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ePortfolio 2005
Transforming Individual and organisational learning
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ePortfolios for Assessment

Mapping capability: lessons learned from providing web-based eportfolios since 2002 through the Managed Assessment Portfolio System (MAPS)

Type: Work in Progress

Session: PS1A

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Abstract

A brief look at the evolution of the web-based eportfolio system developed by TAG Learning Ltd called "MAPS" (Managed Assessment Portfolio System). Starting with the initial reasons for developing the solution - particularly as articulated by Worcestershire Local Education Authority - the paper goes on to describe how the system then evolved and gives examples of observations and lessons learned from use of the system, finishing with a summary of next steps.

Key words

eportfolio; formative assessment; ICT; moderation; transition

In 2001 Will Wharfe and Karim Derrick of TAG Learning began working with a far-sighted team of teaching advisors based in Worcestershire Local Education Authority in the UK (Dave Thomson and Jane Finch in particular) on an ePortfolio assessment system. The focus of the system was two-fold:
i) to help the learner reflect on, understand and improve their own performance;
ii) to help educators share best practice in terms of making valid assessments of learner capability and hence also improve both the learner's performance and the teacher's performance.

From the research carried out by TAG and the Worcestershire team (and building on previous research by TERU at Goldsmiths in the 1990s) the system we called "MAPS" was born. "MAPS" stands for "Managed Assessment Portfolio System" and the emphasis in the MAPS approach has always been learner-centred and on trying to support a formative assessment process which helped both the learner and educator to grow. Apart from designing and developing the software, Will Wharfe and Karim Derrick have had a very hands-on experience of implementing ePortfolios: training teachers and teacher advisers, developing support materials, observing pupils, working with awarding bodies - and yes, providing some of the telephone and email support as well.

1. Why

1.1. Overview of the UK Curriculum - the need for an e-portfolio system to support ICT assessment

All UK schools are required to provide portfolios of pupils' work in ICT (Information and Communications Technology – which is a compulsory core subject in UK schools). To date these have mainly been physical portfolios of printouts of computer-based work. Schools have a statutory duty to assess the level of
ePortfolios for Assessment

attainment in ICT of every pupil - and specifically to do this at the end of Key Stage 2 (year 6) and Key Stage 3 (year 9). Schools are expected to be able to support their assessments with evidence in the portfolios.

In 2001 Will Wharfe and Karim Derrick of TAG Learning began working with a far-sighted team of teaching advisors based in Worcestershire Local Education Authority in the UK (Dave Thomson and Jane Finch in particular) on a web-based ePortfolio assessment system to support assessment of ICT in Key Stage 3. The Worcestershire team approached TAG because we had developed a stand-alone portfolio system previously (Portfolio Builder). Amongst the problems that they wanted to solve were the following:

1.2. Moderating teacher assessments

Each year they ran a conference with the ICT Coordinators from Worcestershire schools to discuss assessing ICT capability and to help bring consistency to the assessment across Worcestershire. However, each year there seemed to be just as much disparity between assessments as the previous year - so they were looking for a way of sharing knowledge and expertise in assessing ICT year round - with the hope that this would aid understanding and so improve consistency in assessment.

Aiding transition of pupils and their work from school to school

The Worcestershire team also found that there seemed to be a dip in progress in ICT by pupils in the year they started a new school. With a local education system featuring middle schools (involving transition from junior to middle and then middle to high school) the Worcestershire team were keen to see if a web-based system could help by allowing the teacher at the new school to be able to view the work the pupil did the year before and so have a clearer idea of the pupil's capability. This would help to counteract a tendency by teachers to underestimate pupil's capability when they came to the new school - and so set them tasks that did not stretch them and move them forward.

Making the assessments using the digital copy, not a paper copy

There was a fundamental question about the validity of an assessment of ICT capability using a printout alone. For example, where the work produced by the student is a multimedia presentation, a spreadsheet used for modelling, a database or a website - can you really use a printout to make a valid assessment? The view was that an assessment was more likely to be valid if based on a teacher viewing the actual, digital, file.

Making the data more accessible

There are often problems with school networks. If the school's internet connection were adequate then putting the eportfolios on to a backed-up, virus-protected and password-protected server in a secure data centre - seemed to offer a secure and reliable way to store evidence - though we felt at the time that the "if" in "If the school's internet connection were adequate" was a big "if"! But the online version would accessible 24/7 - which could help both pupils working and teachers marking at home... (if both had the required computer and connectivity at home - another big "if").
Assessment for Learning vs. Assessment of Learning

We were interested to see what the impact would be on both the learner and the teacher of a portfolio that would be accessible 24/7. If a pupil's work is put in a filing cabinet and not looked again by the pupil, and only looked at again by the teacher fleetingly at the end of the year then there isn't much chance of it being used in a formative assessment process. But if the work can be viewed 24/7 by the pupil and teacher, then both can reflect on it in a formative process. Could the system be devised to help the formative assessment process? This was against a background of raising doubts about the value and validity of the large amounts of summative testing that goes on in UK schools - where national SATS tests seemed to be soaking up ever-increasing amounts of schools time. If a scaleable web-based eportfolio system could support formative assessment perhaps the amount of summative assessment could one day be scaled back?

Working together with the team from Worcestershire and a number of Worcestershire schools we started developing the web-based system to meet these needs - the system was eventually named the Managed Assessment Portfolio System - or MAPS.

2. How MAPS (the Managed Assessment Portfolio System) works

Everyone who uses MAPS has a MAPS "portfolio". What you see depends on your role: student, teacher, head of department, system administrator, moderator, LEA adviser... and so on.

Our aim is to try to ensure that the system is kept as simple as possible by only showing people what they need to see based on their role. So MAPS is not so much a system based on privileges and permissions, but on what you need to do - a subtle, but important difference, in our view. It has required us to spend a lot of time researching what it is that people in the different roles are trying to achieve - a fascinating process!

In the teacher's portfolio are:

- His/her pupils (we have an import mechanism for mass imports, but you can add pupils manually)
- Assessment tasks. There is a small, focused content-management system built into MAPS, which allows the teacher to combine a series of files and instructions with a set of outcomes. The task and the outcomes can be tagged against the National Curriculum. Additionally there are banks of ready-made tasks for a range of levels.

Having created a new assessment task, or imported one from a task bank, the teacher then assigns the task to his/her pupils - setting a date when the task should appear to the pupils and date when they should hand it in.

When the pupils log in, they can clearly see the task that has been assigned. They open it and can see all the instructions and resources (files, weblinks) that the teacher has uploaded for this task. The pupils can also see the outcomes - either written by the teacher - or imported along with the task (where the task was ready made task).
It's important to remember at this point that almost all MAPS users are being taught in a traditional face-to-face classroom environment. Hence the information in the MAPS task is a reference and a reminder, it is not the "teaching". MAPS is not a virtual teaching environment - it is there to support the teacher, it doesn't replace the teacher in any way. To date we have included no testing elements within MAPS - the assessments are all the teacher's own.

When working on a typical task, students are asked to upload initial thoughts about the task and to upload any planning documents they have created. Then, as they produce them, they upload drafts and finally they upload the finished work.

When they upload work students are asked to indicate which of the outcomes (if any) the file they are uploading is evidence of attainment. Additionally they are asked to comment on how things are going and to reflect on their progress.

There is a messaging system built into MAPS - it permits students to message their teacher about the task they are currently doing - and for the teacher to respond. These messages are then kept as a dialogue alongside the progress of the work - creating a form of process diary - an invaluable tool both for the teacher and pupil when assessing the work at the end of the task.

When a student is satisfied that s/he has finished, s/he presses the hand-in button and indicates which outcomes have been achieved - aided by their previous tagging of files against those outcomes. Students can also write in their own words what they feel they have achieved. Once the hand-in button has been pressed the student cannot alter the work uploaded - though the task can be re-opened by the teacher.

Once the student has handed in the completed task, the teacher can mark it online, seeing all the information about the task, including outcomes, alongside the work uploaded by the pupil - which shows the date and file size.

The teacher can then review the work and the pupil's self-assessment before grading the student. This is then an excellent opportunity for the teacher to understand the pupil's approach to the task and whether s/he has achieved the learning outcomes.

Once the work has been marked, the teacher can opt to put the whole marked task in the school gallery. The task can then be viewed by other teachers, and by other pupils who have already completed the task and had it assessed.

Additionally the teacher can opt to create a copy of a marked task (with the pupil's name removed) and to place it in the school's MAPS moderation portfolio - which is then an archive of marked exemplars - illustrating a given assessment for a given task.

At any time the teacher can review a summary of the class list with all status of all the tasks for all their pupils clearly illustrated - this is particularly valuable at the end of the year, and vital for ICT at the end of year 6 and year 9, when a teacher can look back at the range of tasks by a pupil and form a holistic view of his/her overall capability.

**NB:** for images/demos etc please see [www.maps-ict.com](http://www.maps-ict.com)

### 2.1. LEA (Local Education Authority) Level

Users with the LEA Adviser role can, with the permission of the schools involved, view the tasks, work, assessments, galleries and exemplars in a school's MAPS system. LEA Advisers can also create tasks and share them through the LEA
ePortfolios for Assessment

moderation portfolio (this was a key requirement for the Worcestershire team). Where an LEA adviser sees an excellent task created by a teacher, s/he can (again with the teacher’s permission) import it into the LEA task bank and so share it across the LEA schools using MAPS.

2.2. General Qualifications, Key Skills and beyond

Patrick Grant, from OCR, in his presentation at this conference will be covering our work with them to create a series of bespoke task banks that reflect the coursework mark schemes for units of OCR’s general qualifications. These work almost the same as standard MAPS tasks, but there are important tweaks to aid workflow and usability primarily for the teacher with the task of marking large amounts of coursework. We have also created a separate e-moderation system that allows for schools to submit coursework online, and moderators to view/moderate work online. Having proved the concept in pilots over two years, we are now looking at the possibility of creating an API to allow any eportfolio producer to submit eportfolios to the emoderation system.

We have also created similar task banks for Key Skills and OCR’s CLAIT qualifications that also work with our e-moderation system.

3. How MAPS has been used

We initially piloted the first version of MAPS with 10 schools in Worcestershire in the spring of 2002. Based on a series of meetings with the schools we worked intensively on MAPS over the summer and the first public version of MAPS went online in September 2002. In 2002/3 the majority of schools using MAPS were in Worcestershire - with just under 20,000 users on the system by the end of the 2002/3 academic year. MAPS is now used in over 30 LEAs - some just trialing MAPS, others, such as Sheffield and Warrington, using it across the LEA. There are over 70,000 registered MAPS users.

January 2003, MAPS only supported Key Stage 3 ICT (the Key Stage 2 module was introduced in January 2003) hence the usage of MAPS in 2002/3 was predominantly in Key Stage 3. Usage was very varied. We saw some schools using the system very intensively - using it effectively as a web-based file storage system (at the time they had 15 MB per pupil, 30 MB per teacher; we now offer 200 MB per pupil and 200 MB per teacher). However we saw other schools using the system very gingerly - with just “best work” uploaded without drafts or comments. We even saw one school where the system was really just used as way of scheduling tasks and recording marks - with no work uploaded at all.

The system initially had task outcomes written in teacher speak - but we soon realised that it would be better for all involved if the task outcomes were written in a way that children understand. Once we had done that we also realised that it would be better if the children could initially assess themselves against these outcomes.

There was a very mixed reaction to having the outcomes viewable by the pupils. The LEA advisers were very much in favour (and the team at Worcestershire spent many an hour helping us write levelled, pupil-friendly outcomes), but the teachers were sometimes in favour sometimes wary and sometimes hostile. The main reason to the opposition to showing the outcomes seemed to be rooted in a worry that parents would have a way of querying grades. These teachers worried that if a child logs on at home and shows the work and grades to the parent... with the files being there and the outcomes clearly defined, the parents could check the teacher’s marking.
ePortfolios for Assessment

Experience has shown however, that these worries never really materialised and as the benefits of pupils understanding what they need to do to get a grade are seen to outweigh the need to justify grading to parents.

After the first year of using MAPS the average ICT level in Worcestershire for year 9 pupils in ICT actually went down slightly. This was just because the transparency of the new system enabled the LEA advisers to work with teachers to standardise levelling - and the reality was that teachers had been previously levelling a little generously. It wasn't a major change but it did illustrate how useful an eportfolio system could be for managing educational support across an LEA. The Worcester team have made extensive use of both the LEA task bank - and the LEA moderation portfolio - to share and illustrate good practice.

One of the first schools to use MAPS was Ridgeway Middle School in Redditch, Worcestershire. The school covers years 5-8 and the ICT Coordinator there, Helen Wilkes used MAPS to support ICT throughout 2002/3. Helen Wilkes, together with Jane Finch and Dave Thomson from the Worcestershire LEA advisory team won the Becta ICT in Practice Award for Innovation and Change in 2004. You can see details about how they used MAPS at:

http://www.becta.org.uk/corporate/display.cfm?section=21&id=3220

In the movie recorded for the award, Helen makes the point clearly that seeing the work that children completed at the school prior to coming to Ridgeway made it a lot easier to gauge their ability.

In schools using MAPS in Worcestershire, tasks have been designed to help bridge the gap between schools - an innovative use of MAPS which shows its potential in the hands of the professionals!

An analysis of hourly usage in typical month of MAPS use during February 2005.

Figure 1 - 24/7 usage

Although the bulk of usage is during school hours, there is still a significant amount of usage in the early evening. In fact there's a secondary peak which occurs at 6 pm - clearly someone's doing their homework! The usage at 6pm is about 25% of the usage during school hours.

In schools where ICT is taught through other subjects, the fact that pupils can be told about a task during a lesson and then left to complete the task in other lessons/ at home etc has proved a useful feature:

"Our OCR ICT GCSE short course results for last year are much better than before (92.5% A* to B). Much of this can be attributed to improved collection of work through the Internet. We have year 9 groups who get one double period (70 minutes in total) every two weeks and the ability to maintain the on-line portfolio has made a big difference. It reduced the issues students had handing in work to staff and improved and significantly speeded up any feedback to students. MAPS played a big part in this achievement." (George Rouse, King Edward VI Camp Hill School for Boys, Birmingham)
Note: we queried why the results were so much better - George's response was that, among other factors, an eportfolio system like MAPS does not limit what the pupil can do - whereas previously the paper output limited their ability to show off their ICT abilities. The simple fact that they know the digital work they create will actually be seen by the person marking the work, seems to have had a surprisingly powerful motivating effect on the students.

It seems that the importance of 24/7 access seems to have a greater impact the older the students:

"The introduction of MAPS into the school has really helped in the teaching and assessment of ICT.
One of the most noticeable areas of improvement is in the KS4 GCSE course. It has enabled short, achievable deadlines to be set with students having ready access to information that helps them with the completion... MAPS has also helped in many other aspects of ICT teaching, such as allowing students to continue with a project easily even if the regular teacher is not available."

(Adam King, Newlands School, Windsor and Maidenhead)

Adam also mentioned that the fact that the work was secure and backed up also motivated the students because they could put their heart and soul into the work without worrying that it would get lost/deleted.

Oxford and Cambridge and RSA (OCR)

We have worked with OCR since 2003 to research the feasibility of using MAPS as part of an online moderation process. We have developed an emoderation system, which allows moderators to view coursework submitted from MAPS. The idea ultimately is to create an emoderation system that can accept (using an API) eportfolio submissions from any compliant system. We have also developed a Qualifications Management System that allows qualification specifications including all criteria, units and mark schemes, to be rapidly imported into MAPS - so creating MAPS tasks which have been "tagged" ready for the collection and marking of coursework materials. In trials, MAPS users coped with the trial qualifications system very well - perhaps because the fundamental structure is the same - with the mark schemes replacing the learning outcomes.

4. Lessons Learned

4.1. Evolution of the project - new relationships with users

The people who use MAPS: teachers, pupils, advisers - they regularly let us know what they like and don't like. However, it's not just a simple process of doing everything that everyone asks. It's a delicate business of balancing different kinds of user and different ways of using the system. We're in a constant dialogue with a range of users - but we aren't in a process of rapidly changing the system. If we did that we would bewilder all the new and less expert users.

The biggest single lesson learned is: "Don't forget or underestimate the journey that a user may have to go through before they become fully familiar with your system". It's all too easy to assume that people who use your system use it a lot. But, for example, most schools teach about 1-2 hours ICT to each class per week... and so it can take time for people to adapt to the benefits of using eportfolios: they may carry on printing out stuff "just in case" for some time! The challenge is to produce a
system that has the sophisticated features demanded by regular users without frightening off the new user.

4.2. Changes in working practices
From the start we designed the system so that all MAPS users had a "portfolio". However, we have now begun to see the teacher's MAPS portfolio being used as a Continuing Professional Development (CPD) tool - and as in itself evidence to support promotion and/or threshold payments. Over the next year we will be developing the CPD aspects of the teacher's MAPS portfolio much further.

4.3. "Portfolio" model versus "Extranet" model - strengths and weaknesses
Many schools have extranet type systems, however the feedback we have is that it is more time consuming to set them up as portfolio systems - and that work has be done afresh every year. The eportfolio system won't do everything that an extranet does - but it does seem to be a very easy and efficient way to organise evidence/coursework. Perhaps the lesson here is that you can't get a single system to do everything AND be easy to use. Our user feedback is almost all positive, but perhaps that's because it's also a very focused system in terms of functionality.

4.4. The key factors in getting users up and running quickly
- identifying stakeholders, and their needs
- identifying and eliminating barriers, one by one
- collaborate, innovate, integrate - three steps to making my system our system - and hence easing the process of adoption and ownership
- providing helpful support, training - which evolves with the system - it all needs to be updated with each version.

5. Next steps
We are currently in the process of integrating qualification specifications into the MAPS task banks, so that MAPS will ultimately be able to be used to support coursework in any qualification. We are developing an online forum for MAPS teachers - with the ability to share and comment on task resources nationally - not just within an LEA. We just launched the module of MAPS that supports online submission of OCR's CLAiT suite of IT qualifications. This year we will be looking at ways to enable students to express themselves more/ customise their portfolios more - and to use blogging/ RSS features. We are also looking at the best ways to provide an "institution-free" life-long eportfolio - which will allow the student to keep their MAPS portfolio after leaving school or college. Aside from CLAiT we are currently exploring adult education options with the Scottish Qualifications Authority - for example their PC Passport qualification.
Abstract
In this communication it will be presented an initial experience based on the design, implementation and evaluation of an ePortfolio, as a tool addressed to the learner, for his or her learning and for being assessed in higher education from the psychopedagogical perspective. It will be shown and discussed the pedagogical model created with this objective and the results obtained through it. The conclusions will be able to contribute the empirical research for improving the new styles of learning with digital portfolios.

Key words
Digital Portfolio, Electronic Portfolio, Higher Education, Virtual Learning, Alternative Assessment, Quality Learning

1. Introduction
Electronic Portfolios (or digital portfolios) are considered one of the assessment tools that are improving the quality in the processes of learning in the universities. In our European context, with the recent construction of the European Space of Higher Education, this educative innovation, addressed to new forms of assessing students in universities, is not only showing results that are increasing the quality learning product of the learners, if not also the motivations and engagement to the learning and acquisition of knowledge (based on conceptualization, procedures and attitudes).

However, the way in order to re-focus the central aspects of education and then evaluation are starting to be studied and implemented in our universities. It is in this context and situation where the ePortfolio has a place and role, for this and other reasons (like enhancing our literature and knowledge about this educative innovation) it is important to do more empirical research. This is one of our aims too, and our motivation to do an empirical research in the topic as a learner instrument for his or her learning and assessment, following the objectives of autonomy framed in our European educative politics and our socio-constructivism paradigm of education, based on Psychopedagogical perspective.

From the perspective of the learning and the learner, the purpose is improving their knowledge as future professionals and lifelong learners in the present European and international society, where the role of Information and Communication Technologies (henceforth “ICT”) and the future “long life learners” are central aspects of their professional lives. One good example about this methodology in our context, it is the well-known European Language Portfolio (henceforth “ELP”), which constitutes one of the European instruments for promoting the new characteristics that are addressed to the learner (technological skills, communicative skills, organisational skills, reflective and critical skills, in resume: to be an autonomous learner) with the objective of promoting the teaching and learning of foreigner languages in order to promote the plurality in linguistics and intercultural education.
Furthermore, digital portfolios have the potentiality to facilitate an assessment instrument and methodology that is reflecting easily to the learner and his or her teacher the advances done during a period of time, and offering the advantages that ICT is giving to education. The ePortfolio, at the same time is guarantying the privacy of the student and his or her creation, and promoting other aspects that could not be cover by traditional methodologies of assessment. Moreover, it is giving to these participants (the learner, the teacher/s and the peers) the opportunity for: guiding the process of learning in virtual learning environments, increasing the technological skills and the traditional area of reflection, and sharing the knowledge while communication with other e-portfolio’s owners, with the objective of improving their own knowledge.

2. Empirical research

As it is mentioned above, the motivation of researching in ePortfolios as a leaner tool for his or her autonomy has been to understand how from an innovative pedagogical perspective this instrument and methodology can help to students in order to learn with different parameters, knowing better how is their process of learning, introducing the ICT in their educative practice as a mediation of his or her processes of learning and, above all, to focus this activity in their assessment.

For doing this it has been necessary to design a good model created from good practices and experiences published in our literature and to do a previous descriptive research on pedagogical criteria (López, 2004). Both researches and our experience in introducing ICT in Higher Education has create a model of ePortfolio for our university, in order to be addressed to learn and assess, also, the research it has worked with another ePortfolio experienced studied based almost on the same background and objectives but with another virtual learning environment (henceforth “VLE”) and instructional design. Both examples have been implemented in the “Universitat de Barcelona” (Spain) and the “Universitat Autònoma de Barcelona” (UAB). It has been developed eportfolios for different subjects, students, levels of learning in university, teachers, instructional practices, virtual learning environments, etc. They have formed a complex and large study case analyzed and published soon by the author.

For developing this study case, it has been necessary to elaborate a set of actions for planning the strategies that are implicit in this alternative methodology of assessment, as an authentic learning assessment. It has been necessary to attend the technological aspects, and above all to highlight the instructional aspects of the products and processes of this instrument. This last activity has been done by teacher’s team in order to detect what elements of the model of a digital portfolio must be re-adapted in relation to cover the methodological needs of this educative and evaluative innovation, which will be addressed to a specific learner.

3. International models

At the international level different eportfolios are being design and implemented in educative context, above all in higher education. There are private platforms (as in the case of VLEs) and other made by the own university which use this tool in their processes of learning, usually for recording the achievements of its students. Unfortunately few open initiatives have been developed in this field, but they exists and groups as ElfEL promote the study of this educative innovation.
The case of the “Open Source Portfolio Initiative” (well-known as “OSPI”), with its last version 1.5 (see figure 1) developed last year by Open Source Portfolio Initiative (URL: http://www.theospi.org/), in its concept represented one of the future lines to follow for using an ePortfolio as an open source.

In its technological conceptualization, it presented an adequate format to be used as a digital portfolio for students at the university level: simple, structured by functionality (“enter”, “share” and “view”). But its structure of data was to much close, rigid and hierarchic. For example, “ENTER” option was too much address to a North American system of higher education.

However, it was simple and easy to learn and it used a pedagogical tool. It offered to the learner a personal web-based platform as a portfolio, where the student could include his or her personal information, artifacts and reflections having the possibility...
ePortfolios for Assessment

of sharing this content with others (the teacher, peers and other advisors. They only
used their emails and selected the components to be shared..

On the other hand, digital portfolio is not only an instrument to be used
independently. The traditional portfolios were shown in the eighties in U.S.A. for their
pedagogical potential as a new methodology for teaching, learning and above all
assessment, in the field of teachers training as an accreditation about its practice and
for professional promotion.

Portfolios are acting from the main step to instructional design, above all when they
are used as course portfolios. Moreover, in this kind of portfolio the focus in the
processes of teaching and learning is in the learner, demanding a new role to the
student being more active and promoting his or her autonomy. The students are seen
as a producers of their own knowledge thanks to its alternative methodology and they
used facilitated by the teacher and peers. Portfolios can show the student
competences achieved during a course, they also reflect to the student the learning
achieved to him or her and to his or her teacher (this has been proved by the “ELP”).

Furthermore, this new situation is demanding from the student more responsibility,
managing his or her advances, making decisions in order to progress and being
assessed, and being more conscious of his or her own learning. This is possible
thanks to the mediation of a teacher (or team of teachers) that are facilitating their
acquisition of learning. Another advantage of eportfolio is the use feedback to assess
the

student over the course time. This can be accomplished in class or forums while
giving the instructional advices in group and resolving doubts, etc. These and other
strategies take part in the virtual learning environment of the digital portfolio.

4. Our case study

It’s a fact that digital portfolios are appearing massively in universities recently,
sometimes without taking too much in account their pedagogical implications as an
alternative methodology of assessment addressed to learner and, not only to
institutional interests. In this moment there are few open source initiatives and more
private platforms that are being developed for this and other levels of formal
education.

Usually what is happening is that digital portfolio is developed in a virtual learning
university environment based in the learning components that they consider
important to include, as an institutional electronic portfolios or independent digital
course portfolio for special courses, as is happening in our context.

In our context, some Catalan universities are staring to use portfolios. A good
example is the case of “Practual” (see figure 3) from the “Universitat Autònoma de
Barcelona” (UAB). It started in the academic course of 2003-2004 (Monereo,
Sánchez & Sanz, 2004) and it is a system of digital portfolio oriented to their students
of Psichopedagogy career, which are making their practices in a real context outside
the campus and at the same time are participating in this virtual learning environment
for constructing their own digital portfolio to be assessed in this course.
Another case well studied is our experience in digital portfolios in the “Universitat de Barcelona” (UB), where we are using a virtual learning environment designed for supporting the student in his or her digital portfolio (see figure 4). We are using it in some subjects with our students, taking care of the pedagogical components of its alternative methodology of assessment, and its implementation is being researched (López, Rodríguez & Rubio, 2004).

The ePortfolios were created by teacher teams adapting an open source VLE to the structure and functionalities of digital portfolios for university learners, based on the pedagogical criteria developed for the author (López, 2004). All the content was adapted to the assessment of learners in learning by tasks, like the ELP experience, promoting the procedural and conceptual knowledge, and the reflection in the progress of the learner. The preparation of the implementation of ePortfolios required a well studied and complex planification, because not only the instrument were designed and constructed, but also the methodology was adapted to the eportfolio and to the students. For this first academic year of application, university faculty was selected as experts in teaching with ICT, with theoretical and empirical background in traditional portfolios with their students, and open to educative innovations.

All the resources prepared for this application were digitalised:

- ePortfolio platform, available by Internet (see figure 4)
- ePortfolio digital guide for the students, available by Internet (see figure 5)
- ePortfolio material for developing the learning products (artefacts and reflections)
The own ePortfolio was incorporating some of the VLE specifications in order to guaranty online support to students, but above all the main pedagogical characteristics of a digital portfolio.

- A section of participants (“participantes”), in order to know the group-class
- A section of a calendar (“calendario”), in order to help to student to organize his or her process of learning and assessment
- A section of common resources with the online guide of the ePortfolio, assessment criteria, materials, forum, etc.
- A set of sections with their numbers in order to show the activities, everyone with its artifact (“trabajo de la tarea X”) and its correspondent reflection (“reflexión de la tarea X”), except the first that was reserved for the résume or curriculum vitae and the last one for the overall reflection of the eportfolio as a tool of learning.
Other universities are working on it too and in our country the interest in this educative methodology is starting above all as a teaching innovation, not as a tool for promoting the learner and its learning. The same is happening with other new active methodologies that are starting to be used these last years. The reason is because all of them are offering new approaches to the processes of teaching and learning, in our case with the use ICT.

5. Results

Our results are showing that ePortfolios with this model are educative digital tools that are starting to show that it could improve the quality of learning and promoting the learner autonomy, from a co-constructivism perspective.

The aim of this communication has been to provide a brief view of “digital portfolios” in higher education in general and more detailed in our context. The tendency of digital portfolios is to be more orientated to the learner and his or her new role as a more active and autonomous student. The individual and social aspects of learning are taken care of usually with a constructivism perspective.

In general, it is considered one of the assessment tools that are improving the quality in the innovative processes of teaching and learning in universities. However, its application is not an easy task because it demands from the academicians design and implement the different components (human and material resources) for the new forms of teaching and learning with technologies or, in some cases, at distance in our campus-based universities.

6. Conclusion

The aim of this study case has been to provide an applied research based on basic educative research about effective e-portfolios developed in a virtual university
learning environment based in all the learning components of the modern theories of learning. It will be done a reflection about its use for enhance the learner autonomy and to give elements for innovating the teacher education in higher education and the lessons learned with these experienced developed in the recent academic course 2004-2005. Then, it will start a discussion about the main aspects to highlight in order to continue the research for improving the learning and assessment digital portfolios.

7. Bibliographic References


8. Acknowledgements

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Abstract

Ensuring the validity, robustness and reliability of assessment is essential in developing and maintaining qualifications to ensure that students achievements are recognised as formal, qualitative AWARDS.

The use of e-portfolios allows qualifications to be changed to focus more on the actual core of what needs to be assessed, rather than peripheral efforts to record and administer students work. The emphasis on transcription and accounting transfers to one of justification and reflection, with the use of digital media, enriching the range of evidence presented.

However, maintaining standards in a rapidly changing environment is a challenge during this period of transition.

OCR’s approach to the use of e-portfolios is to maintain our integrity, as an Awarding Body delivering quality assessment, and to ensure that what changes is for the benefit of the candidate; the assessment remains appropriate, fit for purpose and does not increase the workload of those involved.

Initial trials have proved that standards can be maintained for paper and ‘e’; enabling us to design and deliver innovative qualifications to meet the needs of the learner whilst ensuring that the achievements can be recognised, and are comparable, to existing qualifications.

In addition, for the student and the centre, the adoption of the e-portfolio should not just be an area to store work, it should be an environment that contains the qualification, the materials, the learning interaction and the assessment itself.
Social Inclusion and Accessibility

The use of e-portfolios for social inclusion: What counts as valid evidence?
Session: PS1B
Type: Full research paper
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Abstract:
There are several e-portfolio projects that explicitly seek to contribute to the social inclusion of their target groups. This paper seeks to open discussion on what might count as valid evidence that the use of e-portfolios actually enhances the lot of disadvantaged individuals. It engages in some conceptual groundwork necessary for identifying key indicators of a positive relationship between the use of e-portfolios and social inclusion, specifically in the area of participation in education. Three qualitative indicators are suggested and a corresponding research design outlined.

Key words:
Education, evidence, learner identity, personal development, qualitative indicators, social inclusion.

1. Introduction

Some of the key social concerns of our time are the deepening of old social divisions and the emergence of new forms of inequality relating to the penetration of ICTs in many spheres of society (see e.g. van Dijk 2005 and Wilhelm 2004). The electronic portfolio community\(^1\), or at least some segments of it, are increasingly tuning in to this problem area. We are becoming aware that the electronic portfolio (hereafter e-portfolio) as a new technology has the potential both to increase social exclusion and to contribute to the enhancement of social inclusion.

Currently in the planning or pilot stage, there are several e-portfolio projects, the explicit aims of which are to harness the e-portfolio for empowerment of disadvantaged individuals. These projects tend to have been initiated, and are managed, by teams of people based in one or several education institutions, although some have government, corporate and/or civil society organisation partners as well. One project encompasses e-portfolio pilots to support disenfranchised young adults in acquiring key-skills and managing their own learning (EiFEL 2005). Another project is employing an e-portfolio tool with the aim of raising the self-esteem of 14-16 year old students from non-academic backgrounds by recognising and recording their informal learning achievements. This would encourage them to continue their education beyond the compulsory school leaving age in colleges and universities. (Smallwood et al. 2005) A third, proposed, use of the e-portfolio involves seeking to enhance the recognition of formal and informal learning, i.e. hard and soft skills, of

\(^1\) The e-portfolio community comprises of people who define, design, develop, implement and evaluate electronic portfolio applications and related human processes in any institutional context across the world.
adults with learning difficulties, allowing those individuals and their case workers to develop a holistic picture of them. It is hoped that this will ensure that their training and work becomes progressive as opposed to being “a repetitious cycle of short-term low-paid employment with little chance of self-improvement”. (Willis 2005) A fourth project is geared towards ‘isolated learners’, where the target learners may be socially and/or geographically isolated. The project will evaluate the potential of the use of e-portfolios to contribute to raising such learners’ awareness of educational opportunities, and encourage and facilitate take-up. (Mahoney et al. 2005) There have also been plans to introduce e-portfolios to support young offenders.

In light of the fact that there are a few existing, and several forthcoming, attempts to use e-portfolios as facilitators of something we tend to call ‘social inclusion’, it is appropriate to turn our attention to the question: “What evidence do we have that e-portfolios are making a contribution to broadening opportunities and social inclusion?” Ideally, the aforementioned projects do indeed contribute to their target group members lives in the form of enhanced ‘social inclusion’ (to be discussed and defined later). However, it is by no means indisputable what counts as valid evidence in this context, and how to best go about ascertaining it. As Fitz-Gibbon (1999, 33) points out “[k]nowledge is not easily plucked from the stream of existence and social scientists have to offer the sobering suggestion that while ‘What matters is what works’, what matters first is how we find out what works” (see also Simmons 2003). This paper suggests that the appropriate first task for anyone interested in evaluating the relationship between e-portfolios and social inclusion is to provide a well justified answer to the questions: What counts as valid evidence of a positive relationship between the use of e-portfolios and enhanced social inclusion, and how to go about attaining such evidence? The objective of the research paper is to open the discussion on this question.

2. **Defining concepts and setting parameters**

We have set ourselves the task of providing a persuasive answer to the above, two-fold question. This section specifies the question in several respects and sets the parameters for our inquiry by critically examining and defining the key concepts and phrases entailed in the question.

Firstly, the phrase “the use of e-portfolios” is employed here in the sense of “engagement in a supported e-portfolio process” as opposed to engagement with any e-portfolio application in isolation, i.e. without accompanying human interaction. E-portfolio tools vary, but even particularly user-friendly “developmental applications” (Home & Charlesworth 2004) are unlikely to bring much added value to the types of users we are concerned with unless their use is embedded in a pedagogic context such as personal development planning (PDP). The notion “e-portfolio process” connotes that engagement with an e-portfolio tool is not a one-off event but takes place over a period of time. When speaking of any human or social process, however, we are obliged to specify the substance and purpose of such process or processes. The concept ‘process’ is in itself an empty signifier. There are many possible reasons for inviting people to engage with an e-portfolio tool. In addition, both the specific aims of such activity and the key functions entailed in various e-portfolio tools differ from each other. Despite this, we might be able to suggest that the e-portfolio process encompasses computer-facilitated activities, the general purposes of which are to ‘develop’ the e-portfolio user, with particular emphasis on the improvement and recognition of his or her specific skills and/or competencies.
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This view on the generic substance and purpose of the e-portfolio process reinforces the conceptual and practical link made by many between the e-portfolio and ‘personal development planning’ (see e.g. Grant et al. 2004). We will return to the concept ‘personal development planning’ in the next section (section 3) of this paper.

We have specified the phrase “the use of e-portfolios” as individuals’ engagement in e-portfolio-facilitated personal development activities, supported by a third person. We are concerned with the relationship between such activities and ‘social inclusion’. But what is ‘social inclusion’ and how do we know when it is taking place? ‘Social inclusion’ and its converse ‘social exclusion’ are broad and complex social phenomena. There is a growing body of literature on what they entail and do not entail (see esp. Hills et al. 2002). In the author’s view, social inclusion and exclusion are embedded in both human experiences (or perceptions of their experiences) and prevailing social structures. Such experiences and structures can neither be easily pinned down nor explored in their entirety in one research paper. As a consequence, we need to limit our inquiry to some sub-phenomenon of social inclusion/exclusion. Doing so requires us to articulate at least a preliminary understanding of what it means to be socially included versus excluded.

In the academic literature on social inclusion/exclusion, there is broad consensus that the state of being ‘socially included’ versus ‘socially excluded’ has to do with any individual’s or group’s degree of participation in certain key social spheres. Burchardt, Le Grand and Piachaud (2002b, 30), for example, state that “[a]n individual is socially excluded if he or she does not participate in key activities of the society in which he or she lives […] for reasons beyond his/her control, and [although] he or she would like to participate”. In Warschauer’s (2002) view, social inclusion/exclusion refer to “the extent that individuals, families and communities are able to fully participate in society and control their own destinies” (emphasis added). In the author’s view, the concept ‘empowerment’ allows the social phenomenon social inclusion (versus exclusion) to be rooted more deeply in individuals’ experiences. Empowerment can been seen to entail an individual’s enhanced sense of competence as a social actor, where competence involves a capacity to participate in society and to control their own destinies.

According to the literature on social inclusion/exclusion, the key activities of the society, in which people are most keen to participate, are production activity, political activity, social activity and consumption activity. Production is seen to comprise of highly-valued economic and related activity, including engaging in paid work, education, training or caring for a family. Prime examples of political activity are involvement in local and/or national decision-making. At the heart of social activity are interactions with family and friends, and positive identification with a community or any specific groups. Consumption activity involves the capacity to purchase goods and services at a level above minimum subsistence. Its sub-dimension, savings activity, comprises of accumulation of financial capital and property ownership. (Selwyn, 2002, 3 & 2004a; Burchardt et al., 2002b) Which of these activities of the society ought we to focus our inquiry on?

We wish to suggest that one of the sub-categories of ‘production activity’ might be the most appropriate context for exploring the relationship between the use of e-portfolios and people’s experiences of being more (or less) empowered. This category or sphere of activity is education. Some may find it puzzling that education
is considered in the academic literature as ‘production activity’. Firstly, the four mentioned key activities of society are broad categories. Secondly, perhaps it is justifiable to argue that education counts as production in the sense that it is about developing human capital and leads to innovations, some of which are commercially viable. Why ought we to focus on education?

Notions of ‘widening participation’, ‘lifelong learning’, and to some extent ‘social exclusion/inclusion’, dominate the current post-compulsory education debate in the UK and wider European Union (see e.g. Warmington 2003). The recent and forthcoming e-portfolio initiatives geared towards disadvantaged individuals and groups derive their social (and financial) justification from this debate. In the UK context, which the author is most familiar with, e-portfolio developments are driven primarily by, although are not limited to, the education sector. E-portfolios are seen as particularly relevant to the Labour government’s 14-19, ‘Widening Participation’ (to higher education) and ‘Lifelong Learning’ agendas (see esp. DfES 2005), but have not been recognised as part of the government agenda on ‘Tackling Social Exclusion’ yet (see Social Exclusion Unit 2005). UK e-portfolio development work tends to be funded directly or indirectly by the Department for Education and Skills (DfES) as opposed to having been taken up in other policy sectors, such as Employment and Social Services (e.g. in the context of the welfare to work policy).

As the education sector (widely defined to include professional training/CPD and lifelong learning) is currently seen as the most appropriate location of e-portfolio developments, we will limit our exploration of the relationship between e-portfolio use and social inclusion or empowerment to education. In this paper, ‘education’ is defined as any learning activities or episodes of learning undertaken in the context of educational institutions, i.e. schools, colleges of further education, universities and other teaching or training bodies. Such learning activities will result at least in the attainment of a proof of attendance. More typically, a successfully completed episode of learning will be recognised through a course certificate, a certificate of an attained vocational qualification, a diploma, a FE or HE degree certificate, and the like. The social activities called ‘education’ and ‘learning’ are so wide-ranging and difficult to pin down that we have chosen to restrict our conceptions of them in this manner for reasons of pragmatic necessity and analytical clarity. It is open to debate whether it would actually be more justifiable to include non-formal and informal learning in the definition as well, as from the individual’s perspective they can be as meaningful and useful experiences as learning taking place in a formal setting. Unfortunately, this debate is beyond the scope of this paper.

We have so far outlined our conception of the phrase “the use of e-portfolios” and limited our exploration of the enhancement of social inclusion to education. The foregoing discussion allows us to specify our research question, which is now:  
What counts as valid evidence of a positive relationship between the engagement in a supported e-portfolio process and enhanced participation in education, and how to go about attaining such evidence? We now wish to draw attention to the remaining important phrase in the first of these two related questions. This phrase is “positive relationship”. (Our second question “how to go about attaining such evidence” has to do with issues of research design and methodological considerations that will be the subject matter of section 4.)

The author prefers to use the notion “relationship” as opposed to “correlation” when referring to how two human processes or social phenomena relate to each other. This is due to the fact that it is difficult to establish a clear, indisputable, unidirectional
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causal link between any two, complex human/social processes, here specifically a computer-facilitated pedagogic intervention and changes in individuals’ participation in education. This paper seeks to put forward a suggestion regarding valid evidence of a “positive” relationship between the two aforementioned processes. We wish to suggest tentatively that if an individual’s engagement in an e-portfolio process (as defined above) occurs in conjunction with an increase in his or her level of participation in education, then there is a positive relationship between the two in the case of the individual in question.

We will need to explore the relationship between the two processes with regard to a reasonable number of individuals, engaging in the same supported e-portfolio process, before we can begin to make conclusions about the potential benefits of the specific e-portfolio process. The conclusions would concern whether only a few, or the majority of, those individuals’ participation in education (to be specified in section 3) was enhanced, if at all. It is suggested here that we may be able to make plausible conclusions about a positive relationship within the confines of individual e-portfolio projects. As the nature of the supported e-portfolio process is bound to vary from project to project, seeking to make generalisations across several or all “social inclusion oriented” e-portfolio projects will be a problematic undertaking. Having said that, we may still be able to establish a general trend, where “social inclusion oriented” e-portfolio projects either tend to make a significant difference to initially disadvantaged individuals participation in education or make very little or no difference at all.

The approach proposed here does not involve construing the use of e-portfolios and enhanced participation in education as an independent variable and a dependent variable, respectively. The latter approach would involve hypothesising that there may be a direct causal relationship between the two, and seeking to establish, or disprove, a correlation between the variables. In addition, it would involve examining a representative (read: large) sample of initially disadvantaged e-portfolio users across most or all existing “social inclusion oriented” projects to prove or disprove the hypothesis. Many philosophers of social science posit, however, that social processes, including human development and action, are influenced by cultural and situational (i.e. space and time) factors, most of which are difficult to discern, and change over time. (See e.g. Hollis 1994) As a consequence, the search for undisputable causal links and correlation favoured by natural scientists is unlikely to be very helpful for us. What we can do, however, is to engage in reasoned debate about the most appropriate indicators of a positive relationship between individuals’ engagement in an e-portfolio process and enhanced participation in education. The next section is a first, tentative contribution to such a debate.

3. In search for valid evidence: Education relevant personal development ‘indicators’

Evidence is an elusive concept. Researchers, including those engaged in educational research, differ on the nature of evidence, and on what might count as valid evidence in particular contexts (see e.g. Simmons 2003). The divergence in educational researchers’ and consultants’ views on what counts as valid evidence derives predominantly from two sources. First, they may hold different fundamental beliefs about the nature of the social world and what can be known about it (ontological beliefs), and by extension about the nature of knowledge and how it can be acquired (epistemological beliefs). Second, there is a tendency to think that the produced
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evidence has to be ‘fit for purpose’, where the purpose and goals of research or evaluation are often defined by its funders and/or primary audiences. However, reports on the outcomes of research and evaluation projects seldom include a section in which the report’s authors engage in explicit discussion about the underlying beliefs that have influenced their judgements about what they consider significant research findings and/or valid evidence of one or the other issue. Evidence or findings tend to be presented as if everyone shared the same, undisputable ontological and epistemological beliefs.

When unpacking the phrase “positive relationship” in the previous section, the author already articulated some of her key beliefs about the nature of the social world and what can be known about it. This section builds on the conceptual groundwork laid out so far, and starts by delving deeper in the ‘e-portfolio process’ and the concept ‘participation in education’. It will then outline three possible approaches to indicators of a positive relationship between the engagement in an e-portfolio process and participation in education, and take sides with, and elaborate on, one of them.

In order to discern appropriate indicators of a positive relationship between individuals’ engagement in an e-portfolio process and enhanced participation in education, it appears important to throw more light on the possible and desirable substance of the e-portfolio process. In section 2, we suggested that “the e-portfolio process encompasses of computer-facilitated activities, the general purposes of which are to develop the e-portfolio user, with particular emphasis on the improvement and recognition of his or her specific skills and/or competencies.” It was also stated that a conceptual and practical link is often made between the e-portfolio process and ‘personal development planning’. The UK’s Quality Assurance Agency for Higher Education has defined personal development planning (hereafter PDP) as “a structured and supported process undertaken by an individual to reflect upon their own learning, performance and/or achievement and to plan for their personal, educational and career development” (QAA 2001, emphasis added).

Interestingly, this widely shared view on the nature of PDP lays considerably more emphasis on ‘planning’ than on ‘personal development’. In fact, the QAA’s view on PDP presupposes that individuals engaging in such a process already possess a positive learner identity, and have developed both a reflective capacity and the ability to engage in future oriented (more or less systematic) planning. Clegg points out that PDP “aimed at the production of autonomous learners who are capable of planning for their own career and personal futures” is premised on capacity for explicit reflection, something which even many HE students find very difficult (Clegg 2004, esp. 287 & 292-293). It appears plausible to suggest that a reflective capacity and the ability to plan cannot be taken for granted in the case of under-privileged learners, non-traditional learners and especially those who do not have a positive learner identity in the first place (cf. Crossan et al. 2003). Thus, the author promotes a ‘developmental’ approach to the substance of the e-portfolio process. In such a process, the enhancements of self-confidence and motivation to learn, and the improvement of appropriate skills and competences, take precedence over reflection and systematic planning for personal future and career. It could be argued that only e-portfolio projects that take such a developmental approach count as a social inclusion oriented e-portfolio projects properly so called. (See Home & Charlesworth 2004)

Our present inquiry is concerned with valid evidence, and does not involve the actual evaluation of any existing e-portfolio projects. For the purpose of this paper, we will
consider the enhancements of self-confidence and motivation to learn, and the improvement of specific skills and competences, as the appropriate key aims and the four positive outcomes of the kind of e-portfolio processes that has the potential to contribute to individuals’ enhanced participation in education. We wish to stress that it has the potential to *contribute* as opposed to the potential or likelihood to *cause or result in* the latter. In section 2, we suggested tentatively that if an individual’s engagement in e-portfolio process occurs in conjunction with an increase in his or her level of participation in education, then there is a *positive* relationship between the two in the case of the individual in question. It appears reasonable to suggest that participation in education on part of disadvantaged individuals could enhance if they were given a chance to develop their self-confidence, motivated to search for and take up learning opportunities, and supported in acquiring the key skills and competences needed for meaningful and successful engagement in learning activities. What do we mean by “participation in education”, and specifically by “enhanced or increased participation in education”?

Specifying the idea of enhanced participation in education is an equally necessary pre-condition for a reasoned argument about the kind of valid evidence we are seeking to establish, as was the definition of the substance of the e-portfolio process above. We defined ‘education’ earlier as any learning activities or episodes of learning undertaken in the context of educational institutions, resulting in the attainment of a proof of attendance, course certificate, a certificate of an attained vocational qualification, a diploma, a FE or HE degree certificate, and the like. Participation in education simply means that an individual is engaging in some learning activities, which fulfil the above criteria.

For some people, “enhanced participation in education” could mean the opportunity and capability to participate in meaningful learning activities for the first time in their life, e.g. in the case of people with considerable learning difficulties or mental disabilities. For others, it could mean gaining the first recognised educational qualification, e.g. in the case of school drop-outs taking up second-chance schooling (see e.g. [http://www.notschool.net/](http://www.notschool.net/)). Yet other people’s enhanced participation in the education might take place by entering a vocational training college or even a university. Adults might be motivated to re-skill to new professions with better employment opportunities after a period of unemployment.

Participation in education presupposes finding information on, applying for, getting accepted to and successfully completing episodes of learning, all of which require a whole host of skills and competencies, not to speak of self-confidence and motivation. In the digital age, finding information on and applying for courses, and undertaking episodes of learning require at least basic ICT skills, i.e. the ability to use the most common computer software packages and to search the Internet. In addition to such operational ICT skills, however, also information skills (the capability to find relevant information in the Internet from superabundance of sources) and strategic digital skills (the capacity to advance one’s aims though the use of ICTs) are needed as well. Van Dijk (2005) calls these the tripartite digital skills. Acquiring such tripartite skills is necessary for becoming a truly empowered actor in society, and in particular for being able to fully participate in education. Apart from the enhancement of self-confidence and motivation to learn, perhaps a supported e-portfolio process could make a significant contribution to disadvantaged individuals’ empowerment in this area. (See Home & Charlesworth 2004) It is somewhat more difficult to see how the e-portfolio process could contribute to the attainment of basic social
competencies needed in education, for example being on time or the ability to communicate effectively orally and in writing. The same applies for specific basic skills, such as reading, writing and logical thinking, although imaginative ways to facilitate the development of such skills through the use the e-portfolio ought to be encouraged.

Keeping in mind everything that has been stated and suggested so far, we can now outline three possible approaches to thinking about the indicators of a positive relationship between the engagement in an e-portfolio process and participation in education.

First, we could argue that we know that a supported e-portfolio process has worked when individuals take up learning opportunities, which they either did not know existed before or would not dream of taking up before due to lack of self-confidence, necessary skills and/or competencies. In this case, we would collect data regarding whether or not someone from a disadvantaged background, who engaged in an e-portfolio process, went straight onto apply for, or even got accepted to, a course in an education institution. If the majority of people who participated in the e-portfolio process under investigation applied and/or got accepted to undertake a formal episode of learning, then there has been a positive relationship between the e-portfolio process and participation in education.

Second, although such one-off statistical data might be helpful source evidence in this context, we could argue that some longitudinal data is needed as well. Namely, it is one thing to apply for and get accepted to undertake an episode of learning and quite another thing to actually start, and most importantly, to successfully finish such an episode. It appears plausible to suggest that only the latter is sufficient evidence of having acquired the necessary skills, competences and motivation to participate in education, as defined above. It should be noted that the development of such skills, competences and motivation over time may not plausibly be attributed to a single process, e.g. ½ year intensive intervention or even a long-term engagement in a supported e-portfolio process. Despite of this, it is important to develop a way to follow the longer-term progress of our target e-portfolio users, i.e. to collect reliable longitudinal data as evidence.

Third, the above two forms of evidence of a positive relationship are statistical data and thus quantitative indicators. Statistical data does not tend to account fully for the kind of complex human and social processes that we are dealing with when considering the relationship between individuals’ engagement in a supported e-portfolio process and enhanced participation in education. Our valid evidence will also, or primarily, need to consist of qualitative data, the attainment of which requires a qualitative research strategy.

Qualitative research is a broad category that some writers define in terms of what it is not. For Straus and Corbin, for example, qualitative research is “any type of research that produces findings not arrived at by statistical procedures or other means of quantification” (Strauss & Corbin 1998, 11). Denzin and Lincoln offer a more positive definition by outlining some characteristics of qualitative research and the data it produces. In their view,

"[q]ualitative research is situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices [...] turn the world into a series of representations including fieldnotes, interviews, conversations, photographs, recordings and memos to the self. [...] [It]
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involves an interpretive [...] approach to the world [...] [where qualitative researchers attempt to] make sense of, or to interpret, phenomena in terms of the meanings people bring to them.

(Denzin & Lincoln 2000, 3, emphasis added)

The word ‘meanings’ has been highlighted in the quotation, because qualitative research is foremost interpretative activity “concerned with understanding the meanings which people attach to phenomena (actions, decisions, beliefs, values etc.) within their social worlds” (Snape and Spencer 2003, 3, emphasis added)

Our inquiry is concerned with the ‘social worlds’ of individuals who are disadvantaged on some grounds and whose participation in education has been, and is, very low. In thinking about what might count as valid evidence that engaging in an e-portfolio process has contributed to positive change, we ought to focus our attention on individuals’ experiences of being (or not being) more motivated, confident, and competent to engage in learning activities than before. The only way to establish how individuals’ experience, understand or perceive themselves, their situation, the opportunities open, and not open, to them etc., is to discuss such issues with them (see Hammersley 2003). In social science research method terms, we need to conduct well thought out, one-to-one semi-structured interviews, or preferably in-depth interviews, with the members of our target group. This methodological approach, and an appropriate research design, will be outlined in the next section of this paper. The remaining task of this section is to specify the key qualitative indicators that we can consider as evidence of a positive relationship between the engagement in a supported e-portfolio process and enhanced participation in education.

We wish to suggest that there are three related qualitative indicators, the simultaneous presence of which counts as valid evidence that the e-portfolio process has enhanced the self-confidence, motivation to learn and some necessary skills and/or competencies needed for successful participation in education.

First, a noticeable change in the use of language to describe oneself has taken place between the initial, pre-e-portfolio process –interview and the later, follow-up interview. Such a change would involve that the individual’s self-conception has become significantly more positive and active. An example of this type of evidence would be that the individual states in the follow-up interview: “Doing the self-assessment exercise in the e-portfolio tool with the support of my tutor made me to realise that I actually had a few useful skills already, something that I did not think I had at all! Now I know that I am a good listener and am good at caring for other people. I have started to think about training as a nurse.”

Second, it emerges in the course of the follow-up interview that the individuals has developed a new pattern of action directed towards self-development in the context of the education practice. Such actions might include asking or independently looking for information on learning opportunities, considering options, making decisions, applying for relevant courses and starting and completing an episode of learning. For there to be sufficient evidence of a new pattern of action, several of the mentioned type of activities would have had to been undertaken.

Third, the individual assigns (ideally unreserved) positive value to learning and participation in education. On the one hand, positive value would be assigned to learning activities designed to develop his or her confidence, skills and competences
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further either through extended use of the e-portfolio or by other means or both. On the other hand, he or she would also view positively to the participation in episodes of learning or formal education (as defined above) now and in the future.

It is asserted here that valid evidence of a positive relationship between the use of e-portfolios and enhanced participation in education, or any other form of enhanced social inclusion, is first and most of qualitative nature. Such evidence is gathered through skillfully conducted interviews with the members of the target group. The prevailing notion of ‘evidence’ in the “evidence based practice” discourse of educational research is predominantly premised on quantitative indicators (compare: numerical performance indicators and randomised controlled trials) (see e.g. Fitz-Gibbon 1999 and Clegg 2005), and thus may fail to recognise the value of positive changes in people’s self-perceptions, generic competences, values and patterns of action. It is difficult to see how individuals’ experiences of being (or nor being) socially more empowerment as a consequence of any pedagogical intervention could be meaningfully quantified. It is suggested that all approaches to evaluating the value of e-portfolios in enhancing social inclusion ought to reflect this state of affairs. It is important to note, however, that although the author finds the approach involving qualitative indicators the most plausible of the three, the two previously mentioned approaches can complement the qualitative approach. On this note, we will turn to the question how to go about attaining such qualitative evidence.

4. Research design

Attaining evidence of a positive relationship between two human or social processes requires us to devise a plausible research design, i.e. to set out clearly how we will approach the question of data collection or generation. The “search for evidence” also involves devising a methodological strategy, including giving a detailed account of the actual research method that we plan to use to “get out” of our material, here interviews with individuals, what we are after. The latter requires a good knowledge of different approaches to qualitative analysis, and the ability to understands their strengths and weaknesses. Within the confines of this paper, it is only viable to outline a possible research design to complement the picture presented so far. The more detailed methodological considerations, and their ethical implications, will need to be taken up in another paper.

It was stated earlier that we need to conduct well thought out, one-to-one semi-structured, or preferably in-depth interviews, with the members of our target group in order to establish how individuals’ experience, understand or perceive themselves, their situation, the opportunities open, and not open, to them etc. In such a study, the sample of individuals needs to be identified well in advance. They would be interviewed for the first time one month or a few weeks before they are introduced to, and start, the e-portfolio process. It will be necessary to conduct at least one, preferably two, follow-up interviews, after a certain period of time, addressing the same topics to establish whether and how the individual’s self-perceptions, motivation, values, goals and actions have changed, if at all.

The follow-up interview would ideally be combined with a one-to-one session in front of the computer, where the respondent explained what he or she had done with, and learned though, the e-portfolio, what she found helpful, and what not, and how she saw the role of the support provided by the tutor. This exercise might give some indication as to which of the changes in the respondent’s attitudes and aptitudes can
plausibly be attributed to the e-portfolio process, and which might be a consequence of general maturing. In order to find out what other experiences and people might have contributed to the individual’s (potentially) changed self-perception, goals, actions etc., the respondent could be encouraged in different ways to tell what significant experiences they have had over the past, e.g. ½-1 year. After all such experiences have been mapped out, the interviewer could probe the respondent regarding what changes in their skills, attitudes and/or goals, and concrete steps they have taken, they attribute to the e-portfolio process and what to other factors. (cf. Perry 1968, 7-10)

Although the outlined research design is likely to yield clues about our three qualitative indicators, i.e. changes in self-conception, actions and values, it would seem wise to conduct an interview with the individual’s tutor as well. Involving the tutor would enable us to cross-reference the information provided by the primary respondent. I would also allow us to seek validation for our initial “hunches” about whether the engagement in the e-portfolio process has made a significant difference to how the individual now experiences themselves, or not.

We have briefly outlined a qualitative research design for a study that might help us to shed light into the question: Has the engagement in the supported e-portfolio process contributed positively to specific individuals’ experiences regarding motivation, confidence and competence to engage in education or learning activities?

5. Some concluding thoughts

This paper is only a first attempt to address the question of what counts as valid evidence of a positive relationship between the engagement in a supported e-portfolio process and participation in education. It is an initial road map that will hopefully inspire debate, and lead to other, potentially more plausible approaches to tackling the question of valid evidence in this context.

On the academic side, the definitions and views presented in this paper will need to be embedded better in exiting, relevant bodies of knowledge, including debates in the sociology of education and approaches to (evidence-based) evaluation in educational research. It appears particularly important to examine existing approaches to evaluating learning experiences, in particular in the context e-Learning projects, focusing on what can be learned from previous research in this area and how we could refine it for our purposes.

On the practical side, there is one important question that this paper has not addressed at all. This is: How to tackle the first hurdle of motivating disadvantaged individuals with a negative learner identity to give the supported e-portfolio process a try? Unless “social inclusion oriented” e-portfolio projects are supported in tackling this major hurdle, those who could most benefit from such a pedagogic intervention will remain beyond their reach. While considering the “output” side of e-portfolios for social inclusion, as done in this paper, is important, the “input” side is even more so. Meaningful evaluation of the positive contributions of “social inclusion oriented” e-portfolio projects will only be possible if their intended target users actually engage in the supported process made available to them.
6. References


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Smallwood, A. & other RIPPLL team members 2005: *RIPPLL Project Plan*. Version 4 - 31/3/05 [http://www.nottingham.ac.uk/rippll/]
Accessibility in ePortfolio Architectures: Issues and Approaches

Session: PS1B

Type: Abstract

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ePortfolios are a potentially pervasive means of learners and others recording for themselves and representing to others their learning and achievements. There is a growing interest in them across all educational levels. This paper looks at the issues of how to make ePortfolios accessible to disabled students and others. That is accessible to the authors and editors of evidence of learning included in an ePortfolio and those who need to use ePortfolios to review a student’s learning for educational or employment reasons. The paper argues that the task of making ePortfolios fully accessible would be made much easier by work that has not yet taken place but needs to take place in standards and gathering practices together.

We look at concepts and existing standards work and explain how it relates to ePortfolios. We go on to consider what turns out to be an interesting structural difficulty and propose an architectural model that addresses that difficulty. We finish with a recommendation for the standards work that needs to be undertaken.
Providing a visual tool for dyslexics to build an e Portfolio

Session: PS1B
Type: Abstract

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The development of an e-Portfolio is, for the student, a major planning process, with a multiplicity of threads and shifting foci as their path through lifelong learning progresses. However, the quality of tools available to enable e-Portfolio development does not reflect the variation of tools available for other tasks, nor does it reflect the variation of approaches for different learning styles.

Much work has been carried out in using visual mapping tools, not just to support dyslexics but in the support of mainstream projects and as assessment tools. Visual mapping tools are de rigueur for dyslexic students (and many others) in planning work and associated activities as they better enable them to work in the visual rather than textual domains. A range of commercial tools are available to produce visual concept maps and although they are available at low cost to the HE and FE communities, they are not freely available to all students nor lifelong learners. The propriety nature of the software tools inhibits their integration into more widely developed systems, they are simple desktop tools that read and write files in a limited number of formats that are not necessarily exchangeable.

In the United Kingdom the Joint Information Systems Committee (JISC), are responsible for co-ordinating development of e-learning tools. The V-MAP Project is one of the projects that is currently funded under the e-learning tools programme as part of the JISC ‘Developing e-learning tools’ strand. The aim of the JISC funded development is to “Identify significant gaps in the range of current e-learning tools to support lifelong learning and adapt or create standards-based, open source components to fill the high priority gaps.” Under this programme the software tools are required to follow IMS standards and be released under an open source licence.

The V-MAP project consists of the development of a software programme called V-MAP that is designed to provide students who best work in the visual domain with an alternative interface type to develop a portfolio. A V-MAP e-portfolio is created in a visual form through a visual map-type interface, the purpose of this is that it should be more accessible to dyslexic students than more traditional e-Portfolio tools. V-MAP is in the early beta stages of development and requires software development and data from user trials, pedagogic evaluation and pilot implementations to inform the further developments for the software and to finalise the feature set it contains before the release of development software.

The V-MAP tool enables a learner to create an e-Portfolio presentation by arranging components of their portfolio in a visual form, not dissimilar to a concept map; the purpose being that the student can see how the components of the portfolio relate to one another. The output of the process is an xml document with associated artefacts. The file outputs conform to the IMS e-Portfolio 1.0 standard. The V-MAP tool thus provides the user with a visual representation of their portfolio linking competencies, goals, activities, interests and other portfolio components in a visual map.
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representation. The purpose of the software is to provide the learners with a tool that will:

- Enable the learner to interact with a pre-defined institutional template for preparing e-Portfolios in a format that is most accessible to the learner;
- Enable the learner to plan, construct and update an e-Portfolio through the use of a visual mapping interface;
- Enable the portfolios to be exchanged through a range of standard compliant systems.

We have data from usability testing of the software that provides us with information concerning how users interact with the software. The next stage of the project is to carry out a series of pilot studies across a range of contexts that will inform the future software development and provide us with quantitative and qualitative data concerning the effectiveness of the tool in supporting the creation and development of e-Portfolios. The user studies will be carried out across a wide range of learner groups in further education, higher education and continuing professional developmental contexts. The pedagogic evaluation is planned to provide us with answers to questions around the use of e-Portfolios and the effectiveness of the V-MAP tool in supporting development, including:

- Does the V-MAP software better enable dyslexics to construct and develop an e-Portfolio?
- Does the V-MAP software better enable lifelong learners in general to construct and develop an e-Portfolio?
- How does the user interface change the development of an e-Portfolio?
- Is the software easy to use?
- What issues arise for maintaining V-MAP enabled e-Portfolios, and how can external agencies such as professional bodies engage with the portfolios?

This work in progress will explore the results of our evaluative study, providing us with valuable information concerning the impact of the software tool used to construct the e-Portfolio itself, and the resulting issues around interface design, customisability of the V-MAP tool, personalisation of the individual components of the portfolio and ease of use. We will draw upon both data from the study in terms of use and feedback from the users as well as exploring the richer data from the e-Portfolios developed. Furthermore we expect to discover how the tool impacts upon the orientation of the student and/or the learning context and the result that this has on the e-portfolio development. The evaluation is designed to inform our future software development work. Our purpose here is to see whether the results learned in our study can be extended to the wider international community and inform global developments in design of tools for supporting e-Portfolio development and their impact upon the wider e-Portfolio and lifelong learning agenda.
ePortfolios for Teacher Education

Evolving methods and media for building communities of practice with electronic portfolios in a teacher education context.

Session: PS1C
Type: Work in Progress

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Abstract

Eportfolios are perceived to be important and authentic tools for professional growth among preservice teachers. This paper describes the evolution of eportfolios an instructional technology setting in the USA. It posits that eportfolios are suited to fostering legitimate peripheral participation by providing cognitive apprenticeships to preservice teachers. A content analysis of eportfolios is presented with a view of investigating media and artifacts that are anchors into the technology integration community of practice.

Keywords
Eportfolio, communities of practice, cognitive apprenticeship, situated learning, preservice, technology integration, social constructivist

1. Introduction

As electronic portfolios acquire more importance in educational contexts, instructional technologists and teacher educators consider them effective tools for assisting pre-service teachers in becoming more adept at integrating technology into their own teaching (Wright & Wilson, 2005; Standerford, 1994; Faust, in 1995, cited in Read & Cafolla). To be sure, there is a general thrust by teacher accreditation bodies in the United States such as the National Council for the Accreditation of Teacher Education (NCATE) and other professional organizations to recognize portfolios as authentic assessment tools for preservice teachers (Read & Cafolla 1999, NCATE, 2002; Wright & Wilson, 2005). Such efforts have produced teacher education technology standards that in large part define key competencies and features of how technology integration should occur in the classroom. In a very real sense these competencies preceded the increasing use of eportfolios in assessment in education (Castiglione, 1997, cited in Ramey & Hay 2003; Takona, 2003). They represent important indicators for those who would seek to be involved in technology integration as a community of practice.

This article documents an investigation into the evolution of eportfolios at Florida Atlantic University (FAU) in the Southern USA. Particularly, it focuses on how the methods and media used in the development of eportfolios over the past three years are consistent with preparing preservice teachers to participate in the technology integration Community of Practice (CoP). Furthermore, it investigates through the examination of some one hundred portfolios the design challenges that emerge in developing authentic eportfolios which provide complex cognitive as well as practical problem based contexts for engaging presevice teachers into technology integration.
2. **Theoretical background**

Student electronic portfolios as they have evolved in the department of Instructional Technology & Research at Florida Atlantic University are based in large part on the social constructivist paradigm of providing “cognitive apprenticeships” (Read and Cafolla, 1999; Rodney et al, 2001). The premise of cognitive apprenticeships is centered in situated learning theory or situated cognition (Brown, Collins et al, 1989; Brown, Newman et al, 1989; Lave & Wenger, 1990). This theory suggests that new knowledge exists within the setting in which such knowledge occurs (Lave, 1988). This means that for preservice teachers to take on the complex tasks, practices and competencies that define technology integration they must necessarily become participants in a community of practice in which such activities occur. As Lave (1990) explained,

“In other words, cognition is assumed to be social and situated activity. One learns a subject matter by doing what experts in that subject matter do” (Lave 1990, p.32).

This approach is effective among preservice teachers as it limits inert knowledge by providing opportunities for new knowledge to be transferred and connected to their own careers as teachers in the future (Wright & Wilson, 2005).

Previous examinations of the eportfolio process at our institution focused on the fact that eportfolios are effective devices for giving presevice teachers hands on experiences. Furthermore they are perceived to be an important medium for connecting prior knowledge to new knowledge structures about how to integrate technology into teaching (Read & Cafolla, 1999). An extension of this past approach is the vision that eportfolios are important tools for connecting preservice teachers to existing CoP as well as building localized CoPs for generating new authentic experiences.

A CoP is defined primarily as “a sustained social network of individuals who share a common set of core values and knowledge” (Hung et al, 2005). Technology integration as it occurs through the framework of instructional technology and in general education settings is a prevailing CoP. Preservice teachers move fluidly in and out of this CoP through “legitimate peripheral participation” (Lave & Wenger, 1991) while developing artifacts for portfolios. Much of the portfolios that preservice teachers have created over the past five years at FAU have largely been attempts at connecting them into the technology integration community of practice i.e. a social constructivist framework in which they simulate at best the authentic experience of in-service teachers.

3. **Research on ePortfolios and communities of practice**

Although eportfolios appear to be obvious tools for engendering participation in communities of practice, investigations into the role that portfolios can play in this regard is still developing. To be sure, many professional associations and assessment systems in education view eportfolios as an important tool to induct preservice teachers into the profession. In Standard 1 of NCATE benchmark Knowledge, Skills and Dispositions portfolios are referenced as a valid tool for assessing whether preservice teacher candidates meet “professional, state and institutional goals” (NCATE 2002).
Previous studies on e-portfolio development in pre-service education have focused on a myriad of areas. These include the rationale for portfolio use (Barrett, 2000; Ramey and Hay, 2003), quality or assessment capability (Ramey and Hay, 2003; Walker 2002), publishing medium (Barrett, 2000) typology (Barrett, 2000; MacDonald et al, 2005), and ease of creation (Rodney et al, 2001). Examining e-portfolios as a useful tool in preparing preservice teachers to become legitimate peripheral participants in various CoP continues to emerge (Wright and Wilson, 2005).

Recent studies in teacher education with regards to the area tend to examine CoP from the perspective of social partnerships. Sutherland et al (2005) for example, examined teacher education and university partnerships within the context of CoP. Reid-Griffin et al (2004), examined CoP as a tool for dealing with increased work intensification and efficient collaboration in higher education environments. Hung et al (2005) examined instructional continua and scaffolding as elements of learning within CoPs. Other investigations include the role of Computer Medicated Communications (CMC) in the development of “virtual” CoP for in-tern teachers (Hough & Evertson, 2004).

Elements of a technology integration CoP are not explicitly stated in the literature. Past approaches to the use of eportfolios as tools of authentic assessment in preservice contexts have identified rubrics some of which are effective frameworks for examining how preservice teachers become better integrators of technology. Barrett (2000) derived a research based framework for developing and assessing eportfolios. This framework was “derived from two bodies of literature: portfolio development in K-12 education and the multimedia or instructional design process” (Barrett 2000). This framework identified a five stage process for portfolio development, these stages include:

1. Identify the rationale for and goals of the portfolio
2. Determine & utilize software tools to amass portfolio artifacts
3. Identity and select artifacts for moving to a reflective portfolio
4. Assemble and hyperlink artifacts
5. Record the portfolio to a storage medium and present in a public forum

These five stages coincide with a methodological process and employees various types of computer based software and hardware throughout. Another methodological concern that MacDonald et al (2005) have called a sixth stage is the ongoing use and revision of the portfolio as a professional development tool.

These methodological stages center the development of eportfolios within a particular CoP. They represent the common set of shared values and knowledge which preservice teachers need to take full advantage of portfolios as a source for their own “demonstration of growth over time” (Barrett, 2000). Furthermore, they represent the competencies which novice portfolio developers need to activate “professional growth and achieved competence” (Campbell et al. p.3, ) within the wider technology integration CoP.
4. **Methodology**

4.1. **Unit of analysis**

A qualitative content analysis of one hundred eportfolios created between 2002 and 2005 were examined using an investigator-designed coding scheme. Eportfolios were chosen from the two undergraduate course taught by the investigator. The two courses are targeted towards preservice teachers or inservice teachers seeking State of Florida certification. One course is an introductory course and the other is an applied instructional technology course. Throughout the department all instructors of these courses use some type of portfolio as a tool of assessment. However, not all of these portfolios are electronic although a majority of them are.

4.2. **Techniques for Data Collection**

Eportfolios were reviewed and pre-analyzed using a coding scheme that is grounded in the literature. It was created from discussions by Read & Cafolla (1999), Barrett (2000) and MacDonald et al (2005). Furthermore, the coding scheme is framed around how the eportfolios provide cognitive apprenticeships that allow for legitimate peripheral participation in the technology integration CoP. As is consistent with an *a priori* approach to coding schemes for content analysis (Weber 1990) this approach yielded a professional coding form for conducting the analysis. The following common categories were identified as important elements that indicated that an eportfolio was designed to encourage legitimate peripheral participation in the technology integration CoP, i) development rationale, ii) software applications used, iii) process of artifact identification, iv) complexity & type of portfolio artifacts and v) publishing/delivery & storage medium of portfolios. These general categories were further divided into subcategories. The list below describes the variables used in this coding scheme. As is consistent with one use of the content analysis approach, this coding scheme was designed to identify trends (Stemler, 2001).

Year ePortfolio was made

Development Rationale & objectives

- Teaching Portfolio
- Reflective Portfolio
- Working Portfolio
- Presentation Portfolio
- ISTE or other standards explicitly addressed
- Rationale for portfolio stated

Software Applications

- Basic documents (Word, Excel)
- Hypermedia (PowerPoint, Hyperstudio)
- Advanced Hypermedia (FrontPage, Dreamweaver)

Responsibility for artifact inclusion

- Instructor selected
- Student selected

Complexity & type of portfolio artifacts
ePortfolios for Teacher Education

- Unlinked artifacts
- CoP artifacts level 1: (administrative: lesson plans, flyers, resume)
- CoP artifacts level 2: (instructional: PowerPoint slideshows)
- CoP artifacts level 3: (cognitive: detailed concept maps, metaphors, reflections)
- Free publishing by students
- Video & or multimedia
- Computer programming
- Interface design

Publishing/delivery & storage medium

- CDROM
- Local LAN
- World Wide Web (open)
- www (Content Management or Course Mgt. System)
- Video/DVD
- CDROM & WWW

5. Findings

There were a number of positive findings indicating that 1) eportfolios provided experiences that helped students to learn and integrate different types of software into their range of skills, 2) some types of software was more likely to result in portfolios that are consistent with new trends in teacher accreditation and creating reflective portfolios, 3) that eportfolios with explicitly stated rationales and or defined applications of professional standards were more organized and easy to navigate, 4) eportfolios provide a space for learners to infuse their personal and cultural experiences into their educational experience.

A common finding was that all of the eportfolios investigated had artifacts that are used in the context of technology integrated teaching at various levels. These ranged from artifacts created with productivity applications such as rubrics created in a word processor or grade sheets prepared in a spreadsheet application. All portfolios had some type of slideshow presentation. In general office productivity software such as those of the Microsoft Office Suite or the Open Office suite was used to develop these artifacts in all the portfolios. These types of artifacts supported the overall rationale of portfolio development which is to show professional growth over time (Barrett 2000; Takona 2003).

The use of the slideshow presentation applications were however re-purposed in some cases (n=16%) to develop hypermedia activities such as games, puzzles and other types of learning activities (fig.1). Instructional theorists have argued that the use of hypermedia artifacts allow teachers to see technology tools as more problem based and cognitive. Jonassen (2000) describes this use of hypermedia as “mindtools”. Roblyer (2004) sees hypermedia that uses branching, cross-linking, authoring and editing of multiple media along various typologies. Authoring types of hypermedia allows for greater “cognitive amplification” among learners. By using such approaches, our portfolio experience extended these basic presentation tools beyond their traditionally linear application. In this type of application users navigate through the artifact via a menu driven user interface. Preservice teachers engage in the design of the interface and the sequencing and programming of hyperlinks. In the
example below a game for pre k-1 is was designed using this approach. A student selects the number of objects on the screen by clicking the corresponding number at the top. A corresponding slide opens that indicates if the student’s choice is correct or incorrect through the use of visual cues and sound clips.

Another interesting finding was that some types of software were more likely to result in portfolios that are consistent with new trends in teacher accreditation and creating reflective portfolios. One set of 16 portfolios showed how portfolios developed with a certain type of software produced more professional outcomes. These portfolios were developed as a test for responding to the need for an electronic portfolio tool that assisted with the aligning of eportfolios to National Council for Accreditation of Teacher Education (NCATE) standards. A number of commercial eportfolio packages were evaluated. These included Collegelivetext (www.livetext.com), TaskStream (www.taskstream.com) two of the more popular products in the higher education arena. It was decided to run a full pilot of livetext and about seventy eportfolios were developed in the application. Of these this investigator’s students produced 16. As Barrett (2000) reminded us and MacDonald et al (2005) concurs “software used to create the portfolio can constrain or enhance the process of the final product.” (McDonald, et al, 2005, p.54). These livetext portfolios were exceptionally reflective. Due to the nature of the livetext package all of the portfolios developed had reflections throughout. Student artifacts were more likely to contain alignment to ISTE and other professional and curriculum standards. Furthermore, the portfolios had explicit statements on why they were developed and how they were to be used. These reflections are important and compelling in portfolio development as reflections give the student an opportunity to articulate the linkages between theory and practice (Santora, 2005).

These portfolios though not as fluid or student-centered in their design, as our traditional eportfolios, certainly were more targeted towards stated professional goals. Students were not able to engage in extensive interface design, hyperlinking and general artifact design due to the constraints of the software package. However their reflective statements attached to various artifacts revealed that they had some detailed connection with the professional standards and competencies that leads to better integration of technology into teaching. This is consistent with other eportfolio
Studies which support the use of reflective statements as scaffolds to student learning as well as participation (Takona 2003; Santora 2005).

E-portfolios with explicitly stated rationales and or defined applications of professional standards were more developed with regards to interface design. In 37 cases the purpose for the portfolio was stated at the outset within the portfolio. These e-portfolios ranked highly on the interface design aspect of the coding scheme. They were more organized and navigation schemes were easy to understand and use. These portfolios tended to foster the use of cognitive maps or tables as tools for navigation that allowed the user quick access to the artifacts within the portfolio. Although, in general all of the portfolios were highly developed the rationale statements indicated that students had formed an important cognitive link between the theory behind the portfolios development and the practical purpose for its use.

It was also found that students used e-portfolios as a space to infuse their personal and cultural experiences while learning to integrate technology. In 50 of the e-portfolios there were references to students’ cultures and international experiences that shaped their lives. Students took on this approach in two ways. On one hand they used reflective statements as a space for sharing biographical anecdotes. On the other they developed artifacts that were descriptive of cultural roots. These included digital stories using slideshows and video production software as well as learning activities such as interactive digitized presentations on the March on Washington, classroom procedures and popular poems or songs from ethnic folk tales. This to an extent was a revealing finding because it provided insight into how e-portfolios can provide for engagement and personalization in the heavily standards driven educational cultures now emerging in the USA.

It was further found that early attempts at electronic portfolios in this setting were constrained by five main limitations 1) unclear rationale for their use 2) complexity of design applications 3) limitations of localized storage & delivery media 4) non-accessibility for simultaneous shared, iterative assessment and 5) availability to wide audiences while maintaining creator privacy.

Design applications for the infusion of video and the high level multimedia features were not used in the early portfolios. For the most part such portfolios relied on the use of Office suite type applications, concept mapping software and html authoring programs such as Macromedia Dreamweaver and Microsoft FrontPage. As a result of this portfolios did not have high level or extensive use of video for hypermedia authoring such as synchronized video, slides and sound. It has long been anticipated that synchronized video can play a role in developing online, elearning and distance based applications (Bota, 2002).

Recent advances in technology have made these types of design applications less complex. Preservice teachers as well as inservice teachers can develop online lectures, presentations and activities with synchronized video, sound, audio as well as slides in relatively short periods of time. These packages can then be delivered via CDROM or on the web at the convenience of the learner. Of the e-portfolios reviewed 23% have these types of student-centered applications. They ranged from classroom rules, to classroom introductions to interactive video streams on novels of historical fiction and poetry readings.
Figure 3: Screen for Synchronized Presentation on Historical Fiction novel

A revealing finding was the continuous changes in storage medium that these portfolios employed; this was in part due to the limitations in localized storage media. Due to the large size and volume of artifacts that individual students produced while developing portfolios floppy disks were not encouraged or highly used. From 1999 onwards our students have used Zip disks or other larger storage media (Read & Cafolla, 1999). However Zip technology became expensive compared to other types of media. An investment in both the Zip disk and an add on drive had to be made in order to use this media. Students often had Zip drives on campus but not at home or in the dorms. With the widespread distribution of CDRW drives (and now DVDRW drives as well) the department moved to the use of recordable CDROMs as the preferred medium of storage (Rodney et al 2001). Most recently, USB key drives have taken the place of recordable CDROMS due to their low cost and convenience.

Localized storage media also made it difficult for students to author their portfolios away from the campus. This limitation also characterized approaches to delivery. As table 1 illustrates in just this examination of 100 ePortfolios the delivery medium was changed a number of times.

<table>
<thead>
<tr>
<th>Delivery Medium</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDROM &amp; WWW</td>
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<td>13</td>
<td></td>
<td></td>
<td>28</td>
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<td>33</td>
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<td>1</td>
<td></td>
<td></td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>Content Mgt. System (livetext)</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

Table 1: Delivery media for ePortfolios 2002-2005

Our early portfolios in large part used the www as supplements to a paper or folder portfolio. In effect one of the artifacts for the traditional portfolio was a small website. A major rationale for this was storage constraints and the ease of finding webspaces for students to post websites. As the cost of storage space decreased and as newer ways to host webservers became more ubiquitous a move was made to acquire a webserver in the department. Webserver applications such as Apache, Windows Internet Information Server (IIS) and other webserver packages were becoming standard on operating systems. This made it more convenient to create multiple student websites quickly as well as to maintain them more efficiently. On the client side many applications for the authoring and publishing of websites such as Microsoft
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FrontPage and Macromedia Dreamweaver became more robust and were more widely distributed. This meant that students in a short one semester class could learn to create and publish highly developed websites with relative ease.

For my own students in the 2002 and 2003 groups we used these new technologies to reverse the traditional trend we developed a secondary CDROM and a highly developed web based portfolio. In keeping with other approaches in the college CDROM portfolios became an increasing trend (Read & Cafolla, 1999). Additionally, methods for creating such portfolios were no longer constraining (Rodney, 2001). Students were therefore encouraged to develop web-based presentation portfolios while maintaining teaching portfolios for interviewing, employment and professional development.

The CDROM only portfolios of 2005 represent the work of students in the introductory course. They opted for CDROM teaching eportfolios as a way to learn to author auto-run CDROMs. These portfolios are as robust as the online portfolios however they have larger more video and graphic intensive items such as uncompressed video.

By 2003 the college of education was able to expand the size of the web-server to more than 70GB and also to install backup drives for RAID redundancy. Faculty, staff and students now had ample space to create large files and publish them on this web-server. Additionally, the university invested in a campus communications system for managing email, creating message groups and shared resources for the FAU community. Alongside this package was an individual student personal drive. This drive holds a 20MB web-folder for students to publish pages and files over the www.

These resources in server side storage space and application as well as client side software allowed us to move fully into online-based portfolios. So by 2004 all of the portfolios were being published on the www. This also resolved the localized media issue. Students could now use their computers at home to edit and author portfolio content off-campus and at their own convenience. This made multiple revisions and more complex artifacts possible as students could review and assess their eportfolios outside of class time.

Another finding was the fact that simultaneous shared, iterative assessment of electronic portfolios using a dynamic tool was not possible. All of the portfolios are stored in different locations whether online, on a CDROM or within a content management system. Even if they were all published to the www there would be no way to bring them together to be assessed. One of the rationales for the livetext solution was the fact that multiple instructors as well as other reviewers (department chairs or accreditation teams) could assess portfolios from an easy convenient interface. This remains a challenge. In the case of livetext and other portfolio content that is certainly a feature. However, these packages are limited by their lack of interoperability with existing systems that our university uses. Additionally, they pose added learning responsibilities for instructors of in some cases already over laden courses. There is definitely a need for such a device but it must also provide for the freedom of students to create and integrate high level products into their designs.

Another finding was that an enduring challenge remains how to provide accessibility of the eportfolio to wide audiences while maintaining privacy of the creator. This also remains a difficulty for us. In all cases students are coached to exclude from eportfolios, personal and private information that may give too many details into their location or personal lives. Such descriptors even form the basis of rubrics. However, in many cases students still included personal addresses and phone numbers into their portfolios.
6. Discussion

Current electronic portfolios have greater potential to be media-rich embedding various types of hypermedia including video, sound and animation. Our portfolios have invariably become as media rich as contemporary technologies will allow.

Given that students are increasingly drawn from diverse backgrounds and are preparing for disparate work contexts, electronic portfolios have represented a toolkit that levels the playing field. They have allowed for more realistic determination of student prior knowledge, they accommodate varied prior experiences, provide useful and authentic products to assess student learning. Ultimately they allow instructors to focus on the necessary practical experiences that students need in order to successfully join a wider community of effective users of instructional technologies.

The college chose to move away from content management portfolios following the 2004 livetext pilot. These eportfolios were found to be difficult to develop and integrate within the context of the whole college especially within the general teacher education area. It was felt that a more common tool needed to be adopted that would integrate more seamlessly into the university’s existing assessment system.

Even as we continue to work on this solution in the college we have devised an approach which allows for the creation of an institutional portfolio. In this portfolio, specific artifacts (called “critical assignments”) selected from each course throughout the college is chosen after a predetermined multiple instructor review. It is uploaded by an administrator into a college wide portfolio that is housed on the FAU blackboard website. This blackboard site allows for interoperability since all instructors are already included in the blackboard database and all students are included in this database as well. Faculty, staff and students are familiar with blackboard having been using the system for more than four years. This means that eportfolios at FAU may move from simply individual students creating personal portfolios for each class to a unified portfolio that follows the student throughout the degree program. Artifacts in this portfolio can then be selected for inclusion within the college’s accreditation or review portfolio as artifacts of institutional accomplishments.

By examining these portfolios we found that the methods that were used to initiate students into the electronic portfolio creation process have been largely driven by two central factors. First, there were technical considerations which included the cost of software applications as easy availability of certain storage and delivery media. Secondly, there has the desire to develop social constructivist type cognitive apprenticeship experiences for our students. Both of these factors have primarily served to influence the methods and modalities of creation as well as delivery for students’ electronic portfolios. A third, source of influence has been the accountability process that is now apparent in US education. As colleges of education seek to apply for re-accreditation there is a need for student artifacts to be easily accessible and assessable.

At the theoretical level these electronic portfolios have been very student centered. This meant that artifacts, design and development were largely selected by students. An important conclusion is that these electronic portfolios reflect grounding in situated learning theory. As teachers are provided with the necessary skills to integrate technology they must engage in a type of apprenticeship process, one in
which they join through the use of cognitive, technical and theoretical tools - the community of practice in which technology educators are located.

A major recommendation is that electronic portfolios be used in contexts that reflect diversity in the local student population. Electronic portfolios provide an important modality for students to include their own voice and perspective into instructional environments (Santora, 2005). As our teachers in our local setting teachers are culturally diverse in that they reflect the different cultural groups in our area; we found that artifacts as well as portfolios told important stories about the cultural and social roots of students. Invariably this served to engage students and enhance the quality of their artifacts.

7. References


Accessed


ePortfolios for Teacher Education


ePortfolios for Teacher Education

Professional and Career Development: The website which helps teachers map their career and professional development

Session: PS1C
Type: Work in Progress

Hudson Tony, CfBT, thudson@cfbt.com

“Research shows there is a clear message from teachers that there is a need for a document that records both their formal and informal professional development, along with their educational philosophy and career aspirations.”

Stephen Merrill, 2004

CfBT (Centre for British Teachers) has designed and developed, for the Department for Education and Skills, an online tool to enable teachers to take a more strategic view of their career and continuing professional development. Set within a national context, and taking full account of other CPD initiatives and frameworks, the Professional and Career Development website is an interactive tool to help teachers map their chosen route through the profession and support their professional learning. Integral to the site is the facility for self-analysis, a framework for developing a career progression plan, and a resource to enable users to create and maintain an online e-Portfolio.

This online e-Portfolio, which includes CPD logs, learning journals and online CV functionality, ensures easy updates and maintenance, the facility for regular review and, consequently, support for recognition of success. The website emphasises the real benefits of undertaking this process, such as:

- evidence to support recognition of achievement and impact
- the means to reflect on and plan professional and career development
- the use of a tool which is manageable, portable and saves teachers valuable time
- record professional development as it occurs and note any necessary actions
- keep track of the range of opportunities taken and their impact
- reflect on how these opportunities have made a difference to professional practice
- reflect on how an individual has changed as a result of professional development
- identify further needs and actions
- prepare for a focused professional discussion with a mentor/team leader/CPD co-ordinator by informing, steering and giving a framework for the meeting
- record the location of hard copy evidence, certificates, papers, articles or handouts referenced in the log

The website also shows teachers how to make effective use of the learning journal tool

- for personal reflection on professional practice at a period of transition
- to focus on what the teacher has contributed to the success of a class, year team, department or whole school
- to plan a route through a challenging task; (the structure of the template for this aspect is aligned with the journal required for accreditation by the Teachers’ Learning Academy GTC)
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- to reflect on a critical incident and how it was managed
- to identify development needs and analyse the form and manner in which personal development may be supported
- to share thoughts, hopes and aspirations with a mentor, team leader or other professional colleague in order to seek their opinions about what has been recorded – in particular, to seek advice about future work and support
- to record an accurate picture of progress in the profession, which can be used to help plan career development in a realistic way

**Professional and Career Development** uses the experience of other teachers to illustrate potential career paths in the profession and draws together a wide-range of information about CPD resources and opportunities, supported by guidance and exemplar material. It shows:

- WHAT CPD is and WHERE opportunities exist.
- WHY CPD is important for individuals and the profession.
- HOW to make best use of available opportunities.
- WHO and WHAT can help in accessing effective CPD.
- HOW to develop and maintain an e-Portfolio of Professional Practice as an evidence base to support professional and career aspirations and, where applicable, for accreditation purposes.
- HOW to develop a learning journal.

A significant benefit of the learning journal is the facility it provides to plan forward as well as to support reflection and evaluation. The process helps to lift sights above the ‘to do’ list to look beyond the time of current post and consider the question of legacy.

In May 2004, UCET (Universities' Council for the Education of Teachers) produced guidance on compiling a critical journal of professional development (CJPD) and portfolio of evidence, for teachers seeking accreditation at postgraduate level. This guidance emphasises the use of portfolios in providing evidence selected by teachers to demonstrate the significant impact of their professional development.

CfBT is currently working with the DfES and other national agencies including: the Teacher Training Agency; the Universities Council for the Education of Teachers; the National College for School Leadership and the General Teaching Council, to explore designing a common e-Portfolio framework for use by serving and newly qualified teachers for both accreditation and other professional purposes.

It has already been agreed that the CEDP (Career Entry and Development Profile) which all teachers entering the profession undertake Created by Olatz, will function through the site to support emergent teachers in the processes of review and reflection at the outset of their career. To determine its effectiveness in this context, CfBT is currently researching the website’s use in selected Initial Teacher Training institutions. Initial response is very positive and full results will be published towards the end of 2005.

The practicality of this design for other students across all areas of Higher Education will also be considered and piloted. Additionally the DfES intends to extend the remit of the website (and in particular the ePortfolio element) to include all the workforce based within the schools context including such groups as HLTAs, Bursars, Nursery Nurses and other groups. We are currently developing the site to include HLTAs by Summer 2005 and the other groups by early 2006.
Access to the website is free and open to all. A log-in and password enables teachers to maintain strict confidentiality in the interactive sections.

Currently live on Teachernet at, www.teachernet.gov.uk/development, the website prompts teachers to think creatively and regularly about their professional practice. Initially targeted at teachers in the first five years of their career, the site encourages evaluation, reflection on future needs and priorities and offers strategies to help meet these. Phase 2 of the site’s development will widen the scope of the project and extend these opportunities to all teachers and other school staff.

**Comments on the Website from practitioners:**

'CPD ideas that work' – (GTC connect CPD network)

Dear Colleague,

A suggestion has been made to us by some of you that we should send briefer but more regular email alerts about simple CPD ideas which work in schools. We are therefore planning to send one of these a month to all members of the network. Our first is an example of a Portsmouth school who are successfully managing the use of 'Keeping Track' (*Professional and Career Development* - the CPD Website and e-portfolio on teachernet.)

Kate Stapleford, who has led this initiative, reports that her school, Northern Parade Junior, has one staff meeting each term identified for CPD. During this meeting, about 15 minutes is allocated for teachers to update their own CPD diary on teachernet. This seems to be long enough for teachers to record the different types of CPD that they have accessed during the term. It is thought that the records will be useful for such processes as: Investors in People, performance management and Threshold.

Kate, a Y5 teacher, was given a bursary by her LEA to develop a CPD package for primary schools. She has worked with the LEA advisor for CPD and secondary colleagues so that they now have an approach to CPD that has been welcomed by both primary and secondary teachers.

**Extract from on-line discussions.**

CIBT have just brought out a super on line tool for teachers (at no cost!) in their early years, which enables them to explore CPD ideas and make a record of their own experiences. This is to be followed by another for more experienced colleagues and specifically one for Support Staff, something to watch out for!. (LINDA ASPLAND)
Interoperability and Portability

Portability and interoperability between ePortfolio Management Systems: from the EPICC project the eXact Portfolio solution

Session: PS1D
Type: Work in Progress

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Abstract
This short paper introduces the work started in the EPICC project (co-funded by the European Commission) aiming at the development of an ePortfolio Management System based on international specifications. The implementation of the specification proposed by IMS, called IMS eP, means at supporting and improving the portability and interoperability of ePortfolios between different ePortfolio Management Systems and offers the possibility of integrating the ePortfolio Management Systems with HR, recruitment and LMS systems.

Keywords: ePortfolio, ePMS, portability, interoperability.

1. Introduction

In the recent past, Portfolios have been an instrument that offered rich possibilities for learning and assessment and enabled learning for the creator and the user and demonstrated learning for multiple audiences. Nowadays, thanks to ubiquitous, high-speed, economically accessible network capacity, and to a great extent, globally and affordable, multimedia-capable computers, Portfolio is transforming to the ePortfolio, the electronic version of the “traditional” paper-based Portfolio.

The ePortfolio is a highly personalized, customizable web-based information management system, which allows students to demonstrate individual and collaborative growth, achievement and learning over time. An ePortfolio can be used in support of career planning and resume building, advising and academic planning, academic evaluation and assessment, and as a tool for reflection.

ePortfolios are of value to owners for a number of reasons, but essentially, they place owners at the center of their learning experience. ePortfolios allow owners to manage and control access to their records, academic information and coursework, creating personal development planning as a learning trajectory, by mapping out professional goals, experiences and outcomes. ePortfolios contents and services can be shared with others in order to reflect on one’s learning or career, support continuing professional development, plan learning or search a job.

While several institutions of higher education have been developing student digital portfolios over the past decade, this effort has been mostly uncoordinated with the notable exception of two academic consortia in the United States. It is critical for the future of a knowledge Europe to engage upon an orchestrated effort involving both educational and corporate institutions to define, design, and develop digital portfolio systems that meet the needs of all stakeholders and allows portability of e-Portfolios between different systems.
2. **The eXact Portfolio**

The overall scope of the EPICC project was making ePortfolios interoperable across different systems and institutions. The implemented prototype, called *eXact Portfolio*, provides tools for the management of ePortfolio archive, or a general ePortfolio, which might contain, in addition to actual packaged digital works, these different kinds of information, for example about digital and non-digital works created or part-created by the subject, about the subject of the ePortfolio, about activities in which the subject has participated, is participating, or plans to participate, about the competencies (skills, etc.) of the subject, about the achievements of the subject, whether or not certificated, about the subject's preferences, about the subject's goals and plans, about the subject's interests and values, about any notes, reflections, or assessments relevant to any other part, contextual information to help the interpretation of any results, about the relationships between the other parts of the information, about the creation and ownership of the parts of the ePortfolio.

*eXact Portfolio* implements the recent international specifications released by IMS Global Consortium, the IMS eP specifications [2] in order to:

- support the advancement of lifelong learning important to many government initiatives,
- make exchanging portfolios from school to work transitions easier,
- allow educators and institutions to better track competencies,
- enhance the learning experience and improves employee development.

*eXact Portfolio* manages different type of ePortfolios in order to meet more diverse end-user needs:

- *Assessment e-portfolios*: to demonstrate achievement to some authority by relating evidence within the e-portfolio;
- *Presentation or showcase e-portfolios*: to present evidence about learning, skills or competences to particular audiences;
- *Learning and reflective e-portfolios*: to document, guide, and develop learning over time;
- *Personal Development e-portfolios*: contain records of learning, performance and achievement (for reflection), and outcomes of reflection on those records, including plans for future development;
- *General purpose e-portfolios*: could combine elements of any of the proceeding types.
Interoperability and Portability

The system has been implemented to be multilingual: it uses IMS VDEX vocabularies to manage the translation of the GUI in different languages so it is possible to add a new language by simply updating the used VDEX vocabularies.

The portability of ePortfolios is ensured in the developed ePortfolio Management System by the import/export functionalities that package/unpackage the ePortfolio or parts of it according to the IMS eP specifications before to import or export the data.

An interoperability protocol based on a set of web services will offer to registered and authenticated HR and recruitment systems to search for specific information like skills, competencies, goals etc.

Not only, implemented communication mechanisms (still based on web services) will allow the ePortfolio owner to access, after authentication, to elearning courses offered by registered Learning Management Systems in order to achieve the competencies defined in the Personal Development Planning. Once the competency has been acquired, the Learning Management System will update the ePortfolio owner’s profile accordingly. As a proof-of-concept, the eXact ePortfolio will be soon integrated in the Giunti’s LCMS, Learn eXact [3].

References
Clear e-portfolio definitions: a prerequisite for effective interoperability

Session: PS1D
Type: Full Research Paper
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Abstract
Definitions in the e-portfolio domain have been notoriously confusing, impeding practical progress towards agreed interoperability standards. Clear definitions are proposed here for consensus, centring on the concept of portfolio items and types of item, and covering terms beginning with e-portfolio followed by: information; presentation; view; repository; management system/service; related service; enabled service. Justification and examples are given. This opens the way for more fruitful discussion of the requirements of particular application areas.

Keywords
e-portfolio; clear; definition; interoperability; consensus; service

1. Introduction
From the original time when the concept of e-portfolio took root in Europe, around the first international e-portfolio conference in 2003, there have been differences of view about what an e-portfolio is supposed to be. The clearest contrast is between those who regard a portfolio as essentially a coherent presentation of evidential material to an audience, and those who see an e-portfolio as a kind of repository, or system, from which evidence and other material can be chosen. Beyond this difference of view, there are more differences about what other properties or characteristics should be fulfilled in order for something to count as an e-portfolio.

There are at least two plausible explanations for this lack of consensus. Firstly, the field is still relatively new, and there has not yet been enough time for definitions and standards to have reached the stage where they are naturally agreed. Secondly, the subject matter to which e-portfolios are applied is not technical, but human: it could be expected to be much more straightforward to agree definitions and set standards relating to, say, electrical fittings than to personal development, aspirations and achievements.

These differences are not just a phenomenon to investigate, but a practical problem, about which there are good reasons to be concerned. Disagreements about the meanings of basic terms hinder communication, and make mutual understanding difficult to achieve. If agreements could be reached, less time might be wasted in fruitless debate, and it would be very welcome to refocus this energy towards the great positive potential of e-portfolio developments, where the inspiring visions have yet to be made real for the majority.

2. Previous definitions and their problems
The diversity of definitions is well illustrated by three relatively high-profile examples of definitions of e-portfolio. Firstly, a well-quoted definition comes from EDUCAUSE NLII (e.g. quoted by IMS, 2005b).
Interoperability and Portability

“A collection of authentic and diverse evidence, drawn from a larger archive, that represents what a person or organization has learned over time, on which the person or organization has reflected, designed for presentation to one or more audiences for a particular rhetorical purpose.”

This clearly preserves the link with traditional portfolios as specific collections for a specific purpose. Secondly, EIfEL (the European Institute for E-Learning, EIfEL, 2005) explains:

“An ePortfolio is a personal digital collection of information describing and illustrating a person’s learning, career, experience and achievements. ePortfolios are privately owned and the owner has complete control over who has access to what and when.”

This retains the idea of a collection, while appearing to move towards the NLII concept of an archive. Thirdly, EDUCAUSE (2005) depart from their older NLII definition by suggesting:

“E-portfolios have emerged as a valuable online tool that learners, faculty, and institutions can use to collect, store, update, and share information. E-portfolios allow students to reflect on their learning, communicate with instructors, document credentials, and provide potential employers with examples of their work.”

This completes the contrast: is an e-portfolio a collection of evidence, or a tool that manages that evidence – perhaps a whole archive of potential evidence relating to a person’s learning, career, experience and achievements?

Looking at the 2004 ePortfolio conference (EIfEL, 2004) there is plenty more evidence of similar distinctions, whether in definitions or less prescriptive conceptual views. On the side of viewing an e-portfolio as a collection, Wade & Abrami (2004) venture that "A portfolio can be defined as a purposeful collection of student work that tells the story of a student’s effort, progress and/or achievement in a given or several areas." Ahonen & Murto (2004) state “A digital portfolio or ePortfolio is a collection of learner’s work that can include text, pictures, hyperlinks and different multimedia elements.” Hédia (2004) represents other websites as giving the definitions “Collection d’œuvres propres à refléter le talent de son auteur.” and “Collection des travaux d’un élève qui fait foi de sa compétence montrant des traces pertinentes de ses réalisations.” All these give emphasis to the particular, purposeful collection.

On the other hand, there are many examples of viewing the e-portfolio as an archive or tool. For example, Hartnell-Young (2004) states “Portfolios, as the name suggests are mobile containers for artefacts in a range of media”. In the view of Home & Charlesworth (2004) "… the term ePortfolio … tends to be seen as a toolbox for the student and the knowledge worker." Haywood & Tosh (2004) go all the way to stating "The e-portfolio is an information management system that uses electronic media and services” and then explaining how such a system is typically used. The distinction seems to exist equally in French. Barreau et al. (2004) have "Le portfolio a

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2 Approx: “Collection of works suitably reflecting the abilities of their author”

3 Approx: “Collection of a pupil’s pieces of work testifying to their competence, and showing appropriate records of their achievements”
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étée pensé comme un outil générique afin de pouvoir créer des instances de portfolio personnalisées en fonction des formations concernées.4

These differences of view are understandable in that it appears natural for people to relate a new term to something that is already tangible for them. Many developers and researchers in the e-portfolio field have experience of a particular system that has been in use in their institution, perhaps for assessment, perhaps for personal development or careers. Others from fine arts, creative writing and the like can visualise the kind of portfolios that are familiar to them. However, having people use the same term with different meanings is not good for any kind of important discussion. It is a widely shared experience for the continuation of the discussion around definitions to cause exasperation. Many researchers, developers and practitioners in the e-portfolio community would like the debate to move on to the more challenging and practical matters of how to implement and develop e-portfolio systems and services, without being bogged down in dispute over definitions.

3. Objectives for consensus definitions

Further and more detailed analysis of previous usage is left to others. The emphasis in this paper will be on making plausible, positive proposals for definitions that are as likely as possible to be the focus of consensus in effectively resolving differences such as those outlined above. Merely avoiding disagreements by agreeing to differ would not help. It would risk the waste of time talking at cross purposes, and misunderstanding each other.

To address the central question implied by the title of this paper: why is this held to be a prerequisite for effective interoperability? Interoperability standards are meant to be consensus positions which are largely to the benefit of all concerned. If terms are not agreed, it will mean that the language of any standard or specification is more attuned to some views than others, and it runs the risk of being seen as unclear or unfair. Specifications such as IMS LIP (IMS 2001) or IMS ePortfolio (IMS, 2005a), and related standards such as BS 8788 (British Standards Institution, 2005) known as “UKLeaP”, are complex, with a large scope, and it takes very substantial time, effort and knowledge to comprehend them. Given the added obstacle of a set of terms used in ways that are not familiar, and less determined potential users of the standards are likely not to engage with them, risking leaving the issue of implementing interoperability to non-practitioner technical colleagues.

The most important point of all is that effective interoperability in these areas is crucially dependent not only on syntactic, but semantic agreement: about what the different categories of information mean, and how they are used in practice. This is necessary in the attempt to ensure that practically compatible units of information have representations that are as similar as possible. Given the complexity of the domain, the only plausible route to effective interoperability is through pragmatic agreement where the consensus includes both practitioners and technical developers. This makes it even more of a vital challenge to find common agreed terminology.

4 Approx: “The portfolio has been thought of as a generic tool for the creation of personalised portfolio instances for relevant training courses.”
What should be the nature and characteristics of such consensus definitions in the e-portfolio domain? In providing an unambiguous set of terms properly covering essential concepts in this domain, it is suggested here that they should:

- connect with traditional non-electronic usage of the relevant terms;
- integrate with American and other established usage, not diverging without good reason;
- be clear and as neutral as possible, unbiased towards any particular system or practice;
- provide a basis for productive debate among stakeholders, and the construction and agreement of clear specifications and standards.

The first two points are simply criteria for helping to avoid needless conflict with other established positions. The third is an ideal, and the fourth point summarises the argument above. Relating to both latter points, if we are to have effective lifelong e-portfolio systems, it would be a great advantage for the information to be as portable as possible between the systems, so that individuals do not needlessly lose the fruit of their documenting and reflective efforts.

4. Proposed portfolio and e-portfolio definitions

Here, then, are the set of proposed definitions for what has been called here the "e-portfolio domain". Throughout these definitions, "e-" stands exactly for "electronic", which parallels the established usage in "e-mail", "e-commerce" etc.

Current usage suggests that a very loose and general definition of a "portfolio" may be a collection of things related to an individual, or, by extension, to a group of people or corporate entity. Beyond this general concept, as discussed above, there is disagreement about how the terms "portfolio" and in particular "e-portfolio" should be used. In order to avoid confusion and ambiguity, it is therefore suggested here that the terms "portfolio" and "e-portfolio" are not used by themselves, unqualified.

In essence, what is done in this paper is to introduce what seems to have been a missing term, the portfolio item. This becomes the central definition, in terms of which all the other definitions fall into place without having to use the term "portfolio" by itself. Focusing on portfolio items makes a great deal of sense in the context of electronic tools. One of the advantages of an electronic system managing portfolio items is that each item can be reused in different contexts without having to be entirely rewritten or re-entered. Thus it is really the items that are the basis of such systems, while portfolio presentations can be considered as purposeful collections of those items.

4.1. Portfolio item

A portfolio item, in the field of education, personal and professional development, may be defined as any of:

a. a unit of information structured so that it can be integrated with other portfolio items;

b. a unit of information that enables a related object to be integrated with other portfolio items;

c. an object relating to the focal person;
that satisfies all these conditions:
it must be related to a particular person;
it must be valued by the person it relates to;
that person must have relevant rights over it.

An **e-portfolio item** may be defined as a portfolio item that is held electronically.

For clarity, the definition of *portfolio item* uses a singular person, as that is the most commonly understood example. For completeness, the singular should be read as also covering the plural, as well as corporate entities such as businesses and institutions, which can also have their own e-portfolio information.

The concept of *portfolio item* can be related to the IMS ePortfolio specification’s "portfolioPart" element. The reason for choosing a different term in this context is that there is no intention to align, or not to align, with the IMS specification, and a different term maintains neutrality.

*Portfolio items* by themselves do not have to be actually integrated into *portfolio presentations* in order to be counted as portfolio items. However, items such as a word-processed document by themselves are not designed to be integrated into any kind of portfolio involving several items. Where such objects are desired to be held as *e-portfolio items*, they should be closely associated with information (as indicated in option (b) that enables it to be integrated with other relevant *e-portfolio items*.

The intended boundaries of the term *portfolio item* may be illustrated by examples of what is proposed to count, and not to count, as included in the definition.

To begin with, consider the question of the information structure. Plain text, whether written in a book, or kept on a file on a private computer, is not much use to an e-portfolio system. Information starts to be structured when, for example, it is connected together as a set of web pages with links explaining the relationship, as advocated for example by Barrett (2005). Going beyond that, for an ICT system effectively to manage a set of *e-portfolio items*, the items should be stored in some kind of database, where each different information component has its proper, recognised, place.

Related is the question of storing objects. Obviously, only electronic objects or electronic representations of objects can be stored as *e-portfolio items*. But an object by itself, even when electronic, may well not be self-explanatory: it needs to be set in context and related to other information. What is it to be taken as evidence of, for example? Hence comes the part (b) of the definition. What is implied is that every object should be associated with the information necessary to integrate it with other *e-portfolio items*, though the object itself, and separately the information, can both be regarded as *e-portfolio items*. However this relationship of object and related information (sometimes called “metadata”) is not always necessary. For example, when assessing a particular competence, a simple collection of items could be used, where the fact that the item is collected for the assessment implicitly acts as a claim that it is evidence of the competence.

What things, or information, can be related to the central person? Almost anything could be the object of interest for someone, but in many cases it is not the thing itself that should be the *e-portfolio item*, but the record of the interest in that thing. Usually much more significant are the relationships of being the author or creator of
something. What is clear is that things, or information, not related to me in any way (that I care about) should not be held as my \textit{portfolio items}, and that if they are related, the nature of that relationship needs to be made explicit.

Secondly, it must be valued by the individual. If I feel that the article I wrote three years ago is rubbish, it is no business of anyone else to make me include it in my portfolio. I could, however, value it as part of the evidence which would show my improvement over those years. The decision to include must be up to the individual, to the extent to which the individual is able to take responsibility for the decision. A collection of evidence that might count against someone would (and should) more likely be called a file or dossier.

If we are to extend portfolio concepts truly across lifelong learning, we need to bear in mind the case of people who are not, or not yet, responsible, such as young children. For them, another significant person such as a parent, teacher or carer could judge on behalf of the person what is likely to be valued by that person.

Thirdly, "relevant rights" over a \textit{portfolio item} must at least include the right to view the item. No matter how good that confidential reference was, I can’t include it as a \textit{portfolio item}. If I have the right to view something, at least I can reflect on it – perhaps a mentor has written some advice not for circulation to anyone else. To be more useful as an \textit{e-portfolio item}, I will need the right to show whatever it is to other people, so that it can be used by me as evidence of something. For self-presentation, I also need the right to edit the item. Thus, the rights needed depend on the purpose the item is going to be used for.

As with the case above, here too, another person might have to act on behalf of someone who was not able to exercise his or her rights.

The next question to be addressed is, what is the nature of things that could be expected typically to count as \textit{portfolio items}? The next section addresses this question, referring to the history of relevant specifications. Before that, to make an initial general point about granularity, it makes sense that a \textit{portfolio item} should be a self-contained unit of information that could be reused for different purposes or on different occasions. This kind of reuse is familiar to most people through the practice of applying for jobs, posts, contracts or courses. If you prepare a paper or a presentation for a conference, for example, you may want, or not want, to refer to that, depending on how relevant it is to the application to hand. Papers and presentations are naturally associated with related information, such as author, revision date, date of presentation or publication, etc. The dates and other things have meaning only in their relationship to the item as a whole. An isolated date cannot count as a \textit{portfolio item}.

\subsection*{4.2. Types of portfolio item}

The first IMS specification for “learner information”, known as IMS LIP 1.0 (IMS, 2001), explicitly relates to the term “portfolio” while not using the term “e-portfolio”. Its core data structures are given in the IMS LIP 1.0 Information Model. The bulleted points that follow immediately here are directly quoted from the IMS specification.

- Identification: Biographic and demographic data relevant to learning;
- Goal: Learning, career and other objectives and aspirations;
- Qualifications, Certifications and Licenses (qcl): Qualifications, certifications and licenses granted by recognized authorities;
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- **Activity**: Any learning-related activity in any state of completion. Could be self-reported. Includes formal and informal education, training, work experience, and military or civic service;
- **Transcript**: A record that is used to provide an institutionally-based summary of academic achievement. The structure of this record can take many forms;
- **Interest**: Information describing hobbies and recreational activities;
- **Competency**: Skills, knowledge, and abilities acquired in the cognitive, affective, and/or psychomotor domains;
- **Affiliation**: Membership of professional organizations, etc. Membership of groups is covered by the IMS Enterprise specification;
- **Accessibility**: General accessibility to the learner information as defined through language capabilities, disabilities, eligibilities and learning preferences including cognitive preferences (e.g. issues of learning style), physical preferences (e.g. a preference for large print), and technological preferences (e.g. a preference for a particular computer platform);
- **Securitykey**: The set of passwords and security keys assigned to the learner for transactions with learner information systems and services;
- **Relationship**: The set of relationships between the core components. The core structures do not have within them identifiers that link to the core structures. Instead all of these relationships are captured in a single core structure thereby making the links simpler to identify and manage.

At least, these elements appear to be the right size, when taken individually, for re-use in several contexts. In applying for jobs or higher courses of education, different particular qualifications, activities, goals, interests, competencies, etc. may be appropriately represented to different authorities. Taken individually, each comprises a self-contained unit of information, and the constituent parts of that information would make little sense separated from the unit.

During 2004, two separate but parallel development processes identified a missing kind of element: a free-standing statement that may enlarge, or reflect, on other of the elements, or on the learner as a whole person. This kind of element has since been given twin names: “reflexion” and “assertion”, intended to be used dependent on the context.

The list of IMS LIP elements has been reflected on at length in the light of the currently proposed definitions. One apparent issue is that the IMS LIP elements are of greatly varying complexity, whereas technical systems development would be better served by a more uniform size and scope of item types. The following modifications are at present only suggestions, which are in the process of being discussed by interested parties.

The elements “securitykey” and “transcript” seemed less reusable than other e-portfoio items, and could be left out. Security, authentication and authorisation are more likely to have their own mechanisms, and there is no obvious reason to store related information directly with transferable e-portfolio information. A transcript is naturally the property of the body which awards it, and ideally this should not be kept with a learner-editable portfolio, and could be available on appropriate request from the issuing institution. IMS LIP activities include their own official definitions, and their evaluations, and these could be usefully separated out, to form their own items. The “products” of activities could also be separated out, for clarity. The Qualifications, Certificates and Licences element could usefully be subsumed into a more
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encompassing class of “achievements”, which would include those achievements that are not certified.

These modifications would result in a list of portfolio item types, along with suggested definitions, as follows – in alphabetical order, with no implication of precedence.

<table>
<thead>
<tr>
<th>Portfolio Item Type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility</td>
<td>Information about the person’s requirements or preferences for facilitating or enabling interaction with e-portfolio or other systems or environments, whether human or technical.</td>
</tr>
<tr>
<td>Achievements</td>
<td>States that were desired and have been brought about by or with the involvement of the person, including qualifications, certificates, licences, awards, prizes, and other achievements which may have no certification. These need to be carefully distinguished from activities, since activities have duration, while achievements have only a time of fulfilment. To have completed an activity could count as an achievement, but it is not the same thing as the activity itself. To have created something may be counted as an achievement, but the thing itself is counted as a product, not an achievement.</td>
</tr>
<tr>
<td>Activities done, planned or in progress</td>
<td>Any kind of activity in which the person has participated, is participating, plans to participate, or is considering participation. Activities have duration. Jobs, courses, adventures, voluntary activities, can all be included as activities done or planned. Future activities can be those offered by a body which may involve the person.</td>
</tr>
<tr>
<td>Affiliations</td>
<td>Information about the relationship of the person with any organisations including educational institutions, employers, professional bodies, agencies. Affiliation is rather too restrictive a word to capture the full sense here. The person’s identifier with that organisation can be recorded here.</td>
</tr>
<tr>
<td>Assertions</td>
<td>Statements, claims, explanations, etc. about the person or things in the related portfolio items, which might be by the person him or herself, or by another person or body. These are structured like reflections.</td>
</tr>
<tr>
<td>Competencies</td>
<td>Competences, whole or part, knowledge, skills or attitudes, that either are or were claimed by the person, or are aimed for. These could be described in their own terms by the person, or for wider use and interoperability, referred to a published competency definition.</td>
</tr>
<tr>
<td>Evaluations</td>
<td>Records of how one or more activities or products have been formally or summatively assessed or evaluated by others. This should link in with assessment practice and outcomes, and could link to competencies.</td>
</tr>
<tr>
<td>Goals</td>
<td>Future desired states of the world in relation to the person. Typically, a goal could be to acquire a competency by a certain date, or at a certain level, or by a particular means, or to achieve something else. The structure is similar to that of achievements.</td>
</tr>
<tr>
<td>Identification</td>
<td>Names, postal and e-mail addresses, phones, photos, etc. etc.</td>
</tr>
<tr>
<td>Interests</td>
<td>Anything that personally motivates: sports, hobbies, pastimes, personally-held values, etc.</td>
</tr>
</tbody>
</table>
### Interoperability and Portability

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisations</td>
<td>Placeholders for reference to any corporate bodies such as educational institutions, employers, government departments, regulatory bodies, examining or assessing authorities, associations, nations, etc. The relationship between the person and these organisations is represented by affiliations.</td>
</tr>
<tr>
<td>Other Persons</td>
<td>Placeholders for reference to other people who are of significance in a portfolio. It would be reasonable to include, in portfolio records: the other person’s role vis-à-vis the focal person, or their relationship to that person; their relevance; and their contact details; but little if anything else.</td>
</tr>
<tr>
<td>Products</td>
<td>Artefacts, assets, objects, things, that have been created or put together by the person, or with the person’s participation. These include the works of art in a traditional artist’s portfolio, digital artefacts, objects made like chairs, things put in order like gardens, also social, economic and political actualities such as projects, companies or other organisations viewed as things that have been brought into being or helped along their way. Though social or physical things themselves cannot be e-portfolio items, information about them and representations of them can. Digital artefacts can be packaged along with the associated product information in an e-portfolio presentation.</td>
</tr>
<tr>
<td>Reflections</td>
<td>Things authored, normally by the person, which express thoughts, attitudes, feelings, understandings, about self or any of a wide range of other e-portfolio items. The structure is like assertions. May include HTML or similar links to other items.</td>
</tr>
<tr>
<td>Relationships</td>
<td>Relationships between portfolio items, which can be vital to their meaning. Relationships can be between items of the same kind, such as when an activity is part of another activity, or between different kinds, such as when a course activity leads to the achievement of a qualification. Many other relationships can be usefully defined.</td>
</tr>
<tr>
<td>and metadata</td>
<td>Metadata about the portfolio information describes who has what rights over that information - viewing, editing, intellectual property, “stewardship” etc. - as well as when records were created and edited. There may also be other categories of metadata that are relevant to all, or most, portfolio items.</td>
</tr>
</tbody>
</table>

These distinctions are not by themselves sufficient. In many applications, it may be significant to distinguish, for example, work activities from leisure activities. In all contexts is will be important to distinguish different kinds of relationship. With competencies, as a third example, it is vital to be able to tell apart ones that are claimed by the person, ones which are being sought, and ones about which the person may be reporting a lack of competence. IMS LIP introduced the concept of different types of the same kind of element. For example, IMS LIP suggested that activities could be classified as one of “Work, Service, Education, Training, Military”: this is the “type vocabulary” for the activity element. This gives a mechanism to make semantic distinctions while keeping the syntactic structure the same. UKLeaP has kept the same mechanism. Both initiatives recognise that it would be wise to keep
the type vocabularies relatively open and changeable, but clearly for effective interoperability they need to be agreed. At the time of writing, the process of agreeing such vocabularies is still in progress.

4.3. (E-)portfolio information

(E-)portfolio information may be defined as any set of (e-)portfolio items, whether or not related.

This definition would be useful when discussing the kind of information in general that may be the subject of discussion. It is used in following definitions. The intention here is to be completely open in the definition. The items making up a particular e-portfolio information set may or may not be related in any way.

4.4. E-portfolio view

An e-portfolio view may be defined as e-portfolio information relevant to a particular purpose, or intended to be accessible by a particular other person or body.

An e-portfolio view correlates with the same term in the IMS ePortfolio specification (IMS 2005a). It does not necessarily have the same coherence of purpose as an e-portfolio presentation, and may also lack detailed instructions for viewing. It can be defined by relevance to a particular purpose: this may form the basis of defining the information required by or returned by a particular e-portfolio web service. Alternatively, a view can be defined as what a specified person or body is allowed to view. This would be set by those who control access to the portfolio information.

For a purpose-oriented view other than assessment, consider the example of using e-portfolios in conjunction with conference attendance. The conference organisers’ view could perhaps include primary affiliation and contact details, and allowing access to these could be a condition of booking and conference registration. In addition, perhaps interests and publications could be shown to other delegates in a “delegate view”, which each individual would have discretion over: some people might want to restrict some contact details from more public view.

The people specified for the latter kind of view could be, for example: a particular tutor or mentor; institutional staff in general; a line manager; a work group of colleagues; a group of friends; a particular family member.

4.5. Portfolio presentation

A portfolio presentation may be defined as a particular composition of coherent portfolio items, with a deliberately defined audience and rhetorical purpose.

An e-portfolio presentation is one that is managed and presented electronically, composed of e-portfolio items.

This is the first term to be defined here which is intended to replace one of the previous uses of the term “portfolio” by itself, when used to mean a particular collection.

The meaning of a portfolio presentation relates to and goes beyond that of the same concept in the IMS ePortfolio specification (IMS 2005a). A portfolio presentation is sometimes referred to simply as a “portfolio” or “e-portfolio”. The usage is understandable in terms of previous use of the term "portfolio". Even when qualified, as for example "assessment portfolio", there is still the unfortunate risk of ambiguity.
between on the one hand the presentation, and on the other the system which manages that presentation. There is scope here for many other different terms to be given more specific meanings to help resolve ambiguity.

Examples would be the obvious ones that have been identified in other e-portfolio work. A *portfolio presentation* for assessment would be different for each different assessment. A presentation as part of a job or course application could be expected to be at least as specific as CVs and résumés are currently.

### 4.6. E-portfolio repository

An *e-portfolio repository* may be defined as a system that stores *e-portfolio information*.

This can be either localised, or distributed as what could be termed a virtual repository. An *e-portfolio repository* as defined here may be what some people mean when using the term “e-portfolio”.

The vagueness of this definition indicates the relative weakness of the concept of a repository as applied to the e-portfolio domain. It would be futile to try to lay down exactly which information needed to be stored before a repository qualified for being an e-portfolio repository. Different purposes, and different applications, need different *e-portfolio information*. There is no clearly identifiable base set of items that apply to every one.

One can imagine an *e-portfolio repository* associated with any personal development planning (PDP) or *e-portfolio management system*. It could, for instance, be seen as the file store for the digital objects *e-portfolio items*. But there is no clear dividing line preventing any other system or database also being called an *e-portfolio repository*.

The term is probably most useful in the context of discussion of the technical storage facilities which may provide part of an *e-portfolio-related service*. The definition is presented here mainly to suggest that it should not have any more specific meaning.

### 4.7. E-portfolio management system / service

An *e-portfolio management system* or *service* may be defined as one which uses information and communication technologies to give people the ability to use and manage their *e-portfolio items*. This may include the ability to record, construct, compose, store, retrieve, view, edit or arrange *e-portfolio items*, and to present them to or to share them with others, whether as *e-portfolio presentations* or otherwise. An *e-portfolio management system* may cover the management of items that are not *portfolio items*; may use one or more *e-portfolio repositories*; and may be used for any number of *e-portfolio views* and *presentations*.

All of a person’s *e-portfolio information* within an *e-portfolio management system* has sometimes been referred to as their “e-portfolio”, even where the system is designed to support more than one *e-portfolio presentation*. This may have led to ambiguity and thus should be discouraged in the interests of clarity.

A particular *e-portfolio management system* may be designed to manage just one *e-portfolio view* (such as for assessment). The management system together with the view may then sometimes then referred to, together, simply as an “e-portfolio”. This usage may make sense within the limited scope of that system, but it does not help to resolve the ambiguity which has built up surrounding the term.
The intention of this definition is to include all the current systems which are regarded as e-portfolio systems, and thus those can serve as examples. The vital feature is that these systems or services give people the ability to manage their own items. In this way, the definition goes beyond the definition of an e-portfolio repository, where there is no necessary implication of allowing people to manage their items.

The definition leaves open the question of what makes an e-portfolio management system or service actually useful. What range of items should be kept? What features or functionality should be offered to users? These questions are not solved, but enabled, by the definition.

4.8. E-portfolio related service

An e-portfolio related service may be defined as one which generates, uses or modifies e-portfolio items but does not provide an e-portfolio management service.

The rationale behind this is that it is the portfolio items that are the focus of these definitions. Any other service is related to the portfolio domain inasmuch as it is related to portfolio items. The exclusion is simply to aid clarity of use: if a service gives sufficient functionality for it to be termed an e-portfolio management service, then it should be termed as such, leaving the term e-portfolio related to be used more generally and more broadly.

As with an e-portfolio management system, some e-portfolio related services could relate to just one e-portfolio view, and be referred to simply as an “e-portfolio”, even though the service might lack some of the functionality commonly associated with an e-portfolio management system.

Most e-learning systems can be viewed as e-portfolio related, in that they generate or store information which could be regarded as e-portfolio items. Even the simple course definition may be useful as an e-portfolio item, perhaps to be shown to other people interested in a person’s educational experiences. And with an increasing use of e-learning systems to capture, record, or mediate students’ work, the range of associated e-portfolio items increases.

Similarly, systems and services aimed at personal or professional development are all likely to be, by their nature, included in this definition. Very many other systems and services count as e-portfolio related, in view of the fact that they touch on information which may be useful for e-portfolio views or presentations.

It may be helpful to clarify the proposed distinction between an e-portfolio related service and an e-portfolio management service. If a system or service gives the individual concerned control over less information than would naturally count as a whole portfolio presentation or multi-purpose view, then it makes little sense to regard it as an e-portfolio management system. In particular, assessment management systems are certainly e-portfolio related, but tend to give strictly limited control to the person being assessed. They would not be regarded as e-portfolio management systems. Equally, if an e-learning system is not set up to handle general e-portfolio information, it would not constitute an e-portfolio management system. Many e-learning systems are of course e-portfolio related.

Systems covering personal or professional development may be seen as either side of the borderline. The UK definition of PDP was originally contained in guidance on “Progress Files” from the UK’s Quality Assurance Agency (QAA), and is currently kept on one of their more recent web pages.
http://www.qaa.ac.uk/academicinfrastructure/progressFiles/archive/policystatement/default.asp under the somewhat confusing heading of “Policy on Personal Development Plans”. PDP is “a structured and supported process undertaken by an individual to reflect upon their own learning, performance and / or achievement and to plan for their personal, educational and career development”. In order to reflect on their learning, performance and achievement, an individual needs to have the information present on which to reflect. Detailed, thorough and accurate reflection may not be easy from memory alone. Hence comes one vital contribution of e-portfolio management systems to the PDP process. An electronic PDP system by itself may not be deemed to be a complete e-portfolio management system, if it leaves out important categories of e-portfolio items. The University of Liverpool’s electronic PDP system, LUSID, for example (Strivens & Grant 2000) did not offer a service to store student’s work or general files. Thus there was a reluctance to claim that it offers a full e-portfolio management service.

4.9. E-portfolio enabled service

An e-portfolio enabled service may be defined as an e-portfolio related service that interacts with an e-portfolio management system or service, or e-portfolio repository, as part of its primary operation.

This definition revolves around the meaning of the word “enabled”. If a service is enabled by an e-portfolio management service, it must mean that in the absence of that service, it would be disabled.

This can be seen as an area of great future development. Several examples can be imagined of services that would be enabled by e-portfolio management services.

Firstly, one could imagine a system to keep one’s contact details updated in many different places. One of the most important features of such a system would be that the individual could manage which bodies were allowed to see which changes of contact details. Certainly, such a service can be provided without an e-portfolio management service; but if it were available through one, it would save participants much extra effort. Thus it would be more likely to be used.

A second example picks up an idea already mentioned above. Instead of filling in new forms to give useful information to the organisers of conferences, individuals could give permission for the relevant information to be retrieved through their e-portfolio management system. Depending on what information they allowed, it would enable conference organising systems to offer a much richer service.

Perhaps the most obvious of all examples would be an e-portfolio enabled employment service. Those who maintain their own up-to-date and relevant e-portfolio information could be offered many greatly time-saving short cuts in the process of finding and applying for jobs. Such may be the gains in efficiency, that new kinds of service may spring up in the area, such as employment services that take proper account of corporate and personally-held values and ethics.

4.10. E-portfolio system, service, tool

For these three possible terms no definition is offered here because they seem to have a rather wider and less exact meaning. Any of these terms might be useful if a general term is wanted which does not commit the user of the term to a particular definite interpretation.
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The term “e-portfolio system” might possibly be used as a shorter variant of *e-portfolio management system*, but is more liable to ambiguity. In particular, it might be taken to include any reasonably extensive *e-portfolio related system*, including an assessment management system, even if it did not give the individual a fully appropriate degree of control over the portfolio items. Including the word “management” emphasises that one of the key functions of an *e-portfolio management system* is to allow individuals to manage their *e-portfolio items*.

An “e-portfolio service” might be understood as covering *e-portfolio management services*, *e-portfolio related services* and possibly some *e-portfolio enabled services*. The key difference between systems and services is the point of view. Whereas a system tends to be seen as including the ICTs as well as the software, or even ideally including the human processes and arrangements, a service is more of a defined relationship which is offered by a system to other systems, or to other people. Thus, if something is termed an “e-portfolio system” the image is of people interacting with that system, as they do with current *e-portfolio management systems* and electronic PDP systems. If something is termed an “e-portfolio service”, the image is more likely to be of a system, rather than a person, using that service. The human could be using a system, such as an e-learning system, and the e-learning system could be using an e-portfolio service in accordance with a defined Web Services interface. A definition of Web Services can be seen on Wikipedia at http://en.wikipedia.org/wiki/Web_services, but no more will be said here as the discussion is highly technical.

The concept of an “e-portfolio tool” would certainly include *e-portfolio management systems*, and quite possibly other *e-portfolio related systems*. A definition is not offered here, as there does not appear any obvious principled reason for deciding which systems would be included in or excluded from such a definition.

4.11. Resolving disagreement and ambiguity through changing usage

In the light of these definitions, many existing misunderstandings and disagreements could be resolved by replacing the term “e-portfolio”, where used unqualified, with *e-portfolio management system*, *e-portfolio presentation*, or (less likely) *e-portfolio repository* or *e-portfolio related service* as appropriate, which together seem likely to cover the possible intended meanings.

5. Purposes and uses of portfolio information

So far, little has been made of the different purposes, contexts and scenarios of use of *e-portfolio related services* and *e-portfolio information*. The point of this paper has been to prepare solid ground for these discussions, rather than to cover them. E-portfolio literature and discussion together suggest several *e-portfolio related services* and areas of application which may use *e-portfolio information*. Among them are these.

- Assessment
- Demonstration of competence
- Self-presentation
- Learning
- Personal development
- Professional development
- Expression of self-identity
These areas of application are clearly related. The systems and services that are needed or proposed for them may cover more than one of them. To avoid confusion and duplication of effort, these common services need to be factored out. This effort would play a part in the kind of “reference model” set out by Olivier et al. (2005) as part of the “e-Framework for Education and Research” jointly proposed by UK’s Joint Information Systems Committee and Australia’s Department of Education, Science and Training (see http://www.e-framework.org/)

It is hoped that practitioners, researchers and policymakers in each of these areas will be able to use the terminology proposed above to help clarify their discussions. In particular, they may find it relevant to consider:

- what types of e-portfolio item are relevant to their domain;
- whether an e-portfolio management system could usefully play a central role;
- what e-portfolio related services are appropriate to offer the various actors in their domain;
- what e-portfolio views would be appropriate to different actors;
- if e-portfolio presentations have a place in their scenarios, and if so, what place;
- whether the e-portfolio information is to be found or stored in one or more e-portfolio repositories;
- whether, in the longer term, valuable e-portfolio enabled services can be devised and implemented in their domain.

6. Orthography

Definitions are typically written down, so a final note is on orthography. Fortunately, there is no pressing need to agree on orthography, as there is little chance of misunderstanding, and there are no clear differences in meaning between the different written forms which have been used. Nevertheless, it may be worth noting the difficulty for the form “ePortfolio” when it comes to capitalisation. In particular, there are clear problems with clarity and readability at the beginning of sentences, and when using all capital titles. The other widely-used form, the hyphenated “e-portfolio”, has no such difficulties, allowing appropriate capitalisation in all contexts. An added advantage is that the very clear convention becomes possible, where “e-” stands just for “electronic”. It is for these reasons that the hyphenated form has been used in this paper.

A possible drawback may be seen in line breaking. Much word-processing software will break a word at a hyphen if that is convenient for the end of a line. This leads to the unattractive appearance of “e-" at the end of a line and “portfolio" at the beginning of the next line, which may be more difficult to read. However, this problem can be completely solved if a non-breaking hyphen can be used.

7. References


Interoperability and Portability

Interoperability: possibilities and probabilities
Session: PS1D
Type: Work in Progress
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Abstract
This is, necessarily, a work-in-progress: reflecting the subject matter – eportfolio interoperability – which itself is in a state of flux. This paper discusses some of the more pragmatic, problematic and prosaic issues encountered in developing an interoperable eportfolio environment. Technically all things are (virtually) possible however some technical solutions are arrived at in a personal, professional and political vacuum which renders the solutions imperfect, incomplete (or incomprehensible). This paper, which is best viewed along with its supporting presentation, concludes that purposeful, inter-system interoperability is some way distant and that learners may be best supported in the interim with user-friendly ways of exporting their learning stories into self-managed, life-long spaces like Google or Yahoo.

1. I am not a number...
Many discussions of ePortfolio appear to conflate diverse data types; they consider any information about ‘me’ to be appropriate fodder for my eportfolio. How should we regard all of my personal data? Is it a record of me; my qualifications, my attendance record, my credit history and my societal transactions? Is it a picture of me; a metaphorical representation, an accurate view of me as a learner, a worker, a parent, a conformist or a protagonist? If I draw together all of the data that somehow ‘describes’ or relates to me - is that my ePortfolio?

We argue that data should be viewed in two domains: the hard, institutional data that is typically found in a management information system and the richer, personal data that the learner has created, aggregated, reviewed and revised. The hard data is Myopic in nature; it is narrowly focussed, uncreative data that describes the course I am on, the fees I owe, the credits I have gained and the places where I can be contacted. The rich data is Biopic in nature; it is personally significant, it represents things I have done, created, achieved, thought about AND which I have decided to collect, record and review.
To increase the value an ePortfolio brings to its owner there need to be links between the Biopic data store and the (multiple?) stores of Myopic data (see Fig. 1). These will require links which cascade ‘permission to view’ to the end reader of the learner’s story; a story which links to rich, personally significant accounts held within the personal asset store and to items held about the learner on institutional systems. Allowing someone permission to view items or information a learner has added to a WebFolio is controlled by asserting permissions on the WebFolio itself. Our own experience of federating permissions has highlighted that the issue is more of a political challenge than a technical one. Compiling the correct code to make data calls on other systems is much less difficult than convincing the gatekeepers of those other systems to allow the calls at all.

Where institutions allow ‘cascaded permission’ to view information that they currently ‘steward’, this permission may be revoked when the user leaves the institution. In this case, rather than maintaining a dynamic link, the information, in the form of a report – or in HE, a transcript – would be archived as static information within the user’s ePortfolio repository. This can easily be stored as an accessible, but non-editable, report which is assured unadulterated by the ePortfolio system.

This could be a simple, secure tool-tip which displays on roll-over “This is an original version of Andrew N Jones’ Transcript. Viewing this text indicates that it is an authorised version.” Of course, a user with the right (or wrong) motivation could print the report to an editable format, edit it (or alter it in Photoshop) and re-upload it to the system. This ‘ability to alter’ is a source of particular anxiety to many colleagues who assume that digital assets are not secure. How secure do they think the paper transcripts are that we
currently issue? Never mind digital manipulation; Tippex and a photocopier will suffice!

The advantage of dynamic links is that they are current at the point of viewing by the recipient and, especially important for high-stakes information like the HE transcript, they are viewed on a server where their authenticity is assured. Where it is not possible to maintain those links then an eportfolio system must be able to assure the validity of items, reports or transcripts transferred to it. If a system is unable to do this then the integrity of all that is presented through the eportfolio may be called into question.

2. What’s my name?

Moving information between systems in meaningful ways is the challenge of interoperability. Describing the Myopic data is relatively straightforward. Though, as is the case with even simple data elements, straightforwardness is always relative! How, for instance, should a system describe the name Andrew? Forename? First name? Given name? Christian name? Notwithstanding the methods employed by non-eportfolio systems, the UKLeaP standards themselves offer two possibilities. This means that even at this very simple level two systems conforming to the specifications may still need to produce a conversion methodology to move records between themselves. If this is the position with hard data then successfully transferring much richer, personalised data between systems is very much more challenging.

Diagram 1 shows an example asset from the PebblePad ePortfolio System – this is one of the least complex assets. The asset has a core entry, in this case describing an ‘ability’. To add weight to the claim evidence is attached or linked and a reflection on the significance of the ability is recorded. The owner of the asset is able to add a note – perhaps describing the context in which the ability is evidenced; over time the user can return to the asset and add reviews “whilst I felt this ability was only applicable in this context I now realise that…”
Fig. 2 – Describing an ‘Ability’ asset

PebblePad allows users to share their assets at any level of aggregation and to invite comments. In this case two comments have been added and a reply recorded against one of them. The asset can also be linked to other assets – typically an ability might be the result of an earlier action plan.

This kind of substantial asset is not uncommon. Indeed, in research conducted at the University of Wolverhampton during the ePortfolio pilot year, this level of recording represented the norm rather than the exception. Unfortunately this representation of an asset is unlikely to be the norm across eportfolio systems, even when they conform to the same set of standards. This is exacerbated by the fact that definitions of eportfolio vary so widely; which itself is because most systems have been designed (or re-branded) to fulfil very different functions.

Fig. 3 – Simple asset

Fig 3 represents an indicative asset record from a competency-based ePortfolio system – one closer to the assessment or student-management end of the eportfolio
continuum. It is instantly clear that this record has far fewer elements describing it than the previous example. Transferring an instance or multiple instances of records like this is not problematic when moving them from a ‘simple-system’ to a ‘rich-system’. Indeed if such a record were transferred to PebblePad then the learner would be able to access the record and enrich it through reflection, review and feedback. However, if the record represented in fig.2 were transferred to a system designed to handle the kind of assets described in fig. 3 then much of the potential richness may be lost. Where space or performance are important design constraints then the receiving system may be designed to delete (or fail to import) those elements of the asset record that it is not designed to handle or display. The system may also delete the complete record if it is of a type not used by the receiving system. Figure 4 represents what would be lost during the transfer of an asset from a rich-system to a simple-system. An eportfolio system which deletes any part of an incoming record cannot claim to be compliant with any of the IMS-derived specifications.

<table>
<thead>
<tr>
<th>Core Entry</th>
<th>Ability - competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence</td>
<td>activity(productive) / relationship(evidences)</td>
</tr>
<tr>
<td>Evidence</td>
<td>reflection(note,cognitive) / relationship(reflectsOn)</td>
</tr>
<tr>
<td>Note</td>
<td>Assertion(note) / relationship(reflectsOn)</td>
</tr>
<tr>
<td>Review</td>
<td>Reflection(retrospective) / relationship(reflectsOn)</td>
</tr>
<tr>
<td>Comment 1</td>
<td>Reflection(note) / relationship(reflectsOn) / Agent(tutor) / Author(name1)</td>
</tr>
<tr>
<td>Comment 2</td>
<td>Reflection(note) / relationship(reflectsOn) / Author(name2)</td>
</tr>
<tr>
<td>Reply</td>
<td>Reflection(note) / relationship(reflectsOn) / Author(name??)</td>
</tr>
<tr>
<td>Linked to</td>
<td>Goal / relationship(precedes)</td>
</tr>
</tbody>
</table>

*Fig. 4 – Information lost in transfer between a rich- and a simple-system*

If the receiving system cannot display all parts of the asset data in a form which allows them to be edited and/or reviewed it may be designed to present certain elements of the data as flat text. The relationships between the data may be lost and the context in which it is recorded but the data itself will be preserved. The desired mechanism for a ‘host’ system is for it to store those parts of the data which it cannot represent until such time as the record is moved on to a subsequent system. At this time the record is reassembled, with its relationships and context preserved, and exported to another eportfolio system which may be capable of an accurate representation of the earlier record.
3. **Simple Solutions**

The development of sophisticated eportfolio systems is still relatively new and the standards designed to support interoperability between systems are still under development. Even when those standards are ready for wider implementation it will be some time before there is simple and comprehensive interoperability between different eportfolio systems. Even at a very practical level there are transferability issues which arise simply because of the size of eportfolio records. Whilst it is possible to design features to support ‘resume download’ on a transfer out of an eportfolio system it will be much more difficult to upload even a 100mb record to an institutional system. The server will almost certainly time-out and there is, at present, no way to assure a ‘resume upload’ feature.

Developers of eportfolio systems therefore need to ensure that there are practical ways in which users can archive or move their eportfolio data when they leave an institution. Ideally of course institutions will continue to provide hosting for learners – even if this is tied up within some kind of Alumni package, though it is highly unlikely that all providers of eportfolio systems will continue to provide learners with access to their records once they have moved on. One simple, but effective method is for learners to compile assets into a variety of ‘stories’ (presentational eportfolios) and export each of these stories to any of a range of storage devices and then on to their own, self-managed web-space (Google, Yahoo etc.). In our early developments IMS content packages were used to prove the utility of this self-managed interoperability. Indeed, an unplanned bonus was that teachers were able to use the eportfolio to create web-based resources (WebQuests, Treasure Hunts etc.) which could be transferred to the virtual learning environment. The recent development of the IMS ePortfolio specifications makes this a more viable solution as IMS ePortfolio packages also act as content packages allowing users to view their eportfolios in web browsers. Once in the web space any of the assets linked to a particular story can be linked to from any other eportfolio that allows linking to external URLs. The presentation of artefacts through ‘free-for-life’ web space is one way of ensuring the persistence of links from subsequent eportfolio systems to assets created earlier in a learner’s life.

Approaches to, and support for interoperability continues to develop apace: it is crucial to ensure that the solutions we arrive at support the end user; that allow user agency over how their records are secured, moved and reused without recourse to IT technicians. Simple solutions will help to maintain faith in the concept of eportfolio for life-long and life-wide learning but attaining these solutions must not default to simple systems at the expense of eportfolio systems that focus on rich, personally significant stories of learning.
An ePortfolio approach in the Netherlands

Type: Work in progress

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Abstract

The interoperability between e-portfolios is important when it comes to ‘a life long learning’ supported by a ‘portfolio from 6 to 86’. This involves commitment and agreements. Kennisnet is setting up an e-portfolio project in the Netherlands to develop a standard following an approach in three steps:

1. Develop a standard, make for this purpose agreements on the format of an e-portfolio based on international specification(s);
2. Implement the standard and test the standard by practical experience and;
3. Manage and maintain the standard to guarantee the standard;

involving all stakeholders in the chain (Education and professional market).

The themes and issues are

- Technology, issues standards and operability;
- Implementation, issue stakeholders.

1. Introduction

1.1. Standards in Learning environment Education and Labour Market

Within the framework of educational use of ICT there are a lot of challenges to face until there is an actual effective strategy for implementing educational technology in daily school practice. One of the most important problems is the lack of standardisation and agreements. Agreements, specifications and standards all lead to the increase of ‘find ability’, exchange, reuse and stability of value of educational content (learning objects) and information within electronic learning environments. Agreements increase the possibility for educational innovation and the specific role of educational technology. Agreements are from this perspective an important condition for flexible education.

The explanation related to ‘Portfolio in practice’ as mentioned below puts emphasis on the importance of agreements.
Portfolio in practice Jan Bartling, Manager ICT ROC Aventus, chairman of ROC-i-partners

For several years now there is some discussion on the use of portfolios within the MBO (vocational training). Portfolios are seen here as an essential instrument for the guidance of participants within competence based education but also for streamlining and stimulating the transfer between the secondary education and vocational training. In the past there was a lot to do about which portfolio should be the standard. Fortunately these times belong to the past and now it is time for action.

This is the case at ROC Aventus (a vocational school) and a lot of colleague institutions where pupils from the VMBO (secondary education) now attend schooling at these ROC institutions. Preliminary to the ROC education they had vocational training where they became experienced in making products. These experience where described in a (usually physical) portfolio. This portfolio is used during intake procedures at an MBO-education where the pupils apply for. During these procedures this document is a very valuable information source for obtaining insights about the choices the pupil made during his/her former educational career.

Nowadays the ROC Aventus uses the portfolio (meanwhile the portfolio’s are digitized) as an instrument for guiding the participants in the framework of competence based education. In this instance the portfolio has become a very important evaluation tool and it’s being increasingly used by a wide variety of trainings. Concerning intellectual property rights, the responsibility of the content in the portfolio lies with the learner (the pupil, employee) but the educational institutions determine a set of criteria for the actual content, which should appear in the portfolio document. This results in a process where the portfolio slowly expands and at the end of the education the participant is able to take this portfolio with him/her to the HBO (higher education) where the pupil can show his/her performances. Not every participant decides to attend higher education but instead chooses a professional career. In this situation the portfolio serves as a valuable instrument for showing the future employer what he or she is capable of.

The examples show transfer moments, first a transfer from the VMBO to the MBO and secondly from the MBO to the HBO or a professional career. These transfers are essential for the use of portfolios in practice. What are VMBO pupils going to do when the follow up education uses a blanc portfolio? What meaning can pupils give to their efforts at the MBO education when the HBO doesn’t acknowledge these efforts?

It is not a question about whether the transfers use standards. From the perspective of a pupil/participant/student this is absolutely logical. This is moreover a case of finding a standard, which everybody can use, both in educational situations as outside these situations.

To make the exchangeability of digital portfolio’s possible and also guarantee sustainability agreements are needed. Agreements on the fields to be used for information storage should therefore be harmonized with different parties in the chain (educational/professional). For this reason the Kennisnet Foundation started in July the project e-portfolio (http://e-portfolio.kennisnet.nl). Kennisnet uses a proven method from the project Educational Content chain.
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(\url{http://contentketen.kennisnet.nl/praktisch/contentchain}); an explanation of this method is mentioned below.

1.2. The “Investigation e-Portfolio” in 2004

The “Research on e-portfolio, an organizational and infrastructural challenge” (Hensen, 2005) carried out by order of the Ministry of Education by means of the Kennisnet Foundation and realized in close collaboration with ROC-i-partners, SURF, CWI and Colo was presented on the 14th of January, 2005. One of the recommendations of this investigation was to start activities with the aim of realizing national standards and to take a first step in the direction of bringing together all stakeholders with the same frame of concepts. The stakeholders involved are the field of education (primary education, secondary education, vocational training and higher education), educational publishers, knowledge centers and professional market.

1.3. National developments in higher education, vocational training and business branches

The changes within the different educational sectors in the Netherlands are resulting in more emphasis on competence-based education, demand driven learning and tailor made learning. Moreover this change of focus asks for a reconsideration of the existing instruments and tools. The ideal situation would be a close connection between e-portfolio (with the need of the learner) and educational content (the offer of education and educational data); this is actually stimulated by the educational changes. The central notion in competence-based education is the ability or competence to act. Traditional forms of testing fail to examine these competencies. The use of e-portfolios offers possibilities especially through the use of products within an e-portfolio framework (papers, pieces of work, videos etc.) and also the reflection and feedback mechanism. Also in business branches there is a need for thinking and working with competencies. All the developments mentioned will accelerate the use of e-portfolios.

1.4. International developments

Some exploratory research shows that the development of e-portfolios in other countries will accelerate in the same way. The sharing knowledge/experiences (e.g. best practices) in the field of education the Netherlands and the Britain’s have taken an important position. From an organizational point of view, the Americans focus more on training and support during the implementation of e-portfolios and also on the aspect of accessibility. In this case the instrument is a portfolio for “a life long learning”.

2. An approach in the Netherlands

2.1. Introduction to the approach

The question to answer is three folded:
1. How to realize a standard for e-portfolio?
2. How to implement an agreed standard?
3. How to guarantee an agreed standard?
The approach which meet the answers on the questions is to:

1. Develop a standard, make for this purpose agreements on the format of an e-portfolio;
2. Implement the standard and test the standard by practical experience and;
3. Manage and maintain the standard to guarantee the standard.

See Figure 1.

2.2. Developing a standard with a chain-based approach

The development of a standard will consist of making a set of agreements on the format of an e-portfolio and a collective and clear understanding of the e-portfolio. The result is an application profile for the Netherlands fully based on IMS ePortfolio specifications to achieve the aim of providing the interoperability on the transfer points (every possible transfer point between the sectors of education, within the sectors and with intermediate organizations and business branches).

The first step was to involve all stakeholders of all possible transfer points of an e-portfolio. The participants (representatives of the stakeholders) determined in three workshops (May and June 2005) the substantive format (the “WHAT”) of the e-portfolio. The workshops started with the results of the “Research on e-portfolio” of 2004 and with the IMS ePortfolio specification (starting with the Draft of the 20th of September, 2004; later on the Version 1.0 Final specification ePortfolio of June 2nd, 2005). Between the workshops the participants consulted their colleagues concerning the results then their will be a further detailed description of the used terms. The last workshop aims at appointing the first draft of the agreements. The result is an agreement concerning the format/content of an e-portfolio, the first version of the standard and a framework for the implementation of e-portfolios in the Netherlands.

2.3. Implementation of the standard concerning e-portfolio

Making agreements in the chain based approach (concerning all transfer points) is one strategy, effective reviewing of the practice in relation to made agreements might be even more important. Using the agreement in the field (Education as well as
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professional market) the advantages and the shortcomings of the former agreement come to light. Involving the suppliers of e-portfolio information systems and the results of the reviews are very important to the implementation efforts. In this respect the used agreements and previously used information systems will be a natural supplement on existing practice.

Reference projects and proof-of-concept projects

The implementation of the standard consists of several activities. The first step is to look for reference projects in the Netherlands; these are current or starting projects with the focus on the exchange of e-portfolio data in relation to one or more transfer points in the chain approach. The usage of the agreed standards will be supported in these projects. In reviewing these projects the aim is to pinpoint weak points, this will eventually lead to adapting this knowledge in the agreements and/or the standard.

Beside the search for reference projects a regulation on stimulation will be developed for proof-of-concept projects. These projects aim to start initiatives, which focus on the electronic exchange of data on transfer points not realized in reference projects. Also proof-of-concept projects review the agreements and this will eventually lead to more adaptations within the agreements.

Architecture of e-portfolio and implementation guides

During the implementation of e-portfolios in the reference projects and proof-of-concept projects the main focus is on reviewing the standard in practice and that there is less attention paid to the processes around e-portfolio. This part of the implementation path actually examines the processes around e-portfolio and translates these to an e-portfolio architecture. The experiences in the area of practice of implementation of e-portfolio as shared in the different reference projects and proof-of-concept projects are the basis for this. Moreover there is a need for new initiatives and implementation guides so that the experiences from the past are available. An overview of former agreements, architecture and implementation guides provide the desired support for the implementation of e-portfolios. The aim is to help with the realization of e-portfolio initiatives of educational institutions, intermediate organizations, business branches, companies and software suppliers.

Dissemination, communication and training

To assure that the field of education can benefit from the experiences of the project, there is much attention to communication and dissemination of knowledge. During the implementation path it is important that former agreements and gained experiences are shared within the practice of the reference projects and proof-of-concept projects. Through continuously scanning for e-portfolio initiatives and through effective communication and dissemination of knowledge it will be easier cooperate with other e-portfolios and e-portfolio related initiatives. This consists of supporting activities concerning “Agreements on e-portfolio, a chain based approach” and "Implementation of the standard concerning e-portfolio". Established architecture and implementation guides serve as a basis for communicating and disseminating knowledge.

In the different phases of the project the nature of the communication will differ. In the beginning the communication will aim at the format/content of an e-portfolio agreement and the interoperability of this agreement. Later on the communication will
aim more at on educational management where the focus is on the connection between the needs of educational organizations and the use of e-portfolios. Finally EduExchange will be the platform to communicate the experiences of the reference projects and proof-of-concept projects concerning the use of the standard.

**Preliminary analysis e-portfolio systems and administrative systems**

The "Research on e-portfolio" in 2004 has proven to be that the need for further study on possible connections between e-portfolio and the administrative systems still exists. This leads to a preliminary analysis of the desirability and the feasibility of implementing a certain feature in electronic learning environments, learning and administrative systems. This preliminary analysis is also relevant for the architecture of the educational content chain. A by-product of the analysis is a quick scan of the available e-portfolio information systems and the extend to which these information systems approach to the possibilities for registration and exchanging data between the different e-portfolio information systems.

**Manage and maintain the standard**

The agreements will be combined in a standard, which will be secured by placing these in a document, which actually describes these agreements. An independent party will monitor the management of the standard. It is important that all stakeholders who are involved in the exchange of e-portfolios will have influence on the management and the maintenance of the agreements.

**3. Conclusion**

To implement the standards it will be important that the stakeholders are involved in the process of making the agreements. Besides this the reviewing of the agreements is also an important issue. Stimulation, dissemination, communication, training and looking for efficiency within the administrative systems will be the basis for a national and international exchange of data on e-portfolios.

**4. Results until now**

In the Netherlands the standard "Agreements concerning e-portfolio" is realized in concept. On September 28th, 2005 the standard will be reviewed and determined in a final workshop by all stakeholders countrywide.

This version of the standard will be reviewed in the first reference projects from October 2005. See figure 2.
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Figure 2: Status of the process of developing standards

5. References
Hensen, Th. (2005) Research on e-portfolio, an organizational and infrastructural challenge
Kennisnet Foundation Zoetermeer

*) Centre for Work and Income (CWI) is the first stop for job-seekers and employers.
Abstract
This paper gives an insight into the use and implementation of portfolios, either traditional paper-based or electronic, in teacher training in Europe, namely in, Finland, Norway, Italy and Catalonia. The paper focuses on two perspectives; firstly, on the national policies, either in place or envisaged, to foster the use of portfolios both in educational institutions and for the purpose of teacher training. Secondly, the paper presents a number of selected case studies on (e)-portfolio implementations in the countries in question.

Keywords
portfolio, implementation, teacher training, Europe, policy, scenario building

1. Introduction
In Finland, Norway, Italy and Catalonia there is a strong policy drive to integrate the use of portfolios in educational settings for different levels of education. This has led to different portfolio initiatives, some of which are more technology driven, whereas others focus more on introducing the concept of portfolios in education.

Portfolios are part of large scale initiatives in Norway and Italy where the use of portfolios goes together with an educational reform. Italy introduced the concept of portfolios targeting at all schools, whereas Norway has an outreaching policy for portfolio implementation in terms of use at all levels of education. The Norwegian portfolio scenario in this paper presents a case affecting all teacher trainees in Norway. Portfolios are likewise seen as a tool that can help to renew teaching methods in Finland, the portfolio scenario presented in this paper is part of a networked nationwide action between universities. Catalonia on the other hand, takes up a European initiative in the field of language learning and gives support for its integration and dissemination at national level. The portfolio pilot project in Catalonia is part of a training framework that affects a group of teachers who use it in secondary education with preparation going on to implement it also in primary education.

The first part of this paper gives a European review, which is not exhaustive, on the national and regional policies for the use of portfolios in teacher training. These policies are either already in place and implemented, are envisaged or only in their planning phase.
The second part of the paper concentrates on case studies of four selected countries presenting cases on how portfolios are used in teacher training. Each case follows a “scenario building” scheme that has been developed in the framework of the EPICC project. The idea is that each case study includes a scenario. In a scenario the use of portfolio is described in a narrative form answering questions such as “how is the portfolio used by the learner?”, “who are the other stakeholders and what are the expected outcomes of the portfolio?”. Hence, the attempt is to look at the e-portfolio usage from different stakeholders’ points of view, such as learner, teacher, tutor, recruiter, worker’s unions, etc.

The final part of the paper provides a meta-analysis of the portfolio cases implemented in the presented countries. This includes the attempt to identify any emerging models, establish common characteristics of successful e-portfolio implementation, but also common challenges or drawbacks in the implementation of an e-portfolio. Finally, the paper will attempt to give recommendations for the field - on policy and practice level- to create favourable framework conditions for the successful use of e-portfolios in educational establishments.

2. Policies of portfolio use for teacher training in Europe

A portfolio culture, which can be both paper-based and electronic, in schools and other educational establishments, can only be coherently developed if policy-makers set favourable framework conditions for their implementation. Otherwise, only some individual projects lead by enthusiastic teachers or individual schools flourish without fully benefiting from the potentials of portfolios in an educational context.

This part will set the policy framework for the portfolio use in supporting teacher training with focus on the countries of the selected case study. Policies from other countries will be brought into the picture, if they show interesting approaches.

2.1. Policies on portfolio use in Norway, Finland, Italy and Catalonia

Finland

In the recommendations of the Finnish Information Society Programme for Education, Training and Research 2004-2006 it was announced that good overall and pedagogical ICT skills enable the teaching professionals to develop their own work and renew their teaching method. Supporting this need the Finnish Virtual University has funded several sub-projects through funding they received from the Ministry of Education. “TieVie” is one of the funded projects by the Ministry of Education.

The TieVie project offers training free of charge to all the teachers and other staff members in Finnish universities. Training started in 2001 with two courses, one part of the program aimed to provide skills in using ICT for educational purposes and the other part aimed at content-specific and professional applications, the production of digital learning materials, institutional information management, and an ability to assist, support and train colleagues, develop the school community and act a part of an expert network. During the training the participants collect all products in a portfolio.

The Ministry of Education monitors the number of participants, their affiliations and the work they have achieved during the training. Until now 934 persons have passed the course and the amount of participators this year’s course is 100. The aim is that
by 2007 at least 75% of teachers have the knowledge and skills to use ICT in teaching. (Ministry of Education 2004). The funding from the Ministry has decreased yearly for the aim of creating local courses of ICT in different universities.

**Norway**

The Norwegian Ministry’s Programme for Digital Competency 2004 – 2008 states that within 2008 portfolio assessment should be in use at all levels of the educational system in Norway. Thus, the use of portfolios is an imperative at all levels of the Norwegian educational system. Norway has witnessed a number of strong official commitments to the use of portfolios since 2003, with emphasis on e-portfolios. In 2003 a white paper to the Parliament proposes that portfolios should be used in primary education for learning, as an overall assessment tool and for schools parent contacts. From 2003 teacher education had to integrate the use of portfolios in their plans, as portfolios were considered one of the important tools of “The Quality Reform”, a major educational reform in higher education.

The Norwegian policy documents use the concepts “portfolio”, “digital portfolio” and “assessment portfolio”, often in connection with policy statements of using more ICT in education and introducing new methods of teaching and learning. However, it is up to the individual school and teacher to define what pedagogical, technological and other implications the portfolio imperative should have.

**Italy**

In Italy portfolio use in schools for assessment purposes is high on the policy agenda and part of the school reform. The Italian Ministry of Education (MIUR ) introduced the use of the portfolio in school with the Ministerial Decreed Nr. 100 dated September 18th 2002. The article 7 describes the portfolio as “Competences portfolio” and as an object that includes:

- descriptions of the progress of the student
- document (assessment test, projects, etc) produced by student during the school year

The law indicates that the portfolio should be updated and compiled by the student’s family and teacher (in accordance with the working team – head teacher).

The second step in the introduction of the portfolio was made with the Law Nr. 59. The annex “Indicazioni Nazionali per i Piani di Studio Personalizzati nella Scuola Primaria” (Presidential Decreed Nr. 275/99) describes portfolio structure, its functions and management. It is divided into two sections: the evaluation and orientation sections, both of which aim at helping the student to be aware of his/her skills.

At a national level the Italian Ministry of Education is to disseminate the use of portfolio, which is supported by the teachers’ training through INDIRE’s e-learning environment. INDIRE offered to teachers a training course with experiences in the use of portfolio at national and international level and exchanges of opinions with experts via synchronous and asynchronous tools.

**Catalonia**

The Catalan Ministry of Education has been involved in the training and coordination of a small number of primary school teachers who pilot the European Language
ePortfolio Policies

Portfolio (ELP) in Catalonia to reach the principles and aims of the Council of Europe in the field of modern languages.

The concept of the European Language Portfolio (ELP) was developed by the Language Policy Division of the Council of Europe, piloted from 1998 to 2000, and launched on a pan-European level during the European Year of Languages (2001) as a tool to support the development of plurilingualism in language learning.

The ELP was designed partly to mediate the Common European Framework of Reference for Languages (CEF) levels of language learners and to help them record their competencies in an internationally transparent manner and manage their language learning on a lifelong basis.

The schools and the teachers taking part in the project were selected through public announcement made by the Catalan Ministry of Education. They were offered tailor-made teacher training sessions, an earmarked budget was assigned and teachers and schools were given institutional recognition from the Department of Education for their contribution. Two teams were created to pilot ELP in mainstream education: One for the 8-12 pupils’ ELP and another for the 12-18 year-olds.

2.2. Policies on portfolio use in other European countries

In most other European countries portfolio use in teacher training has only been taken up recently or is not yet on the national policy agenda and mostly driven by organisational initiatives. In the field of teacher training, if not centrally directed, the universities have their own policies of introducing the use of portfolios in teacher education. The UK and the Netherlands shall be illustrated here as examples where the development of e-portfolios have a quite prominent place. These two examples also show a different emphasis as opposed to the countries of the case studies, they encompass e-portfolios also as a tool for documenting lifelong learning and to move between different stages of education.

Much experience with the implementation of digital portfolios has been acquired in The Netherlands, through both national projects and initiatives set up by most institutions of higher education. Here the creation of portfolios is strongly connected to issues such as competence development, employability and life long learning. In The Netherlands there have been a number of examples of the use of the portfolio in education where teachers (at university) are trained in education that is competence-oriented and prepares students for a clear professional practice. (Surf Stichting 2004). The university teachers training division at the University of Amsterdam has, for example, been working for years with the competencies for teachers.

E-portfolios are an emerging area of technology-supported learning which is beginning to be reflected in UK policy. Although no formal national e-portfolio system exists at the moment, e-portfolios are referenced in mainstream national policy. They might be seen as providing the ‘glue’ between elements of the learning and assessment processes. There is a widespread policy support for national implementation of an e-portfolio process and consequently work has been commissioned to support the drawing up of detailed specifications.

The e-Strategy, ‘Harnessing Technology’ refers to e-portfolios in their relation to the personalised on-line learning space. Every school and college will have a personalised on-line learning space by 2007-8 ‘with the potential to support e-portfolios’. The paper outlines the use of e-portfolios as a personalised tool for
learners that supports them at all stages of education and with progression to the next stage. Although the extent and function of an e-portfolio has yet to be defined, the e-strategy does point to key components which it believes e-portfolios must have.

The 14-19 Education and Skills Policy White Paper (DfES 2005) was unequivocal in its support of the introduction of technology to support assessment. In this policy paper, e-portfolios were seen as a way to support the practical assessment of vocational and occupational courses. The Qualification and Curriculum Authority (QCA) was explicitly encouraged to continue its assessment modernisation programme.

The Higher Education Funding Council for England’s (HEFCE) e-strategy also mentions e-portfolio as a strand of work it expects to continue. E-portfolios in the higher education sector are largely concentrated around good practice in personal development planning.

Although these policies tend to refer to different components of the e-portfolio process, taken together, they form a comprehensive view of what e-portfolios could encompass in their support of learning, teaching and assessment (UK country 2005).

A recent EUN survey on Assessment schemes for Teachers’ ICT Competencies revealed that more flexible, learner centred, forms of assessment and accreditation for teachers’ competencies are needed (Balanskat 2005). Portfolios could play an important role in that process. Some other countries have only started to take initiatives accordingly, which are briefly mentioned in the following.

In the context of the recommendations of the Swiss Conference of Cantonal Ministers of Education- CDPI-EK concerning the development of teachers competencies in ICT use, there is also a proposition to develop personal training portfolios in ICT related teaching competencies that are to be recognised across cantonal boarders and, wherever, possible, internationally compatible.

France has also started to look into the issue, especially in relation to the C2i certification for teachers and other students at university

In Northern Ireland the regional training unit will run on-line programmes of professional development using e-portfolios. On-line access to material, peer-to-peer, email and file exchange facilities will be mandatory requirements for the professional qualification for headship in Northern Ireland.

In Germany the use of portfolios for students is envisaged to be integrated in the concept of the full day schools as a means of showing competencies students have in using new technologies.

In countries, where there are no special national scale initiatives and projects for the use of e-portfolios in schools, work is under progress for regulating ICT- competencies and their evaluation, as well as to create suitable conditions to endeavour these competencies, e.g. Lithuania. Portfolios could play an important part in that process. However, information about developments and different e-portfolio initiatives is not yet available in many countries at national level.

This part of the paper looked into policy practices, and the following part will present several case studies to give more insights into the practical implementation of portfolios in the field of teacher training.
3. **Case studies of portfolio use in teacher training**

This part will first describe the tool to be used to write the case studies and then look into four cases of practical portfolio implementation in the field of teacher training in Norway, Finland, Italy and Catalonia. These cases involve different implementations of the use of portfolios: in some cases portfolios are used as reflective learning tools for teachers in their professional development, whereas in other cases they are used more as a tool to report achievements and competencies.

3.1. **Tool to describe the case studies of the portfolio use**

Variations and combinations of different portfolio definitions exist, this paper attempts to classify the cases according to an existing typology created in the framework of EPICC. This typology comprises four different portfolios, such as assessment, showcase, development and reflective portfolios. The definitions are fairly general, and it is common that those different types have characteristics of the other, or that they overlap with one another (Tartwijk 2004).

The cases from Finland, Norway, Italy and Catalonia will be presented according to a common structure. The structure imitates the “scenario building tool”, developed and implemented in the EPICC-project (Rees Jones 2004). This “scenario building tool” provides a general description format to give a uniform look and vocabulary for different descriptions.

The first part of the common structure includes a general description of the case study with additional elements that will describe the type of portfolio, the status of the implementation, the primary and secondary users of the portfolio, the time frame and the context of the usage.

The second part will add different perspectives, or scenario, to the description. These perspectives will be elaborated to tell the same story from different stakeholders’ point of view. Other potential stakeholders of the portfolio, for instance, could be a headmaster who is recruiting a new teacher, or teacher’s union whose interest is in continuous professional development.

In the original “scenario building tool” the following perspectives are envisaged: admission staff, adviser/counsellor, coordinator, employer, manager, mentor/tutor, policy-maker, technologist and worker’s union (Figure 1), but the structure is flexible to add other perspectives, too. This flexibility allows any user to describe in a unique way of using portfolios in any educational setting. Likewise not all the different perspectives must be tackled in the scenario.

![Figure 5: Different interest groups and stakeholders involved in the use of portfolios](image)

Figure 5: Different interest groups and stakeholders involved in the use of portfolios
Finally, each case study will also attempt to look into validation aspects, achievements, success factors, room for improvement and barriers in the implementation.

3.2. Finland

Main description of the case study

“TieVie” is a Finnish nationwide support-service project of the Finnish Virtual University providing training in the use of ICTs in educational settings. TieVie provides an expert training programme. The training is intended to all the teachers and other staff members in Finnish universities, with participants from all the 21 universities in Finland. During the training the participants collect a portfolio about all the products done within the course.

The programme is targeted for university staff with previous education or experience in the educational use of ICT. The participants usually have a profile of educational ICT trainers, IT support personnel, experts and proficient users for universities and their virtual university projects. The training deepens the participant’s knowledge in the educational use of ICT, enabling them to function as trainers, consultants, supervisors, educational planners, support persons, network coordinators or agents in the educational use of ICT.

An e-portfolio, which is mainly used for reflections and description of learning throughout the training, plays a crucial role in the training. TieVie provides a training programme of 15 ECTS (European Credit Transfer System). Previously the training lasted 1,5 years (three semesters), but this year it lasts only little over half a year (from August 2005 until May 2006). The implementation is on-going.

Different perspectives to the case study

Learner's perspective

During the training the participants collect a portfolio about all the products done for the course (Figure 2). Most of the work is guided with certain assignments that are compulsory for all, but participants may also add personal writings and reflect upon their learning. These two last mentioned parts of the portfolio make a difference for the work. Although the work with portfolio serves mainly a personal need (i.e. the participants write for themselves), but the work done with portfolio is freely available for all to look at, except the reflection part which is private. Picture below describes the work done with portfolio during the training.

During the training the work with the portfolio is in two phases. The first phase is collection of material and is called “collection of basic portfolio”. All materials done during the training is first collected into one place. Towards the end of the training participants start to work with their portfolios in order to create a sample portfolio for peer evaluation and assessment. After first round of assessment participants can modify their portfolio for final version. Portfolio is one of the compulsory outputs of the training.

Participants are free to choose which way they prefer to make the portfolio. Some of the universities offer content management tools for teachers that they can use for making portfolios. In this case-portfolios become electronic. Usually it is only about 10% who use this kind of tool, so mainly all portfolios are paper based. This years (2005-2006) participants were offered learning platform tool for portfolio work. In this case all participants have their own folder in platform where they have to collect all
Home institution's perspective

The training intends to deepen participants’ knowledge in the educational use of ICT, enabling them to function as trainers, consultants, supervisors, educational planners, support persons, network coordinators and agents in the educational use of ICT. The participants who take part in the whole training can, for instance, improve teaching in the department or a unit utilising ICT, engage in network teaching activities within a national or international network, participate in master’s programmes using ICT, carry out in-service training in the educational use of ICT in a university, carry out strategy work for strategic implementation of the educational use of ICT, and organise the pedagogical and technical support for the educational use of ICT.

Aspects of validation

Feedback is gathered from the participants on the different components (contact seminars, on-line periods, courses focused on skill) of the training programmes and on the training as a whole. The mentors of the local groups and leaders of the interest groups have gathered oral feedback in their meetings and assessed the success of mentoring in their mentor’s diaries. These diaries are personal self-reflective reports that are not analysed systematically. Local mentor groups are developed through these diaries. Feedback is also gathered from TieVie contact persons in the universities and mentors through joint mailing lists. All this information is processed in planning group meetings where the great lines for the programme are drawn. Some experiences are listed below:

- There has to be a true need and added value for networked nationwide action
- Networked action requires a plenty of time and discussion in a large planning group consisting of 10-15 people, finding compromises is not always easy in tightly scheduled planning
Planning group includes people from different educational and professional background which is a strength.

It is also important to get quickly from the goals to concrete action for the cooperation to proceed naturally.

It is a challenge to integrate the sections produced in different universities into a uniform programme.

A thorough negotiation on concepts and definitions is needed to achieve a joint understanding and shared goals.

### 3.3. Norway

**Main description of the case study**

In one form or another all teacher trainees in Norway use-portfolios in their learning and are assessed by the learning results they are able to demonstrate through their evaluation portfolios. The use of digital portfolios as a means to enhance the learning processes in teacher training was studied 2000 – 2003 at the Faculty of Education at Vestfold University College (the PLUTO study). The introduction of ICT is seen as a pretext to change learning processes. The penetration of Learning Management Systems in Norwegian schools is very high. A survey from 2005 shows the following figures of LMS access (table 1).

<table>
<thead>
<tr>
<th></th>
<th>7th year</th>
<th>9th year</th>
<th>10th year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>31,22 %</td>
<td>36,3 %</td>
<td>90,7 %</td>
</tr>
<tr>
<td>Teachers</td>
<td>38,9 %</td>
<td>48 %</td>
<td>90,7 %</td>
</tr>
<tr>
<td>Management</td>
<td>36,4 %</td>
<td>36,1 %</td>
<td>79 %</td>
</tr>
</tbody>
</table>

*Table 2: use of LMS in Norwegian schools*

The concern of the Educational Authorities in Norway when it comes to introduction of portfolios in schools focuses on portfolios' role in assessment. It is not about adaptive learning, personal development planning, documentation of competencies, or support for reflection or meta-cognitive activities in particular. Assessment has a strong influence on how teachers teach and students learn. “Assessment practices are difficult to change, but if they remain unchanged, important aspects of a new or emergent learning culture are in danger.” (Dysthe O. 2004).

The Educational Authorities are concerned about the quality of education. The Quality Committee behind the 2003 white paper states: “What is special for portfolio assessment it that all the work during training is of importance to the summative evaluation at the end. It is not possible with an occasional spurt just before the final exam.” Portfolios and ICT are two factors that could be administered to make the educational culture change. Combined in e-portfolios they become even more potent.

**Different perspectives to the case study**

**Learner’s perspective** The PLUTO study shows that the students over all are unequivocally satisfied with the organisation of the study, in which digital portfolios played a major part. More specifically about the-portfolios they underline that portfolios give feedback from real users (e.g. fellow students and students all over the country); portfolios are motivating and stimulating (attendance, fellowship...
ePortfolio Policies

feeling); digital portfolios are hypertextual, collective and “dialogueish”; they are revealing and expose products you are not always satisfied with; they invite to share knowledge and texts, they are very labour intensive, and they invite to use much time on design and presentation. However, the survey showed that nobody wanted to stop using digital portfolios.

In conclusion, portfolios as an aspect of new working methods promote new learning processes where theory and practice are integrated better than previously. The portfolio method makes students produce more text, which improves the quality of their learning. The students who define collaboration within base groups as a productive work method assess their experience with PLUTO as highly relevant for their future occupation.

Teacher’s perspective The introduction of portfolios created new forms of collegiality among the teachers. A collective orientation evolved, but not automatically: Academic leadership is a precondition for innovation. The teachers in the PLUTO study valued many of the same aspects of the new learning processes as their students: the social aspect of learning changed, new ways to create and structure texts and convey knowledge were opened up, the dynamic aspects of the texts invited to constant improvements, open portfolios gave authentic writing conditions and a real audience, and they opened up for new ways to collaboration and creation of joint documents. The teachers found it important to make explicit what in a digital portfolio should be kept private, what should be shared within a community of learners, and what is public.

The teachers experienced some negative effects of portfolios, too. Even if the learning results were better, evaluating portfolios took much time. There is a conflict of roles to do very intense tutoring and at the same time be the evaluator to grade the students. There is a fine balance between formative and summative evaluation, and a real danger that the summative evaluation takes over. Digital portfolios give more work for both teachers and students, the PLUTO report concluded.

Policy perspective At a policy level the Norwegian portfolio practice poses many questions, to be followed up both through research and administrative measures. From a pedagogical perspective transparent learning processes are much wanted. When you introduce e-portfolios at all school levels, questions of legal, privacy and other nature arise. As portfolios are, for example, more used in formal exams, the question arises about storing portfolio cross sections for documentation of legal reasons. At a policy level we need to focus on other aspects of e-portfolios, e.g. Personal Development Planning, Career planning, recruitment etc.

Technical aspects The PLUTO study raised questions about limitations of the state of art LMS to support open learning processes. The very concept of e-portfolios challenges the way we up until now have designed our learning platforms (LMS/VLE/MLE). Interoperability aspects of different portfolio systems are just about to be addresses, as for instance the IMS e-portfolio specification is just published.

Aspects of validation
The ambitions in what we have called the Norwegian e-portfolio imperative, are so high, that there is an urgent need for more studies on nearly all aspects of e-portfolios. The study on e-portfolios in teacher training showed promising results. However, it is an open question if the introduction of e-portfolios at other levels “on
the back of” the Learning Management Systems that are now deployed, will deliver sustainable results for the different stakeholders.

3.4. Italy

Main description of the case study

The portfolio is introduced in schools as a tool that can show students’ needs, their learning processes, their reflections, and to store real works which document the student’s career. In Italy the portfolio represents the most significant innovation tool on which primary school teachers have worked with an action-research pilot, analysis and attempted to design and produce portfolios.

At a regional level, more than the 50% of the Italian primary school teachers produced examples of portfolios after having taken part in a short e-learning training organised by INDIRE. INDIRE used its digital teacher training environment (Puntoedu) where a dedicated section of Portfolio was made available. In this section teachers learned about Italian and European experience of portfolio examples; they were able to discuss with experts and share experiences, ask for suggestions, and talk about their doubts. At a regional level the “Istituti Regionali per la Ricerca Educativa” (IRRE – Regional Institute for the Educational Research) carries out action-research pilot projects to support the usage of portfolio in schools, and helps teachers in finding new way for handling didactical activities and speed up work procedures.

Italian experience on portfolio are based and realised as a paper portfolio. In Italy in the law it is not specifically requested to use digital portfolios, hence, it depends on the personal initiative of the Italian schools to introduce any form of portfolio (either on paper or digital). It could be observed that some Italian teachers have a rather negative attitude to produce electronic portfolio since many do not master technology to the level where they feel comfortable to produce or reproduce documents in electronic format. Also, not all the Italian schools are equipped with suitable technology.

Different perspectives to the case study

**Learner’s perspective** “In my school we used the portfolio to manage parents’ meetings: it provides authentic assessment of the student's progress, family assessment and student reflection and self-assessment. It could help to start a dialogue between school and parents.”

**Teacher trainer's point of view** Pontara Giovanni, experts and forum moderator says: The use of portfolio seems to be in the balance between bureaucratic and “picopedagogic” dimension. It helps the student to develop metacognitive aspect; the teacher to personalise the didactic activities; parents to cooperate and be updated on the learning process of the student.

**Teacher’s Union** The main Italian teachers Unions, Cgil, Cisl e Uil, believe that the introduction of the portfolio would change learning assessment criteria and the role of teachers as well. Without better evaluation of practices, the portfolio, according to them, risks becoming a tool to control a person, a document that reports student’s difficulties and lack in term of cognitive processes and consequently a negative judge that will affect student school life.
Parents’ Association point of view According to the Italian Parents’ Association (Associazione Italiana Genitori - AGE) parents should be informed and aware of the possibilities, aims of this tool for their children and the school expectations. To this regards, school should inform and train parents on how to use it in order to involve them in all aspects of their children education.

Headmaster’s point of view Behind the use of the Portfolio there is the school identity and what the school offers in term of school learning plan. Personalised learning objectives, team working and common design and processes are just any of the criteria which lay behind the identity of a school. The usage of a common tool, such as the Portfolio, for authentic assessment of the student's progress and self-reflection is the most visible example of school strong identity.

Italian teachers have somewhat negative approach to the portfolio since they have experienced the usage of a “pupil's personal paper dossier” which is a collection of student significant works and it implied a lot of work for the team of teachers. It was introduced in many schools and it is handled by the head teacher in cooperation with the team of the other teachers of the section. Naturally portfolio shouldn't be considered just another register to fill, but an instrument that shows the way pupils grow.

Aspects of validation

The end of the first step of the R.I.So.R.S.E( Ricerca, Innovazione e Sostegno per la Riforma del Sistema Educativo)v project showed positive outcomes and the fulfilment of the original objectives. The involvement of the schools in the action-research projects carried out and monitored by the regional institution, IRRE; the creation of a common database of experiences dealing with the aspects of the school reform; the cooperative work among the national research institutions, IRRE, INDIREvi and INVALSI vii

This experience and the outcomes of the project lead the Ministry of Education to start a second phase of this project which started in September 2004 and has been just completed. At the moment the Italian Ministry of Education (MIUR) is monitoring what schools have produced through the R.I.So.R.S.E.-project. Updated data can be made available within the next few months (end 2005). The main actions of this new phase will be the set up of research working groups organised in laboratory, based in the network of schools. The "research working lab" will deal with the school reform objects and will be structured according to the school levels. Also, in this phase the cooperation of IRRE, INDIRE and schools management by the USR (Regional School Office that have administrative tasks) will be of strategic importance.

3.5. Catalonia, European Language Portfolio (ELP)

Main description of the case study

To be able to carry out the piloting of European Language Portfolio (ELP) viii it is necessary that teachers are familiar with the principles outlined in the Common European Framework of Reference for Languages (CEF) first, and that they are trained on how to use the ELP, as well as are able to integrate its use into their everyday activities with pupils.

In the case of the ELP for 12-18 in Catalonia, the pilot phase took place together with the development of the Spanish ELP for secondary education and was carried out
under the direction of the Catalan University team that developed the Spanish secondary ELP which was later validated.

The group of teacher who will pilot the ELP with 8 to 12 year olds has not started with pupils yet (Sept 2005), as the teachers and the schools involved are studying the Spanish version of ELP, its descriptors and how best to integrate its use in the planning of classroom activities as part of a training framework.

The information for this case study was provided by Ms. Dolors Solé Vilanova, Head of the Resource Center for Foreign Language Teaching in Barcelona.

Aims of the European Language Portfolio (ELP) The ELP has two main aims which are motivating learners by acknowledging their efforts to extend and diversify their language skills at all levels and providing a record of the linguistic and cultural skills the learners have acquired (to be consulted, for example, when they are moving to a higher learning level or seeking employment at home or abroad).

Its functions are also two. Firstly, ELP has a pedagogical function to enhance learners’ motivation to improve their ability to communicate in different languages, to learn additional languages and to seek new intercultural experiences. It is designed to help learners to reflect on their objectives, new ways of learning and success in language learning and to plan their learning and become autonomous learners. ELP aims at encouraging learners to reflect on their plurilingual and intercultural experience. Secondly, ELP has documentation and reporting function. It is a record of the learner’s achievements in foreign languages in both academic and non-academic settings.

The ELP has three components, the Language Passport, the Language Biography and the Dossier, that serve different purposes and become very powerful when used in relation to one another in a coherent way. The Language Passport section provides a general idea of the pupils’ proficiency in different languages at a given moment in terms of skills and strategies. The objective of the Language Biography is to foster pupils’ planning, reflecting upon and assessing their learning process and progress. Finally, the Dossier’s main purpose is to illustrate the achievements and experiences pupils have noted in their Biographies or Passports. Thus, ELP could be described as assessment and showcase portfolio. To disseminate the ELP among teachers in Catalonia a roundtable was organised at APAC (Association of Teachers of English in Catalonia) Annual Conference held in February 2005.

Different perspectives to the case study

Learner’s perspective (Learners, in this context, are the teachers who were trained to implement and pilot the ELP in Catalan schools.) It was reported that cooperative work and reflection within the group during the training sessions led them to organise their lesson planning from a different perspective. Participants acknowledge the need to organise curriculum planning through didactic sequences that link learning tasks to the different parts of the ELP. It was reflected by the participants that the introduction of portfolios created new forms of collegiality among the teachers. A collective orientation work evolved, although not automatically, some academic input and help along the process was provided.

Teacher’s perspective (Teachers, in this context, are the teachers who have already piloted ELP with their students) Participants share the view that all the components of ELP are very powerful when used in relation to one another in a
coherent way. According to participants, the Language Biography seems to offer the biggest potential for teacher’s intervention and learner growth, especially in primary and lower secondary education, whereas the passport and the dossier become more important when moving from one educational institution to another, moving to a higher education level or another country, or seeking a job. Among foreign language pupils at secondary level, the work with the descriptors in the target language has helped to promote its use in the classroom.

Policy perspective The final expected outcome by the Catalan Department of Education is a guide for teachers with examples of implementation and ways of integrating the ELP into their own classroom planning to ensure that the ELP does not become an “extra” activity to be carried out at school occasionally, but a component of the day-to-day learning and teaching process.

A proposal has been made at national level to create an electronic version of the existing ELP so that a policy of widespread use of the ELP on a non-compulsory basis could be adopted to foster systematic and high quality teaching of mother tongue and foreign languages in schools. Catalonia has a high interest in having an electronic version of ELP as soon as possible.

Aspects of Validation

The piloting of the Spanish validated version of the ELP in Catalonia is in process. The work done so far shows promising results, however there are challenges to be met. Some of the challenges put forward by the members of the panel of the roundtable on the ELP organised by APAC are the following:

- Should ELP be integrated into the educational culture of the different countries or left to voluntary adoption by individual schools?
- Should there be an ELP for the whole group at each educational stage or is it better to have different models to cater for students’ specific needs?
- Should the dissemination policy for ELP be done through information sessions or would it be better if it was embedded in initial and in-service teacher training plans?
- Is it better to leave the descriptors as they are or should they be adapted to suit primary and lower secondary education?
- What should be done when there is a lack of suitable descriptors in bilingual contexts, such as Catalonia?

4. Common elements of success and challenges

A variety of common elements could be found from the four scenarios. First, all the case studies presented in this paper are policy-driven initiatives, a fact that gives to their implementations a more powerful incentive than what could be found in some of the local and regional grass-root initiatives. It is good to note, though, that these initiatives are currently somewhat pioneers in European educational setting. Furthermore, all the case studies have a fairly big evaluation part, which might indicate that there is lack of research-based results on the topic and that the policy-makers seek for insights about pros and cons of portfolio implementations.

A common positive observation is that the introduction of this new tool can develop new competencies and bring about new ways of working together and improved collaboration among teachers, which is still a problematic issue in many
schools in Europe. In Norway and Finland it was reported that portfolio practices brought along peer-reviewing among learners and also some feeling of community of learners. In Italy, a dialogue between school and parents could be established in the cited case. In the Catalan case, the potential of portfolios for collaborative work and gaining new perspectives into the planning of work was emphasised.

Competencies and assessment seem to be the key elements in the mentioned case studies, but also other elements such as self-reflection and personal development exist to some extent. Some other elements in the use of portfolios, such as home–school link, are emphasised especially by Italy and Norway. The use of portfolio as a tool to reflect and as a development roadmap, as well as a tool for documenting lifelong learning and to move between different stages of education, opens many interesting ways for learning, that should be further document as not been fully covered in these case studies.

Furthermore, some commonalities could be found on the dimension of introduction of technology vs. introduction of the concept of portfolio. In most cases the policy enforced the use of portfolio, whereas in Norway and to some extend in Finland also, it was about introducing learning technologies such as the use of LMS, in the workflow. Especially in Norway, and probably also in the future in the other countries, the question will be whether to implement e-portfolio into the back-end of existing LMS used in education or embrace a new service oriented architecture for portfolio servicesx.

It can be too early to establish common characteristics of successful e-portfolio implementation as these initiatives are still on-going, however, the evaluations have been positive about the practice of portfolio. It is also becoming evident from the different cases that different types of portfolios can be adapted to different age levels and different educational settings or levels of education.

What comes to common challenges, it can be observed that to make any learning process effective, it would be important to involve the portfolio owner, i.e. the learner into the process. It can also be observed that the common educational culture of a given country affects on the implementation as well as to the views that the diverse stakeholders have. In some countries, such as Norway, the implementation of the portfolio is much more open, whereas in other countries this is more restrictive. The way teachers have a say in the creation of the portfolio might be crucial in terms of implementation and in the creation of ownership which has an influence on how they see the tool as beneficial or too much time consuming. Whether the policy driven initiative should be made voluntarily or compulsory is therefore a considerable aspect.

Furthermore, the portfolio has to be a meaningful part of the learning process and the workflow; otherwise it will become only an additional time-consuming check-list to be filled about the learner. As mentioned in most of the case studies, this was seen as a challenge. Re-thinking the reasons for portfolios usage and its purposes of use should be fundamental before embarking on the implementation. This, of course, includes issues of assessment and student evaluation. As reported in some of the cases, implementing portfolio had effects on many aspects in education, from the way the teaching was planned to the time learners and teachers spent in working with it.

Moreover, a challenge could also be the transition from a paper based portfolio into a digital one, as the concept of usage changes with the new media. This brings along
issues related to the management and organisation of the portfolio, but most importantly, the issues of privacy, rights, access and portability will become important. On a very basic level, the creation of suitable framework conditions comes into play here such as the necessary equipment and the training of teachers in the use of ICT.

The use of portfolios to improve school-home links is on the one hand a positive aspect, but on the other hand it raises also some questions which became evident from some cases. Parents need to be informed and also sufficiently trained in the use of the new technologies, in the concept of portfolio and in particular in e-portfolios. Moreover, portfolios should not be used as a control mechanism, but as a constructive development tool. Here again, the question of what information is made private or public needs to be tackled sufficiently.

4.1. Recommendations

Finally, the paper attempts to give recommendations for the field - on policy and practice level- to create favourable framework conditions for the successful implementation and use of e-portfolios in educational establishments.

Peer-Review and aspects of transferability: gathering of information, exchange of best practice and research

As the overview on policies shows, there are some countries that go considerably ahead with the use of portfolios and drive it by large-scale policy initiatives and projects. On the other hand there is a group of countries where the use of (e)-portfolios is still completely in the reflection phase. Those countries could benefit from the experiences made; outcomes of first pilots and training programs therefore should be shared among countries to establish a dialogue on the issue.

Peer-review practices on the policy-making level could be established in the context of portfolio implementations. Peer-reviews could be conducted on the gathered best practices to gain maximum insights into the experiences and to envisage transferability. Moreover, as most of these cases are still in a pilot phase or on-going, there should be an interest in reporting the progresses made and especially to observe the final results.

Moreover, further research in the various aspects of portfolio development and implementation is still needed and it also needs to be shared openly between countries. Closer co-operation could be established between researchers and policy-makers to fully benefit from the outcomes. This could help policy-makers in their decision-making process to serve best their educational visions and educational context in schools and education in general.

Scenarios as a tool to support decision making

To better envisage how e-portfolios can be applied in teacher training, the scenario building exercise could become helpful. Scenarios can support the decision-making process as well as help to transfer the best practices. The idea is to identify the needs and requirements of all stakeholders. The EPICC-project xi has created a database where practitioners can submit scenarios and read them. Scenarios can be used for many purposes such as defining better specifications for e-portfolio applications, help and support the decision making process, and to promote and
transfer good practices. Eventually, they can also be used to identify the needs of specific communities of users to create an application profile that fits to their needs.

School heads, e-learning planners, policy-makers, etc. could benefit from this type of scenarios to better understand what can actually be done with e-portfolios. More importantly, scenarios can help to see what is at stake, for example, when a learner is moving from one educational level to another and what role can an e-portfolio play. Scenarios can help to understand how things are inter-relater and thus support the creation of better policies that actually help the use of e-portfolios in education as a tool for lifelong learning. Scenario building can also be a powerful tool for decision makers to shape their visions, a scenario does not need to be in implementation, it can be a route map towards which to work on.

5. References


A short brochure in English summarizing the results is available at http://zalo.itu.no/ITU/filearchive/ENG_PLUTO_FV.pdf

ePortfolio Policies


[http://insight.eun.org](http://insight.eun.org)

**Endnotes**

i European Portfolio Initiatives Co-ordination Committee: [http://www.epiccproject.info](http://www.epiccproject.info)

ii MIUR [http://www.miur.it](http://www.miur.it)

iii [http://www.educnet.education.fr/dossier/portfolio/default.htm](http://www.educnet.education.fr/dossier/portfolio/default.htm)


vi INDIRE: [http://www.indire.it](http://www.indire.it)

vii [http://www.cede.it/](http://www.cede.it/)

viii Further information on ELP can be found at: [http://culture2.coe.int/portfolio](http://culture2.coe.int/portfolio)

ix It was coordinated by Mrs. Dolors Solé, Head of the Resource Center for Foreign Language Teaching in Barcelona, with the participation of Professor David Little, Consultant to the Council of Europe ELP project, Professor Cristina Escobar, who has been involved in the piloting for Secondary schools and Mrs. Josefa Subirà, coordinator of a group of Primary teachers piloting the ELP in Catalonia.


xi Scenario building: [http://insight.eun.org/innovation](http://insight.eun.org/innovation)
Abstract

This paper presents a progress report on a large scale implementation of a student ePortfolio at one of Australia's largest universities. The paper describes the origin of the project and the way it was deliberately planned and developed as an institutional initiative, in contrast to some other developments involving ePortfolios.

1. **Introduction – The State of Play at QUT**

QUT is one of the larger universities in Australia with 40,000 students and nine faculties. It is one of the two universities in the state attracting the highest proportion of university entrants, and has a reputation for a strongly applied emphasis in both its teaching and research, captured in its public relations slogan, "a University for the Real World".

The Electronic Portfolio at QUT was adopted by the institution as a whole rather than being the product of any particular faculty, school, or teaching initiative. It was launched publicly by a member of the Queensland Government (Karen Struthers, MLA), in 2004 having been developed for trial in 2003.

As of September 2005 12,000 students are maintaining electronic portfolios, with almost 1,000 alumni having retained portfolios after graduating. During the course of 2004/5 the University developed policy which was passed at Academic Board to provide and maintain for graduating students a minimum amount of storage space for data, artefacts, (presently 128MB) which had been collected in their portfolios prior to graduation, and with a commitment to maintain this in interactive form for one year, and in archived form for a further nine years.

The significance of the statistic of almost 1,000 alumni student is that within months of the approval of this policy the take up of that aspect of it has been significant.

Although ePortfolio at QUT was launched as a student initiative and voluntary process (in contrast to the more widely found model of a development within a curriculum or course context), several of QUT's faculties have taken decisions to adopt the approach as part of undergraduate teaching. It has proved particularly appealing in cases involving students in practical and clinical placements, but it is used through the full range of academic contexts including first year Law, first and second year Business courses (which at QUT have enrolments of enormous proportions), Creative Industries, Nursing, Psychology, Engineering and Architectural professions, IT, and PhD and doctoral students in Education. One particular reason for its eclectic appeal, is that the institution sought to address with the introduction of this tool one of the long standing learning and teaching issues in our universities, ie, the issue of graduate attributes and capabilities, particularly where these might be labelled as "generic". But more on this in the remarks below, which describe the advent of this development.
2. **The Development of the ePortfolio, a Personal Reflection**

This brief paper is written particularly from the perspective of the development of this tool from the point of view of institutional strategy. It really had its origin in 1999/2000 when the author attended a summer school in the US which was designed to encourage participants to consider in the broadest possible terms how the capabilities of the digital age might apply to their particular institutional settings. Of 140 students the author was the only one from a university.

For some days, I struggled with what the lessons and inferences I might draw from this course might be, given that the University already had a full range of technology projects many of which will be familiar to anyone close to universities. These included corporate systems (Student, HR and Finance), intranet (secure), transactions to assist students with a number of tasks and routines such as tutorial class allocation, booklists, timetables and so on, online learning and teaching, and the radical changes in library services, to name a familiar few.

But, were we missing something – was there a particular thing which might be done which might offer some exciting and potentially transformational possibility in relation to university experience by students? After all, what is it about attending university that is distinctive, what separates it from most other things that a person can do in life?

The answer to much of this lies in the word "engagement". The essence of higher education, and what differentiates it from other training and education processes (worthy in themselves as these are) is the notion of stimulating and creative engagement. For a significant number of people, university is a rare and special time, for some a rite of passage, and if not quite that, for others a critical juncture, a major point in their life's journey.

And in reflecting on this, how might one also respond to the current criticisms of universities, in terms of the quality of graduates, relevance of their career preparation, and so on?

Principal among these criticisms include the disappointing lack of engagement by one's lecturers, the frequent concerns about the quality of teaching, and particularly where older models of content cramming for examinations prevail, the lack of durability of learning, and the overall failure of the system to impart skills and capabilities which later turn out to be so crucial, and the deficit of which is so noticeable in the challenge of the changing workplace, and more generally in career development.

So, in 1999/2000 was there some way of addressing these things together?

3. **The Project**

And the answer was yes – this is indeed how the project was conceived, ie as a way of engaging students more personally and intimately in their own learning, structured in such a way as to cause them to recognise and identify skills and capabilities in addition to the content of their courses, and furthermore a tool which in itself would become an artefact, a useful facility, something concrete in addition to a parchment which they might take from their year or years at QUT and have for as long as they wished.
In arriving at this conclusion and mapping out a broad concept for what we would do from 2000 onwards, there were two specific incidents which influenced me further. One of these was the fact that in one of our teaching grants about a year before, a course coordinator in architecture had developed an interest around the concept 'student capability profiling', and sought to develop this approach in courses in the Faculty of Built Environment and Engineering.

This never proceeded beyond the prototype, but some work in the UK in about 1997/98 was an influence here.

The second incident was to observe a friend of mine who was completing a degree in business at another Brisbane university, and who had self taught web development skills. This student prepared himself for graduation, with two absolute beliefs, neither of which were developed, fostered, or even confirmed by his university curriculum. The first of these beliefs was that he would be working in a world where web literacy would be crucial, and the second was that he would require as part of engaging with that world, and indeed finding employment, to build a profile, a representation of himself for presenting to employers.

4. Steps in Development

So far, there was little enough developing more generally for QUT to review. Initially, and with some influence over where project development might occur, I pursued the idea that the portfolio would develop in our learning and teaching environment, and therefore be developed with reference in the context of the online learning and teaching (OLT) system at QUT. One of the immediate tactical quandaries in this, which I considered at length with one of the Directors in this area, was to engage the very large community of academic staff, particularly unit and course coordinators in such a process. At QUT the OLT approach was to provide individual accounts to academic staff to develop pages and interfaces.

Another issue was the actual process of software development itself.

Funds were provided to develop an approach, but while this was occurring, the conversation about what kind of tool it should be, and the extent to which it might be a student initiated activity regardless of whether it was present in particular course contexts had developed. We already had a common interface providing authorised and authenticated access for student interaction with a range of university functions. There was no reason in theory why an ePortfolio should not simply be added to the range of functionality available in that way. When one of the project leaders (Wendy Harper) involved with the QUT intranet (QUT Virtual), became aware of some relevant developments at Florida State University, we became interested, particularly as the tool had been written in Oracle, which had increasingly become a standard for applications development at QUT in most systems other than the online teaching system itself.

At a critical point in 2001/02 I decided to take the development from the online teaching environment and place it with the student intranet environment. This was critical to achieve what then developed. I hasten to point out that this is no reflection on the capability of those working to support the OLT environment, but rather a comment on the rules on access and the nature of dissemination in the two systems.

The most critical effort of all during development was to figure out the taxonomy of attributes on which students were being encouraged to reflect, and which they
subsequently would develop as part of their portfolio. And here a partnership between IT Services and Careers and Employment became critical.

Because of its applied reputation, QUT had a strong investment in careers and employment advice, and the head of this area, Col McCowan, immediately on becoming aware of the ePortfolio idea, became excited by the prospect. What is more, the involvement in this area brought with it another challenge for universities, and that is the extent to which they are able to successfully engage with the outside community of employers, industry, government, and the professions. A variety of industry bodies had already developed advice to universities about the skills and attributes that they sought in graduates, and which many of them so often declaimed the absence of in those they employed.

In short, what happened was that a core set of attributes were adapted/adopted from those developed by a couple of major employer bodies including the Business Council of Australia, and these were then discussed with the various faculty areas in terms of attributes that were relevant to them. Thus, in the case of the Faculty of Education, teacher practitioner attributes become the major inventory of the qualities that students will come across in their portfolio whereas in engineering, IT, and other areas these were adapted for those particular contexts.

The development of the portfolio with a core set of attributes which mapped onto those that had been developed outside the sector became one of its most compelling features as it developed towards its launch date.

5. National Interest

As mentioned, strong interest was shown by employer bodies in the QUT development as they became aware that a University had responded to the Employability Skills Framework developed by the Business Council of Australia and the Australian Chamber of Commerce and Industry. Further, DEST (the Federal department administering education) was also keen to develop its own national equivalent, and was initially interested in the possibility of building directly on QUT’s project.

More recently cross sectoral interest has developed, with a national body on ICT in all education sectors (AICTEC) promoting discussion of the possible development of tools which might move with individuals across their experiences of different levels of education. More work on this is to be done by AICTEC by the end of 2005.

6. Conclusion

The State Government, with a high profile within Australia for its sponsorship of Research and “Smart” initiatives in collaboration with the region’s universities was associated with the launch. This launch date followed several months of piloting in a selected number of disciplines. Indeed, certain signals about the likely popularity of the tool gave us caution about the load that would be thrown on university systems, as we had already had experience of new services generating demand which was a challenge for our systems to handle. So it was that the portfolio was released in chunks over about a 12 month period to groups of students, with full release occurring in Semester 1, 2005.
In all of this, no one has ever in terms of educational policy, doubted the usefulness of the tool. Rather the debates about it have concerned the extent to which it is a mandated or elective resource.

Speaking personally, the main surprise I have had in recent months has been the development of issues that have arisen from mandating its use in courses. Because I had always conceived of it as something that students would use if they chose to, I had not given thought to some of the complexities that involve its being made compulsory within curriculum. As I speak this is precisely what is happening over a range of courses, and it is yielding the occasional result that students' content is not what was intended. I refer to the occasional student who treats the requirement to complete attributes with what we might at best describe as certain informality. The use of the tool as the basis of assessment is of course bound to result to some extent in that kind of unforeseen development.

Overall however it has been one of our most successful projects and I look forward to assessing and understanding its future growth.
**Abstract**

ePortfolio at the University of Nottingham has a strong regional dimension and contributes significantly to national UK thinking through its ePortfolio Reference Model work, drawing together cross-sector practice with developments in technology, research and policy. The Nottingham Passport, a key partner in standards-based interoperability, introducing ePortfolios for college admissions at age 16 across the Greater Nottingham area, highlights conflicting ePortfolio priorities: technical advances, pedagogic possibilities and administrative drivers.

**Key words**

region, interoperability, transition, schools, universities, policy

1. **Background**

Work between city schools and colleges and the University of Nottingham, towards a regional commitment to ePortfolios, began in 2000 with the ‘Making the Links’ project sponsored by the UK government Department for Education and Employment – the 2002 report on the Nottingham work exploring links between schools and higher education (HE) is available at [http://www.internet-pars.ac.uk/PAR_docs/Appendix_A.doc](http://www.internet-pars.ac.uk/PAR_docs/Appendix_A.doc). Out of this grew the collaboration between the University of Nottingham ePARs system - [http://winster.nottingham.ac.uk/epars/shared/htm/about.asp](http://winster.nottingham.ac.uk/epars/shared/htm/about.asp) - and the new initiative for 14-19-year-old students in City schools, the City of Nottingham Passport - [http://www.cityofnottinghampassport.com](http://www.cityofnottinghampassport.com). This collaboration continues to develop and has at its heart a commitment to demonstrate the effective role ePortfolios can play in the drive to widen participation in higher education in the UK - to attract, support, motivate and retain students from non-traditional backgrounds, so that they continue to take up training and/or further study after the end of post-compulsory education, first in further education (FE) and then in higher education (HE). The broadening of the definition of individual achievement which can be promoted by the use of ePortfolios is a key element in the new environment which is being created in Nottingham, within which students recognise their potential and take more responsibility for their own learning and development. At the same time, ePortfolios promise a richer information resource for institutions receiving new students and a valuable tool to improve student/course matches, induction, retention and further progression. This work is underpinned by technical pilots for the exchange of information – both between eportfolio systems and between administrative databases - within the region and also with national organisations, as demonstrated by
ePortfolio Policies

Nottingham and NuVentive for the Cambridge plugfest preceding the 2005 ElfeL ePortfolio Conference.

2. Context

The Nottingham-based work has influenced the development of Harnessing Technology, the 2005 government eLearning Strategy for England. JISC, the UK body responsible for supporting IT developments in colleges and universities, has funded the development of a specification and then a reference model of ePortfolio for Lifelong Learning by the Nottingham team; and the Department for Education for England commissioned a report.

Since Nottingham’s presentation at the 2004 ElfeL ePortfolio conference, four significant new initiatives have been started.

A. Work is well underway on a new JISC regional eLearning project, RIPPLL (www.nottingham.ac.uk/rippll) – Regional Interoperability Project for Progression through Lifelong Learning. This aims to support progression to HE for widening participation by making interoperable all the major existing electronic systems for study-based Progress Files which are in use in the Nottingham area. Technological know-how is being shared to enable all institutions to use the UK LeaP interoperability standards. Thus Nottingham Trent University now joins the University of Nottingham in linking its evolving ePortfolio functionality directly to the Nottingham Passport system in schools and colleges, thereby providing direct transition into FE and HE for the full range of widening participation students in the Greater Nottingham area.

The same project is developing understanding of further transition processes between study and employment (in both directions) and considering connections with issues of graduate retention in the region.

The consortium growing up around the University of Nottingham work now includes:

- The University of Nottingham and the Nottingham Trent University
- City of Nottingham Local Education Authority (Nottingham Passport)
- Ufi/learndirect East Midlands (responsible for people outside formal education)
- FE Colleges representing the Greater Nottingham 14-19 Strategy Group: Broxtowe College, New College Nottingham, South Notts College and West Notts College
- Nottinghamshire Connexions (information, advice and guidance service)
- Training providers
- Employers, including Rolls-Royce, Toyota, Siemens

B. At the same time the University of Nottingham is leading a second JISC project for the JISC/DEST web services eFramework. The aim of this is to develop a Reference Model of ePortfolio (http://www.elframework.org/refmodels/epll). The two central tasks are:

- to map existing ePortfolio developments into a landscape of lifelong and life-wide learning and investigate user needs across the piece
- to identify the basic web services which, in the form of a variety of aggregations, could meet those user needs.

Please see Figure 1 overleaf for an overview of this project.
C. The project to identify landscapes of life-wide learning will be greatly enhanced by the work of the University of Nottingham’s third new initiative, the Centre for Excellence in Integrative Learning, recently funded by the Higher Education Funding Council for England for five years (2005-2010), under the CETLs programme. Alongside a range of other Integrative Learning projects in the Business School and History, as well as further subjects across the academic spectrum of the University, this Centre will pilot a range of ePortfolio solutions involving both pedagogic and technological developments. The aim will be to explore the synergies between eportfolios and holistic approaches to learning, the resources required to draw together skills development in study and in employment and to support learners in integrating the full range of their learning from diverse sources during specific episodes of their lives.

D. The University’s fourth initiative is a new International Centre for ePortfolio Development, bringing pedagogic initiatives for staff and students, institutional implementations and advancing interoperability technologies together with a research base and capability, in order to inform the development of future policy. Major themes which will be investigated through the Centre’s programme include:

- Specifications for web services for eportfolios – complementing our existing work on eportfolios for transition with work on personal development portfolio services
- The conflicting demands between Institutionally-based provision and personalisation for effective implementation of eportfolios for lifelong learning
- Synergies between scenarios of practice and scenarios of policy
- Individualised and collaborative learning with eportfolios, and the place of informal, mobile technologies within a national strategy

Ministries, practitioners and technologists interested in joint work with the Centre should contact angela.smallwood@nottingham.ac.uk

The Nottingham JISC ePortfolio Reference Model project, together with the five-year programme of the University’s CETL for Integrative Learning and International Centre for ePortfolio Development will provide reference implementations with a view to scoping and specifying a range of web services which will begin to deliver ePortfolios for life-wide, as well as lifelong, learning
ePortfolio Policies

LIFELONG LEARNING

Many further unspecified scenarios in Lifelong Learning of PDP & e-P in:
- Work, Trade Unions and many others
- Vocational Training,
- Apprenticeships,
- Work experience,
- Professional Development
- Professional bodies
- Student Internships
- CPD
- Voluntary Sector
- Traineeships
- Work

Y9
Y10
Y11 PDP use Cases

Apply to College

Y12 use cases

Y13 use cases

(1) Full Iteration : Y11 – Y12
1. Scenarios & use case
2. UML + XML + service components
3. Aggregation of components, ELF
4. Consultation
5. Pilots
6. Implementation advice

(2) Part Iteration : Y13 – HE undergraduate
1 – 4 + PLANNED CONNECTION TO UCAS

Induction to HE undergrad PDP

Exit PDP use Case

Nottingham CETL e-Portfolio Reference Site

(3) Part Iteration : Y13 – work
1-4

(4) HE 3 – work
1-4

(5) Full iteration
HE ug – HE tp
1-6

Applying to work or HE cycle

Induction to HE taught postgrad PDP

Taught Postgraduate PDP

Figure 1: Nottingham JISC ePortfolio Reference Model diagram
3. ePortfolios for transitions – linking them to PDP to raise aspirations, encourage ownership of learning and support student progression

The first phase of the Nottingham JISC ePortfolio work has concentrated on ePortfolios for transition. While the developmental value of ePortfolios within episodes of learning or training (the personal development planning – PDP – element) is strongly supported by the Nottingham team, recent work has demonstrated the usefulness of transition points (applications for further study or employment) in focusing and clarifying the purposes and content of PDP systems for new users. Transitions are also crucial in policy terms for regional bodies. The endorsement of the Nottingham Passport by all of the county’s further education colleges (for students aged 16-19 and other learners) has been secured because of its usefulness at the point of transition from secondary into further education.

3.1. Moving towards a regional policy for transition at 16

The 14-19 Greater Nottingham Strategy Group is a collaborative group of senior managers representing all bodies in the locality with an interest in 14-19 education. These include schools, further education colleges, higher education institutions, training providers, regional government bodies and the information and guidance service. A key element of the 14-19 strategy relates to transition at 14, 16 and beyond. The transition policy centres on the needs of the individual student in terms of appropriate progression and enhanced induction and retention. Whilst the student is at the core of this development, institutions have their own reasons for wanting better transition processes, including the ability to collect more detailed data about incoming students at an earlier date. Tensions continue to exist around transition especially where there is potential competition for students. In the city of Nottingham this is partly alleviated by the fact that the majority of schools are 11-16 institutions, but this situation is due to change and is not replicated in the suburban areas. There is a fine balance to be maintained between the push from the schools and the pull of the colleges where the demands may conflict.

At the centre of the strategy sits an e-Portfolio. Originally developed as an electronic progress file, the City of Nottingham Passport has had 3,500 students log on in just over two years. The Passport has been updated to include an electronic application form as an interim measure until a new, more interactive e-Portfolio – PassPortFolio – is ready. The existing Passport is primarily used within the city but is making inroads into the county. The new site should reach a far greater audience.

The Strategy depends upon the endorsement of all partners and so far the following set of commitments has been agreed:

- All institutions provide access and encouragement for students to maintain an e-Portfolio on the Passport website
- FE Colleges and training providers view the Passport as a central aspect of both application and induction and create a designated email facility to receive a common electronic application (Note: A major aspect of the RIPPLL project, introduced above, is to look at and facilitate the transfer of some of this data into a college’s management information systems using UK Leap)
ePortfolio Policies

- The Passport is an agreed set of outcomes based on an ongoing process. This process should be embedded in the school curriculum and results in a comprehensive individual learning plan.
- The Connexions service and local education authorities promote the Passport as a central tool for Information and Guidance.
- Local universities’ central data management systems will accept an incoming student’s New Entrant Profile webform directly from the PassPortFolio passed directly into their portal once a place on a course has been confirmed.

The transition process between key stage 4 and FE offers three discreet but related phases when students will use their e-portfolios to support the admissions process. These phases are enquiry, application and induction. They call upon data from different areas of the e-portfolio, as illustrated in the diagram on the next page.

The PassPortFolio is owned by the individual user and offers three distinct but interlocking zones: Achievement, Reviewing and Presenting. Other users such as teachers and advisers can access the work of their students, but only where they are allowed access by the student.
Where an e-portfolio ceases to be a service for an individual user and a major driving force for using it is to make applications, there is a danger of losing that original purpose. The development of the individual learning plan is clearly a reflective process which utilises a range of enabling services. Its outcome, however, has a far more public audience as part of a transition process. Equally some of the data included in the individual learning plan could be incorporated into an institution’s MIS systems. Use cases have clearly demonstrated that there is a need to link a range of systems together. The hard data to be found in an application can help establish student profiles on a college’s systems. A college will also need to access other systems which can verify elements of that transferred data. Whilst our project is in part grappling with the technical difficulties of interoperability, it is also attempting to balance the demands of all its partners. These demands can challenge the original pedagogic vision of an e-portfolio as a tool for empowering students.

The potential for utilising the agreements arising from Greater Nottingham’s partnership of schools and colleges extends beyond admissions into tracking and monitoring students. In one sense this could be seen as another challenge to the integrity of a private e-portfolio, but it offers the opportunity to pass data back down the transition chain, thus enabling iterative evaluations to be used to refine and enhance the evolving admissions process.

4. Issues

Many issues remain to be dealt with:

- Accessing training providers and employers is difficult unless they are part of a regional network.
The question of multiple applications is real and arguments still occur about how and whether these should be monitored centrally and if so by whom? Colleges and training providers would welcome this information but the applicant might not.

The ability to include multimedia examples of good work as part of the application raise the expectation in the learner that these will be utilised in the decision making process. Showing FE colleges and training providers that an electronic application process is more than an electronic application form is crucial to the value given to the e-portfolio. However, the impact in terms of the extra staff time required to be given over to an e-portfolio-based approach to admissions and induction is considerable, if the broader educational purpose, beyond the mere transfer of data, is to be achieved. An application that evolves from an e-portfolio is of significant importance to the personalisation of learning. It ensures that the transition acquires meaning and purpose within the individual’s personal and career development. This synergy between admissions and an assisted personal development programme could further support social inclusion as long as the admissions process recognised the outcomes of such a programme.

The nature of the education system in the United Kingdom means that local and regional initiatives will always be influenced by national policy. Often they are ahead of that policy and this project is one such example. One national change which would enhance the Nottingham experience would be the creation of a unique student number which followed the learner through all phases of their education. The Nottingham project has lifelong learning at its heart and can influence national policy makers but needs them to take the lead on creating a workable infrastructure which would facilitate the realisation of the aims behind the Passport.

5. **Useful URLs for reference**

   http://www.dfes.gov.uk/publications/e-strategy/
   http://www.cityofnottinghampassport.com
   http://www.nottingham.ac.uk/e-portfolio/
   http://www.nottingham.ac.uk/rippl/
   http://www.nottingham.ac.uk/epreferencemodel/
Abstract
The paper is based on developing and implementing e-portfolios in three different European projects. It is argued that insufficient attention has been paid to the pedagogy of e-portfolio development and that existing applications and implementations tend to be overly dominated by the requirements of assessment. The paper looks at the different pedagogic processes involved in the development of an e-portfolio. It considers the competences required for developing and maintaining an e-portfolio. The final section considers the challenges in developing e-portfolio applications.

Keywords
e-portfolio, informal learning, pedagogy, non-formal learning

1. e-Portfolios – context and purpose

This paper is based on a series of projects aiming to introduce portfolios to support learners in different countries in Europe. Much of the paper is based on a series of blog entries written during the spring and summer of 2005.

The projects have different target groups and are based in different educational sectors but all share the idea that portfolios could be a valuable tool to record and reflect on learning.

They are also based on the idea that “the real potential for e-Portfolios is in the widening contexts in which learning is taking place - or is recognised to be taking place - and in the ability to bring together personal learning gained in multiple contexts” (Attwell 2005a).

The following describes three of the projects.

The first is the Workplace Learning Partnerships project. The objective is to use e-portfolios to support apprentices in bringing together formal learning from the school based component of the apprenticeship with learning from the workplace (for more details see http://www.workplace-learning-partners.org/partners/knownet).

The second is the ICOVET project which is working with socially disadvantaged young people in five different European countries. Portfolios are intended to help them recognise and record their learning and reflect and validate their learning experiences (for more details http://www.pw-projekt.de/pw-projekt/11a.php?url_projektid=3).

The third project is the European ASSIPA project which is implementing an e-portfolio for adult education teachers following an on-line professional development programme in self-evaluation.
Initial research undertaken for these projects discovered few experiences in using e-portfolios outside the context of formal school and higher education contexts. This poses a problem in terms of pedagogic approaches. The use of portfolios in universities has been largely as a means of assessment (although in the UK portfolios have been seen in higher education as a means of Personal Development Planning (PDP)). Such a focus is arguably at the expense of other potential uses, such as recognising and recording and reflecting on learning and focusing on learning.

Secondly the focus on formal learning, and basing portfolio development on formally prescribed curricula and outcomes, has been at the expense of recognising different forms of learning – informal and non formal learning –and learning from different contexts including the workplace and the home.

Thirdly, because of the context of school and university education, portfolios have been assumed to be owned by the institution and not by the learner. Ownership may be a critical issue in education and there is already some evidence that students are rebelling against portfolios, seeing them as another externally imposed layer of assessment.

Formal higher education may be the least productive context to introduce ePortfolios. Universities already have well developed and culturally embedded systems for recognising, recording, validating assessing and certifying learning. ePortfolios may have far greater potential for those excluded from existing means of recognition of learning, be they socially excluded young people or workers undertaking continuing professional development.

The intention of this paper is to explore these issues through looking at the different possible pedagogic and learning functions which an ePortfolio could be expected to support and then considering how an ePortfolio system could be designed to support such pedagogic design. One of the motivations for writing this paper is an email from a trainer working with socially excluded young people in Germany. He was happy to experiment with an ePortfolio but found it difficult to understand how such a system could be implemented in practice:

“I had some problems with working with the portfolio. Simply not knowing how to start. Would need some inspiration. Ulrike from DJI had similar problems, also asking for didactic concept,” he wrote. It is hoped this paper will begin to answer some of those questions.

2. **Processes and stages in e-portfolio development**

There are different definitions of what an ePortfolio is. Scott Wilson (2005) says: “An e-portfolio is a repository of information about a particular learner provided by the learner and by other people and organisations, including products in a range of media that the learner has created or helped to create alongside formal documents from authoritative sources, such as transcripts of assessed achievement, which the learner has chosen to retain.” Wilson goes on to say an ePortfolio is “principally owned by the learner although some of the things it contains may be co-owned,” This latter part of the definition is both important and contentious and will be returned to later in this section of the paper. Wilson continues to say an e-portfolio is “capable of providing the information about a learner from which different profiles of the learner may be developed through other services and retained within the portfolio.”
There are seven different functions for an ePortfolio, all of which can be mapped against different pedagogic processes (Attwell, 2005b).

The first is **recognising learning**. This is not as simple a task as might be at first assumed. Within the formal education system learning has been conflated with achievement. Although it could be said that all learning is an achievement it does not follow that the formal education system has recognised it as such. Learners frequently lack the skills to recognise their own learning, especially on-going learning which does not necessarily lead to formal outcomes.

The second is **recording learning**. What should be recorded in a portfolio?

An ePortfolio will contain records of formal achievements but possibly more important on going learning from home and work as well as formal education and training. Peer group interaction may be the most powerful means of recording non-formal learning. ePortfolios should allow individuals to build and present a profile or picture of themselves and should allow people to record their learning and achievement from the home, form school or college and from work.

The third is **reflecting on learning**. Reflecting may be the most important part of the learning process. In terms of e-portfolios it is probably the least developed. Reflection has generally been seen as a process of commentary by the subject on any aspect of themselves (Wilson, 2005). The commentary may be private, shared, or public. Examples include journals and more recently web logs.

The fourth is **validating learning**. Validating is the processes of proving – to oneself and to others – learning has taken place– including the abilities and competences identified and recorded. Validation takes place through evidencing and verification.

Evidence is provided by the learner to attest to their own achievement and may be in different forms and media - for instance a picture of a chair they have made or the url of a web site they have designed. Verification is externally sourced evidence of claimed achievement - for example a letter from a team leader verifying as to performance during a work placement.

Validation is not the same as assessing and accrediting. Validation is referenced against the abilities and competences identified by the learner – not those of an external occupational profile or qualification.

The fifth is **presenting learning**. Presenting offers an opportunity to select artifacts from the portfolio to tell a story or make a point. Presentation involves the processes of structuring, visualising, narrating and re-purposing (Wilson, 2005). Presenting is the bridge between validation and assessment but it is only one of the possible purposes of presentation. Other purposes include for a job application or application for a European funded project! ePortfolios should allow individuals to present their learning for different purposes and should be owned by the learner and independent of institutions.

The sixth is **planning learning**. Planning is a form of reflection - looking back and looking forwards. What have I achieved and what do I want to achieve?

The seventh is **assessing learning**. Assessing is an external process, not under the control of the learner. Assessing is external judgment of the value of a set of artifacts presented by the learner.
3. **Assessment and ownership**

The next section looks more closely at two issues – the problems of the focus on assessment in many portfolio applications and implementations and the issue of ownership. These two issues may be interlocked. “As always happens with any innovation, ePortfolio development has taken place in the context of existing paradigms of education and training. This means development has been dominated by universities and worse dominated by the assessment goals of higher education institutions. Put quite simply portfolios have been seen as yet another form of recording and assessing student achievement. What's wrong with this approach?” (Attwell, 2005c).

Firstly the assessment process is owned by the system and by the institutions. This means learners do not own their portfolio. Secondly institutional provision of portfolios has tended to militate against portability. When learners leave an institution the portfolio stays with that organisation - they do not own it - neither can they take it with them.

More problematically the range of achievement and learning reflected in the portfolio is constrained by curricula and course objectives. One participant in a debate at Alt C 2005 said that an eportfolio is neutral regarding what a disadvantaged learner can actually do and another that it can be made neutral regarding how the learners’ achievements are recorded (Davies, 2005) However if the only valid portfolio entries are those that support the attainment of externally imposed objectives, the eportfolio is not pedagogically neutral, neither do learners own their learning. e-portfolios can be an important tool for recognising, recording and validating non formal learning especially if the portfolio application provides means for peer group interaction, exchange and sharing. However, the recognition of non formal learning requires moving beyond formal learning objectives. Many existing portfolio applications place considerable restraints on what is seen as valid learning.

Helen Barret and Joanne Carney (2005) have found that “When portfolios are used for accountability purposes, to document pre-service teachers’ achievement of standards-based competencies, teacher candidates viewed their portfolios as a hoop they needed to jump through to graduate, and not the lifelong reflective tool that had been envisioned.”

They go on to ask “In the name of assessment (i.e., accountability) are we losing a powerful tool to support deep learning? Are we losing the "stories" in e-portfolios in favor of a skills checklist?”

Most existing applications tend to conflate the different processes involved in developing a portfolio or focus on only one or two of those processes - usually recording, presenting and assessing.” Helen Barret has said “Those tools that purport to be more “assessment management systems” tend to provide an institution-focused structure that makes it much easier to “score” but more difficult for the learner to tell their own story of their learning.”

In practice ownership is not a straightforward issue. The following diagramme (Figure 1) attempts to locate the different pedagogic processes involved in e-portfolio development within the wider education and learning environment.
Within this construct recognising, reflecting and presenting learning are under the control and ownership of the learner. Responsibility and ownership of verification, moderation, accreditation and certification lies in the external education and training system.

However the processes of planning, validating, assessing and recording learning are a shared and negotiated process between the learner, teachers and educational institutions. Even so it could be argued that the learner should ultimately control with whom (and if) they wish to share.

The last issue to be picked up in this section is the issue of text and language. Perhaps because of the higher education context, there seems to be an assumption that ePortfolios will be predominantly text based. This is a little ironic in that, at least in the UK (non ‘e’) portfolios were traditionally most commonly used by art and design students and professionals. Especially as access to bandwidth increases, computers can be used to record competences in many different media including photographs, video and audio. This is particularly so if the pedagogic idea of using a portfolio to tell a story is accepted. This may be very important for learners who are not confident, comfortable or accustomed to expressing themselves in a text format.

4. **e-Competence and e-Portfolios**

A considerable constraint on the discussion regarding e-portfolios is to consider issues of pedagogy, where they are considered at all, in isolation from the wider processes of teaching and learning. The development of an ePortfolio involves considerable competences and abilities in terms of literacy. This is not meant to refer to narrower definitions of literary in the ability to read and write but to include processes of reflection and judgment making – which have tended to be known as digital literacy (although in reality there is no real reason for such a separation).

The International ICT Literacy Panel, comprised of experts from education, government, non governmental organisations, labour and the private sector, including representatives from five countries (Australia, Brazil, Canada, France and
the United States) defined ICT literacy as “using digital technology, communications tools, and/or networks to access, manage, integrate, evaluate and create information in order to function in a knowledge society” (International ICT Literacy Panel, 2002).

The “continuum of skills and knowledge” required, they said, included:

- Access – knowing about and knowing how to collect and/or retrieve data;
- Manage – applying an existing organisational or classification scheme;
- Integrate – interpreting and representing information. It involves summarising, comparing and contrasting;
- Evaluate – making judgements about the quality, relevance, usefulness, or efficiency of information;
- Create – generating information by adapting, applying, designing, inventing, or authoring information.

This is a useful starting list but the following competences could be added (Attwell, forthcoming):

- Define – framing a problem or issue and developing a structure for approaching the issues
- Apply – the ability to move between abstraction and practice – and, conversely, between abstraction and practice
- Contextualise – the ability to apply knowledge from one context to another
- Scaffold – the ability not only to integrate learning in a personal knowledge base but to develop and build ongoing learning
- Search – the ability to use different search techniques to find knowledge and information
- Make sense – the ability to make sense out of disaggregated sources of information and knowledge (this goes beyond evaluating or integrating)
- Share – the ability to judge when it is appropriate and useful to share learning.

The acquisition and application of such competences cannot be undertaken as a stand alone ‘lesson’ in developing and maintaining an eportfolio, but requires a broader approach to teaching and learning, embedded in the wider curriculum. For both professional development and for socially disadvantaged learning, it suggests the use of e-portfolios cannot be regarded as a separate measure in itself, but has to be introduced as part of an overall approach to the recognition and development of competences. George Siemens (2005) has used the term ‘connection preparation.’ He asks: “How can I prepare my students? I think I have to ensure that they are comfortable with expressive writing. I think I also need to make sure that they are comfortable using tools that can help them navigate the networks around them and organize their personal knowledge. I also believe that they need to be able to interact with these networks and to contribute to them. Finally, they need the freedom to explore and connect, to co-construct, to learn through discovery. They need to know that the journey takes precedence over the final result.” A number of European projects have begun to explore such approaches under the heading of self evaluation (see, for example, www.self-evaluation.org).

5. **Challenges in ePortfolio design**

As the movement towards e-portfolios matures, it may be that instead of seeing an eportfolio as a ‘standalone (or integrated) software application, it will be regarded
ePortfolios: Learning and Learners

more as a pedagogic process, supported by a range of different, interoperable, software applications. What are the challenges in designing such applications?

5.1. Developing learner centred applications

e-Portfolios should support learning processes, rather than forcing learners to follow software design driven work and learning processes. Whilst this may be relatively easy for formal education, supporting informal learning is more complex. Research suggests most e-learning is SMEs is both informal and is problem driven (Attwell, forthcoming). e-Portfolio applications should be designed to record and support problem centred learning.

5.2. Supporting the recognition of learning and reflection on learning

Present eportfolio applications are weak in their support for both the recognition of learning and reflection on learning. Recognition and reflection may require support or new pedagogic processes and involve peer group interaction as well as the intervention of facilitators. e-Portfolio applications should allow learners to reflect on real life experiences.

5.3. Recognising the multiple contexts of learning

e-Portfolio applications must support learning from multiple sources – including the workplace and home as well as formal education and training. This means applications should facilitate movements between abstraction (in the process of recording learning) and application (in using and evaluating learning).

5.4. Scaffolding learning and knowledge

Informal learning is often interest or problem driven. It does not happen sequentially nor does it necessarily build on previous knowledge bases. e-Portfolio applications must allow for the revision of previous learning and the reorganisation of personal knowledge bases to take account of new learning which may challenge previously held knowledge and previous knowledge schema.

5.5. Supporting multiple media

e-Portfolio applications should allow learners to present learning in different media and in different combinations of media.

5.6. Developing communities

e-Portfolio applications should recognise the social aspect of learning allowing the natural and flexible development and interaction of communities as part of the e-portfolio process.

5.7. Negotiating and sharing learning and content

e-portfolios should recognise the importance of ownership and sharing, not just through flexible and powerful permission environments, but through providing support and tools for negotiating and mediating the sharing process.
5.8. Presenting learning

E-Portfolios applications should recognise the multiple contexts and purposes that learners have for presentation and provide tools to guide, develop and build presentations.

5.9. Porting data

It is likely that at some point or another learners will wish to move data held in one e-portfolio system to another – or to a different digital application. E-Portfolios applications should be designed in such a way that it is simple for learners to retrieve a copy of their personal learning record and to port it to another applications.

6. Educational technology and pedagogy

There are problems in establishing the pedagogic processes and meanings behind new educational technology. Technology is not pedagogically neutral. All technologies, be it intentionally or otherwise, facilitate or constrain particular pedagogic approaches and methods. The contexts in which educational technology is used may greatly influence pedagogic approaches.

Generic terms for educational technology – take, for example, Virtual Learning Environments or Learning Management Systems – can embody different pedagogic approaches dependent on the functionality and design of the application. This complicates any effort to develop shared understandings and meanings about the application of educational technology in practice.

Such difficulties increasingly pervade the discussion around e-portfolios. There is not one generic e-portfolio approach but multiple approaches based on different pedagogic understandings of the purposes and processes of using e-portfolios for teaching and learning. To clarify the debate it is necessary to start not from a description of technological functionality but to first understand the pedagogic approaches involved and then to consider how technologies can be shaped to support pedagogy.

7. References


Attwell, G. (forthcoming) Searching, Lurking and the Zone of Proximal Development: e-learning in Small and Medium Enterprises, University of Bremen, Bremen


Research Driving Policy: Implications of Research on eFolio Minnesota for Supporting Lifelong and Lifewide Learning with ePortfolios

Session: PS2B
Type: Abstract
Cambridge, Darren
George Mason University

Abstract
Much useful work is underway envisioning applications of ePortfolio in pursuit of the learning society. Through systematic stakeholder analysis and wide-ranging examinations of applicable technologies, projects such as the JISC reference model for the the UK are forging powerful visions of how ePortfolio can be used throughout life and the services governments must provide to individuals to realize this vision. This work is shaping ePortfolio policy is essential ways. However, effective policy must also be informed by equally rigorous research into how individual portfolio authors already use and value portfolios. While the potential of portfolios is wide open, we ignore the concrete experiences of these authors and the institutions that support them at our peril. ePortfolio policy makers must both actively support and act on the results of research that answers the key questions about current practice from the perspective of the individual: What do successful portfolio authors use their portfolios to accomplish? How do these uses relate to each other? What factors predict a successful portfolio experience? What sorts of services do portfolio authors value and what are their defining features?

This paper and presentation will examine the findings of research on the eFolio Minnesota project and chart its policy implications. eFolio Minnesota provides ePortfolio software and services to all residents and students in the State of Minnesota. The Minnesota State Colleges and Universities commissioned this research because of its conviction that State’s support of lifelong and lifewide learning with ePortfolios must be informed be careful research into the experiences of actual portfolio authors. The results of the research will be summarized and contextualized in relationship to other research initiatives in the United States, such as the National Coalition for Electronic Portfolio Research.

The eFolio Minnesota research suggests several policy directives:

- ePortfolios must be conceived as digital compositions, arguments the explain and predict, rather than mere repositories of personal information to which services connect.
- ePortfolio programs should minimize barriers to entry for casual participants.
- ePortfolio service providers should support collaborative development of portfolios.
- Institutions supporting ePortfolio authors should cultivate real audiences with real stakes.
- ePortfolio readers should be supported, as well as ePortfolio authors.
- ePortfolio interoperability should be achieved through concrete partnerships, emerging bottom up from actual practices as well as top down through standards development processes.
- ePortfolio programs should balance a focus on centrally-defined objectives with sufficient space to see and support what people actually do and care about.
Abstract

DigOport is developed for institutes for higher education. This application together with a certain procedure is a helpful instrument for quality assurance and stimulates management (a) to act following the plan-do-check-act cycle, (b) to be prepared for accreditation without the burden and the pressure just before an audit, and (c) to use multimedia as evidence of the quality of education (specially for arts institutes). This paper will pay special attention to the process of implementation and the factors that explain the successes and failures. Analysis of these factors makes clear that to be successful:

- the stakeholders (National Government-Ministry of Education; ArtEZ-Board of Governors; ArtEZ-management of departments; ArtEZ-ICT-department; ICT-companies; ArtEZ-Office for quality assurance) have to cooperate well,
- the aims of all stakeholders have to match well and
- the stakeholders have to be creative in looking for solutions to meantime problems.

1. Introduction

Dutch institutions of higher education are in a transitional phase, between visitation and accreditation, as it were. In this process, increasing value is being attached to a system for internal quality assurance. A system of this kind needs to be effective and efficient, meaning that the time required for documentation should be in proportion to the amount of time needed for the primary process, that is education itself. Quality assurance must also do proper justice to the artistic quality of the education given. Information and Communications Technology (ICT) could be a useful tool in this regard and it was for this reason that DigOport (http://digoport.artez.nl) was developed. DigOport is an application that, used together with a certain procedure, supports a system for all-round quality management in higher education. DigOport:

- stimulates management to maintain the PDCA cycle (i.e. plan-do-check-act)
- ensures that management commences the self-evaluation process in due time, thus averting pressure of time at the end
- uses multimedia as proof of the quality of art education offered.

DigOport is a project undertaken collaboratively by ArtEZ, Institute of the Arts in Arnhem, and Codarts, University of Professional Arts Education, Rotterdam. The project was made possible by a SURF grant.

DigOport is work in progress. This abstract concerns the problems that are risen in arts education (par. 1) and the development of DigOport, as a solution for quality assurance for institutes of higher (arts) education (par 2). Special attention will be
paid to the process of implementation and the factors that explain the successes and failures (par. 3). Conclusions are drawn in par.4.

In this paper the processes of ArtEZ are described, because more information is available of ArtEZ, due to the fact that ArtEZ has taken the initiative and is started earlier then Codarts.

2. Problems with accreditation of institutes of arts education

The last (2000-2002) visitations of study programs in music, theatre, dance, design and fine arts resulted in a lot of commotion. Due to a lack of time the ‘visitation’ panels were not able to visit expositions or music or dance performances. These expositions and performances are very important to get an idea of the level of achievement of the students. Written reports about art pieces of the students themselves, can never give as much evidence of their performances as the expositions and the performances. What to do with this dilemma?

Study programs in arts education have limited access. Some study programs work with an enrolment of a maximum of 12 students (theatre). Study programs with a higher amount of students are for example the study program for dance teacher (60 students). This implies that a lot of communication and organization is done face to face, without formal documents and without expensive electronic administrative systems.

In general the culture in institutes of arts education are rather informal and against bureaucracy.

3. DigOport

The main goals for the development of DigOport are:

- to use multimedia as evidence for the quality of several aspect of the study program
- to use ict to support the management while working with the pdca-cycle
- to use shared workspaces to develop a digital self evaluation

In order to develop an internal system for quality assurance the idea of Digital Department Portfolio’s (DDP’s) was invented. Compared to student portfolio’s a department portfolio has several differences and similarities. The main difference concerns the aggregation level. The owner of a student portfolio is one person, while the owner of a department portfolio is a group of people, i.e. the management. The main similarity concern the self reflection (the student reflects on his own learning process; the managers reflect on the study program and the organisation). Both students and managers analyse their strengths and weaknesses and translate their weaknesses to challenges and action plans.

DigOport is a webbased application with a portal and a content management system. DigOport is the portal for all digital department portfolios (DDP’s) of study programs in one institute.

3.1. Procedure

A faculty in an institute of higher education forms a so called ‘portfolio committee’. This committee is composed by a chair (head of the department), a teacher, a student and an educational advisor. This committee is responsible for the quality assurance of the department (the self evaluation and the audit). They assemble
information, draw draft conclusions, check conclusions with stakeholders and put the results in a digital department portfolio. In this way the management has always access to a documented overview of the study program and the organisation.

3.2. Application

Both ArtEZ and Codarts have their own portal for digital department portfolio’s, the so called DigOport (http://digoport.artez.nl for ArtEZ and http://digoport.codarts.nl for Codarts).

DigOport is the portal for an educational institution’s entire range of digital education portfolios. The portal authorizes access, creates relationship with other databases in the institute. DigOport consists of a content management system, which allows all members of the portfolio committee to add information to the portfolio, or change or remove it. Certain data, such as study results etc., can be requested in a fully automated manner from other files. The portal also has a help function, assisting portfolio committee members in the process of internal quality control. DigOport is moreover linked to a streaming video server, so brief video fragments can be added to the digital department portfolios. Furthermore, DigOport can be used to hold surveys on all aspects of the education offered. The results of these surveys are made directly visible using histograms.

Robin Slagman (company: Slagman.com) did the requirement analysis and developed DigOport with MS Sharepoint Portal and MS Sharepoint Services.

See figure 1 for some screenshots.

![Figure 1: Screenshots from DigOport of ArtEZ](image-url)
4. Implementation of DigOport: successes and failures

For the analysis of the implementation process we used the model for ICT implementation of Cetis/SURF (see figure 2 and http://www.surf.nl/en/publicaties/index2.php?oid=44).

The implementation of DigOport within ArtEZ, institute of arts is described in chronological order. After each incident the success factor is mentioned, followed by the factor from this model.

In 2003 the Board of Governors of ArtEZ founded the new office KtweeO (department of quality assurance and educational development) as a mean to support quality assurance for all the 30 programs in The ArtEZ, Institute of Arts. This indicates consciousness of the management concerning the importance of quality assurance in the institute (success factor 1; necessity).

The new head of the department was told to give quality assurance the first priority (success factor 2; necessity). The head of KtweeO looked for subsidiaries and formulated in June 2003 a proposal for SURF. SURF is an organization that has to promote the use of ict in institutes for higher education in the Netherlands (success factor 3; communication).

One of SURF’s conditions to accept proposals is the commitment of the board of governors to the proposal. In this case that was no problem. Another condition of SURF implied that the proposal was part of an ict-development plan of the institute. ArtEZ developed that ict-development plan due to the claim of SURF (success factor 4; steering). Making this plan resulted in more ambitions concerning the technical infrastructure, intranet en the electronic learning environment. All kinds of side effects that were not foreseen. However one of these side-effects seemed to be a necessary condition for DigOport (uploading videoclips). SURF offered also support in giving advise how to develop an ict-development plan and which company to ask for support (success factor 5; support).

During the first year of the project the head of the ICT-department decided to move to another job (failure factor 1; no involvement). The solution was found quickly. The
company that assisted in developing the ict-development plan was also able to operate as an information-officer as long as the head of the ict-department was vacant (success factor 6; support).

The time between applying for subsidies and being selected took almost six months (potential factor for failure 2; no proximity). In order to go on with the development of the internal system for integral quality assurance the board of governors of ArtEZ decided to start with simple html-pages in order to develop digital department portfolio’s. In 2003 the management team of all four faculties of ArtEZ agreed with the ideas of integral quality assurance in July 2003. The program coordinators agreed in October 2003 (success factor 7; involvement). In December 2003 SURF agreed to subsidize the grants to ArtEZ in order to develop DigOport (success factor 8; support).

The time to develop DigOport took about 11 months. In order not to loose time members of portfolio committees got training in quality assurance in March 2004 and had to put the information in simple html-pages (failure factor 3; not enough support). This indeed did not work. The composition of portfolio committees took a long time, because program coordinators were not motivated. They only saw a lot of work adding up to their normal work overload (failure factor 4; not enough support). When the portfolio committees were composed finally, they did only met once or twice and had an excuse: wanting to wait for DigOport to be ready (failure factor 5; no involvement). In November 2004 DigOport was on the air. DigOport was build with Microsoft Sharepoint Services. It was cheap, easy to build and user friendly (success factor 9; support). The office KtweeO offered a training to all members of portfolio committees (failure factor 6; no good support). Only two people gave a reaction. Because of this KtweeO offered tailor made training (success factor 10; support) for program coordinators in due time (success factor 11; support). This worked out well. The program coordinators who asked for these tailor made training were motivated by several reasons (success factor 12; involvement), like

- participating in a project to try out the accreditation for art programs
- being pushed by external pressure of the government (deadline of accreditation), and
- being pushed by their management due to serious problems in the quality of the program.

During the just in time given tailor made trainings it became clear that the procedure developed for portfolio committees did not work (failure factor 7; no involvement). In some departments it took a lot of time to compose the committees and after one or two meetings the compositions changed completely. Due the informal culture of in educational institute of art? However, it became clear that the program coordinators felt responsible for the DDPs’ (success factor 13; involvement). They were able to mobilise different people at different times to assemble information and evidences for the DDP’s. The functionality of share workspace in DigOport was very helpful in this situation and it was appreciated by almost everybody (success factor 14; support). However, user of mac-computers were disappointed by this Microsoft product (failure factor 8; no good support).

Out of 30 DDP’s of DigOport of ArtEZ 4 of them were fully completed in September 2005, due to the time pressure of accreditation deadlines (success factor 15; proximity). All other DDP’s become filled in more or less detail. The higher the time pressure of accreditation to more information is assembled in the DDP’s. All
members of portfolio committees have problems to start, due to the lot of extra work. When the DDP is almost finished most members feel proud of the results, although it took a lot of time. Although coordinators still complain about the required time investment for quality assurance, the board of governors of ArtEZ keeps giving highest priority to quality assurance (success factor 16; consistency). The process of next years will show it the DDP’s are only helpful for the accreditation or also for their own pdca-cycle.

In table 1 an overview is given of all success and failure factors and categorised by stakeholders.

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Success factors</th>
<th>Failure factors</th>
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<tbody>
<tr>
<td>National Government (NVAO)</td>
<td>15. Deadlines for accreditation</td>
<td>2. Time between grant-application and confirmation</td>
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<td></td>
<td>16. Quality assurance highest priority</td>
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<td>SURF (gives grants for ICT)</td>
<td>3. Promotes use of ICT in higher education</td>
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<td></td>
<td>5. Giving support and advice</td>
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<td></td>
<td>8. Confirmation of grants</td>
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<td>ArtEZ Board of Governors</td>
<td>1. consciousness of importance of quality assurance and acceptance of conditions of SURF</td>
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<td>ArtEZ Departments (management)</td>
<td>7. Agreement on development of DigOport</td>
<td>4. Lot of work</td>
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<td>12. Motivation of program coordinators</td>
<td>5. Waiting for DigOport to be ready</td>
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<td>13. Program coordinators felt responsible for DDP</td>
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<td>ArtEZ ICT-department</td>
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<td>9. Cheap, easy to build and user friendly</td>
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<td></td>
<td>14. Shared workspace in DigOport</td>
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<td>ICT-companies</td>
<td>2. Quality assurance has first priority</td>
<td>3. Training in and use of simple html pages</td>
</tr>
<tr>
<td></td>
<td>10. Tailor made training</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Training to all members at the same time</td>
<td></td>
</tr>
<tr>
<td>KtweeO</td>
<td>11. Just in time support</td>
<td>7. Procedure of portfolio committees</td>
</tr>
</tbody>
</table>

Table 1: Success and failure factors during the development and implementation of DigOport in ArtEZ.
5. **Conclusions**

In this part we will explain in what degree the primary goals of DigOport are achieved and which conclusions might be drawn from the analysis of the development and implementation process.

The main goals for the development of DigOport were:

1. To use multimedia as evidence for the quality of several aspect of the study program.
   
   This goal as appreciated very much by all users of DigOport. The users seem to be motivated to assemble more multimedia evidences in future.

2. To use ICT to support the management while working with the pdca-cycle.
   
   At this very moment several actions are planned in the DDP’s. So the ‘p’ of the pdca-cycle is done. Time will make clear if the DDP's will be used in future for the ‘dca’-part of the pdca-cycle.

3. To use shared workspaces to develop a digital self evaluation.
   
   Many employees use DigOport to put information and evidences in the DDP’s. This functionality is appreciated very much by the users, although the self evaluation is still time consuming. However, this is more due to the fact that educational aspects are not documented at all and need to be described. The activities around a DDP are also time consuming because users want problems to be solved immediately instead of planning the problem solving.

The analysis of the process of development and implementation of DigOport makes clear that to be successful:

1. the stakeholders (ArtEZ, NVAO, SURF) have to cooperate well,
   
   a. asking for advise (ArtEZ to SURF)
   
   b. giving advise in stead of just controlling progress (SURF to ArtEZ)

2. the aims of all stakeholders have to match well
   
   a. same priorities (aim of SURF and aim of ArtEZ concerning policy plan)
   
   b. respect each other’s priorities (DigOport and technical infrastructure)

3. the stakeholders have to be creative in looking for solutions to meantime problems:
   
   a. giving support just in time (KtweeO/ICT-department to portfolio committees)
   
   b. being flexible in application and procedure (requirements of DigOport, portfolio committees)

In September 2005 DigOport is evaluated by all members of portfolio committees. During the presentation at the e-Portfolio Conference results of this evaluation of DigOport will be presented.
Abstract
This paper identifies the usage of group ePortfolios, provides a brief discussion of the main types of group ePortfolios, and presents a method for building group ePortfolios from personal portfolios. Issues such as intellectual property and group ownership of artifacts, group processes and teamwork models, and relationships between individual and group portfolios are considered. Finally, an information model of the group ePortfolio is proposed.

Keywords

1. Introduction
Using ePortfolios to assist learning seems to be an important component of future educational models. An ePortfolio is a collection of artifacts that characterize in some way the learning experiences and activities of a person over some period of time. EPortfolios provide learners a flexible way to understand their learning more deeply. EPortfolios can offer advantages in demonstration of skills, learner reflection, collaboration, and assessment. Most current research about ePortfolios focuses on individual learners, e.g. IMS has released an ePortfolio specification built on its Learning Information Package (LIP) specification. However, such specifications are found inadequate when documenting collaborative team-based learning activities. We claim that dividing a team project into several disjoint pieces and putting the pieces into separate personal ePortfolios diminishes team-based learning artifacts. To support collaborative learning more effectively, a special type of ePortfolio is proposed in this paper, the group ePortfolio.

A group ePortfolio is defined as an ePortfolio for a group of people studying or working collaboratively and who jointly contribute their efforts to build a portfolio based on group-constructed artifacts. Group ePortfolios are different from personal ePortfolios in the aspects of portfolio construction and in artifact and annotation management. Group ePortfolios may persist well beyond the dissolution of the group – they relate to the artifacts created by a group and should remain as long as the artifacts do. These group ePortfolios could also serve as extra evidence for reflection, demonstration and assessment in personal ePortfolios.

Specifications for standardizing ePortfolios have been proposed (IMS ePortfolio specification, 2005). With these specifications standardized meta-data can be bound to ePortfolios, making them easier to interpret by computers. The content in an ePortfolio may be widely varied, but the associated meta-data should conform to standard and predictable formats. This paper intends to propose an extension of the
specification for group ePortfolios, which potentially improves monitoring and investigating team-based learning activities in e-learning.

2. Use of group ePortfolios

The use of ePortfolios has been categorized into four aspects: collection, reflection, connection and evaluation. These aspects equally apply in teamwork settings. A group ePortfolio can provide evidence of the achievement of an entire team that can be used as a learning example, a basis for evaluation, a historic record, etc. A group ePortfolio should attempt to characterize the achievements of the group, as well as document the collaborative process of realizing these achievements. Beyond a resume of a group, a group ePortfolio should tell a vivid story, which describes and even enhances the competency of the “team”. The data collected in a group ePortfolio is also valuable for modelling group performance and characteristics.

Another use of group ePortfolios could be to help users practice and improve teamwork skills alongside the process of collaboratively building a group ePortfolio. Teamwork training is sometimes excluded or dismissed by instructors because it is a difficult, time-consuming and sometimes an ill-defined activity. Group ePortfolios can assist teamwork training by implementing some kinds of recommended protocols for team data recording and reflection, although existing and sharable successful teamwork models are necessary for realizing this function.

3. Major types of group ePortfolios

In order to identify and capture different collaborative learning and working activities for group ePortfolios, it might be helpful to look at several major types. Group ePortfolios can be divided into several types according to the differences in group size, goals, and time constraints. This paper lists three main types of group ePortfolios and discusses their characteristics. There could be more types, and discovering more will be a topic of future research.

- Course-based group ePortfolios

Course-based group ePortfolios have been used commonly in different ways and purposes in education. Many senior courses in universities and colleges include team-based projects; some of which count for a large part of the students’ grades. The main characteristics of course-based group ePortfolios are small size, short term, heterogeneous team, with a focus on discrete projects. This type of group ePortfolios usually focuses on one particular project or topic and it could become part of the learners’ personal ePortfolios. One of the importances of introducing course-based group ePortfolios is that students could benefit from good teamwork model and be stimulated to participate and practice communication skills. This kind of group ePortfolio is also useful for institutional assessment.

- Working group ePortfolios

There are project teams, research groups, and sometimes entire departments in companies where workers might need to build group ePortfolios. Working group ePortfolios are more complex than course-centered group ePortfolios. Working group ePortfolios may involve more partners and longer duration. The content of group ePortfolios in the workplace can contribute directly to corporate knowledge management initiatives. Intellectual Property (IP) is a key issue in this kind of group ePortfolios.
Portfolios for virtual communities

The largest groups in e-learning domains could be online “virtual communities” or “virtual learning communities” (VLCs). The members in a VLC usually have diverse backgrounds and flexible online times. Since VLCs are created and maintained generally for long term goals for people who have some common interest, ePortfolios for VLCs should be concerned with both content management and groupware use in supporting members in the community.

4. Connecting group and personal ePortfolios

It seems that group ePortfolios should be linked together with personal portfolios because group ePortfolios can serve as supplements for evidence of demonstration, reflection and assessment. Personal ePortfolios are equally important to link to group ones because personal record and history could be discovered and analyzed by potential employers or even future adaptive learning systems. Although the concept “group ePortfolio” described in this paper intends to establish for each group a relatively independent portfolio apart from personal ePortfolios, there are still many ways that information needs to be exchanged between the group and personal portfolios. The relationship between personal ePortfolios and group ePortfolios is complex and subtle.

An important feature of group ePortfolios arises out of the sometimes temporary nature of groups. Groups are formed for a purpose and they may dissolve after that purpose is achieved. In a similar way, the group ePortfolio gains data while the group operates and then ceases to evolve or accumulate information when the group dissolves. It may be appropriate to distribute the group ePortfolio back to the individual members of the group upon dissolution of a group. Whether a group ePortfolio should live on as a separate entity after a group has been dissolved is a question for further research.

Besides personal content and artifact management, a group ePortfolio also deals with the special characteristics that a group brings, such as roles in a team, synergies, conflicts, and conflict resolution issues. Group ePortfolios should record the details of collaboration and the roles that group members play in this collaboration. Three levels of structure for group ePortfolios are proposed in the paper: goal and task establishment level, logistical and time-line level, and conversation level. Goal and task establishment level is the highest level, which can be used to check what the goal is and whether it has been achieved. Logistical and time-line level attempts to capture how a group of people should work together towards the goal and what progress has been made from time to time. Conversation level is used for keeping details of communication among the group members, such as meeting conversation and collaborative problem solving process. A well-functioning group ePortfolio system should provide support in all three of these levels. Thus, group members can gain the flexibility of linking group ePortfolio and their personal portfolios at different granularity levels. A user study will be applied to test the proposed three-level structure and find out more valuable details as a future work.

IMS has proposed some specification for ePortfolios, in which multi-user ePortfolios were briefly described (IMS e-portfolio XML Binding, 2005). The <participation> element shown in Figure 1 is used to represent a group of people, which may or may not include the Owner of the Portfolio. The <participation> element may be used to represent a group of people who collaborated on the creation of a Product or who
participated together in an Activity. One can see that a set of links to the different level of relative group ePortfolio parts can be annotated by the group tags with a slight modification if necessary.

![Diagram of <participation> element composition in IMS ePortfolio XML Binding](image)

**Figure 1: <participation> element composition in IMS ePortfolio XML Binding**

Assuming the IMS specifications are applied in a certain system, the following example shows a possibility to make progress toward a set of specifications for group ePortfolios that could interoperate effectively with the IMS specifications of personal ePortfolios. Figure 2 shows an assertion by a teaching assistant, it can provide useful clues about the student’s skill level after completing some project or assignment. If the assignment was a team project and this assessment was given to the anonymous student who is in charge of a certain module of the program, how does the system help this student to transfer the comment to his/her personal ePortfolio?

Records in the <relationship> part and the <role> part, which can be found in the proposed model in this paper, seem to be necessary.
5. **Who Owns a Group EPortfolio?**

Ownership is a key issue for ePortfolios. A claim has been made that “Students should take ownership of their ePortfolio; they control content and viewing privileges to his/her portfolio information. Students become active learners when they assume ownership” (LDP e-Portfolio report, 2005). It is difficult to decide who owns a group ePortfolio because there is more than one person participating and contributing to a group ePortfolio. As a result, there are intellectual property issues involved. The models for group ownership of the intellectual property associated with group artifacts need to be somehow applied when specifying ePortfolio use. Fortunately, group ePortfolios may provide a record of activity in artifact construction, which provides a basis for assessment or performance evaluation and an opportunity for transparency in group processes. When conflicts over intellectual property occur, group ePortfolios can help decision makers resolve problems by providing the record as reference. Thus, group ePortfolio do not decide the ownership of artifacts, but may help the co-owners to claim and illustrate their relative contributions more clearly.

6. **An Information Model of a Group EPortfolio**

The group ePortfolio is a special type of ePortfolio. It may be reasonable to modify the existing designs of personal ePortfolios to add a category for managing collaborative learning activity. Our information model (Table 1) proposes the essential parts of a group e-portfolio. More detailed specifications could be added and modified based on some specific contexts. The information model of a group ePortfolio is presented in the form of an XML description of element composition, as well as brief descriptions.

In our model, a group ePortfolio is annotated by ten elements: Identification, Team Description, Artifacts, Self and Formal Assessment, Factor of Team Success, Reflection, Relationship, Applied Standards and Metadata. Each of these elements contains sub elements. The identification part keeps a unique URI of the group ePortfolio as well as the identification of the group and links to individual ePortfolios. The team description part keeps basic information about the group history and characteristics. Information about artifacts created or worked on by the group is stored in the artifacts element. The self-assessment part deals with self-evaluation, peer evaluation and peer help inside the group, while the formal assessment part is the record of all certified assessment. The “factors of team success” may be the most
important part of a group ePortfolio (Soller, 2003). Group members could benefit by following a set of successful cooperative models pre-selected by the group or the ePortfolio system and successful groups could promote their factors of team success to other, newly-formed groups. Standard templates for group ownership of intellectual property could also be incorporated into this element.

Table 1: An information model of a group e-portfolio

<table>
<thead>
<tr>
<th>Element</th>
<th>Sub Element</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification</td>
<td>e-portfolio URI</td>
<td>Authorized unique identification</td>
</tr>
<tr>
<td></td>
<td>Owner identity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Certificating identity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Group identity</td>
<td></td>
</tr>
<tr>
<td>Team descriptions</td>
<td>Membership</td>
<td>Basic team information</td>
</tr>
<tr>
<td></td>
<td>Interest &amp; goal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Valid period</td>
<td></td>
</tr>
<tr>
<td>Artifacts</td>
<td>Size</td>
<td>Attributes of artifacts</td>
</tr>
<tr>
<td></td>
<td>Ownership</td>
<td></td>
</tr>
<tr>
<td></td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>Self-assessment</td>
<td>Individual assessment</td>
<td>Assessment from group itself</td>
</tr>
<tr>
<td></td>
<td>Collaborative assessment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Functional Knowledge and Skills</td>
<td>Task dependant</td>
</tr>
<tr>
<td>Factors of team success</td>
<td>Teamwork Skills and Social Intelligence</td>
<td>Team roles, Balance, Leadership, etc.</td>
</tr>
<tr>
<td></td>
<td>Task</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Context</td>
<td>Certified assessment</td>
</tr>
<tr>
<td></td>
<td>Periodical assessment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overall assessment</td>
<td></td>
</tr>
<tr>
<td>Reflections</td>
<td>Reflection on a stage or process</td>
<td>Learning reflections</td>
</tr>
<tr>
<td></td>
<td>About a topic, concept or issue</td>
<td></td>
</tr>
<tr>
<td>Applied Standards</td>
<td>Data exchanging standards</td>
<td>Data format, languages, etc.</td>
</tr>
<tr>
<td></td>
<td>Team models</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Presentation standards</td>
<td></td>
</tr>
<tr>
<td>Metadata</td>
<td>Logs</td>
<td>Update information</td>
</tr>
<tr>
<td></td>
<td>Attributes</td>
<td>Restrictions, e.g. type of artifacts</td>
</tr>
<tr>
<td></td>
<td>Links</td>
<td></td>
</tr>
</tbody>
</table>

It is difficult to capture, record and summarize relevant elements of communication among group members; to demonstrate the detailed problem-solving processes; and to represent how outcome are achieved collaboratively. Many group participants, particularly students in groups, may lack an interest or ability to organize, summarize and record this data. By using a group ePortfolio with annotation based on the
proposed model, assistance from the supporting software system can be provided to automatically capture and manage valuable information that is beneficial for both group members and potential employers.

7. Conclusion and Future Work

To conclude, this paper provides a wide range of discussion on multi-user group ePortfolios and the relationship between ePortfolios for individuals and groups. It proposes an information model that might lead to defining future specifications for group ePortfolios. Artifacts constructed by groups need to be treated somewhat differently than individually constructed artifacts in terms of ownership, processes of construction, and meta-data annotations. When group-constructed artifacts are included in individual ePortfolios, credit must be given to the group, which may be achieved through a link to a group-ePortfolio.

ePortfolios can be related to learner models. A learner model is a characterization of the cognitive state of a learner with respect to some content domain (Greer and McCalla, 1994). Learner models are used to personalize interactions in adaptive learning environments. When learners interact with some learning environment, the learner model is built up further. Recent research has explored the benefit of opening the learner model to both the learner and other peers for reflective interaction. This makes learner models appear to be even more similar to ePortfolios. One extension to this paper is to develop mechanisms for individual learners or groups to build user models based on their own portfolios and to compare the difference between the models generated by an adaptive learning system and that based on the e-portfolios. Moreover, the effectiveness of this mechanism could be evaluated.

8. References


IMS e-portfolio XML Binding, Version 1.0 Final Specification, 2005
http://www.imsglobal.org/ep/epv1p0/imsep_bindv1p0.html, accessed 8/15/2005


Abstract
In recent years, adoption of e-portfolio tools in higher education has occurred in individual courses, departments, schools and across institutions. Use of the weblog has grown exponentially and many now regard it as an excellent tool to facilitate reflective learning. Social networking protocols have tremendous potential to create a truly user centered environment of knowledge creation and distribution. The combination equals a learning landscape.

The learning landscape really put the learner at the centre of their learning and encourages learners to form their own communities of learning, thus promoting learners as contributors to knowledge not just consumers!

It is all about creating an online presence and making relevant connections, building up a network of knowledge transfer which results from the interactions and relationships among all learners within this type of community.

This paper will document the technologies behind the learning landscape as well as touch upon some of the outcomes.

1. Introduction
A student’s time in higher education is a complex blend of diverse experiences; therefore, it is important that e-portfolio software can go beyond simple course applications. The significance of linking together people, ideas, resources and experiences cannot be overestimated; the greater the engagement in the e-portfolio process the greater the potential for deep learning and cognitive absorption.

A learning landscape framework allows faculty and students to consider outcomes out with the rigid structure of course outlines and requirements, incorporating and overlapping experiences from many learning contexts.

2. Framework tools
The learning landscape will draw from Web technologies designed for facilitating communication and connection. Weblogs allow for personal reflection that can be commented on by other weblog users; automatic “trackback” links allow anyone to follow the thread of the conversation from site to site. Social networking tools, meanwhile, allow users to create simple portfolios and establish connections to those created by their friends, business contacts and Web communities that interest them. This functionality could potentially be incorporated into an e-portfolio system allowing the user to share their uploaded work, as well as reflections about their courses and lives within the institution.

Some of the connections in social software are independent of individual Web systems, and are instead defined using a generalized XML technology (Friend Of A Friend). Weblogs also have XML generalizations, called RSS and Atom, which allow
for content to be exported into various applications, for example aggregated weblog readers. Within the context of a learning landscape, a combination of XML generalizations could be used to allow a user to transfer their portfolio between institutions, or perhaps for different learning systems to talk to each other.

The result would be a standardized technology allowing students to converse with each other and learn as a community not only within an institution, but potentially across the learning spectrum. With metadata attached to a user’s uploaded objects and e-portfolio data, then utilising a peer-to-peer searching mechanism, users could find students with similar interests at institutions across the globe.

3. Expanding the e-portfolio model: current web technologies in more detail

E-portfolios are one component of the digital learning landscape that students inhabit. It is worth noting that the technology does not define the learning landscape and the framework will allow substitution of emerging technologies as and when they become available. The following describes some of the technologies.

3.1. Weblogging

A weblog (commonly referred to as a “blog”) is a frequently updated website consisting of chronologically ordered text or photographs, most often displayed in a diary form. Due to the high quality and ease of use of the underlying technology, this has been incredibly popular; updating a website no longer requires technology-specific skills such as HTML or server maintenance. Some adherents have nicknamed the weblogging culture “Web 2.0”, which references the original concept of the World Wide Web as a medium to share information.

3.2. Folksonomy and Social Networking

In a folksonomy, a weblog post or an uploaded file will be marked by a number of keywords (or “tags”), which the user creates by typing free text. If anyone else has also marked posts or uploads with those keywords, the user will be able to see an aggregated list. Because an infinite number of keywords are theoretically possible, and all keywords have at least one attached object, the classification system is constantly adapting to the content on the site. This means the categorization system is efficient: a user clicking a keyword is always sure to find at least one object. Often there will be a page displaying either a set of random keywords or the most popular keywords, with the individual popularity of each indicated by that keyword’s font size. Probably the most popular of these sites is the photography site Flickr (Flickr; http://www.flickr.com/), which allows users to sort both their own and other peoples’ pictures through tags.

Social networking is a Web technology which allows users to discover new business or personal contacts by traversing relationship links between people, and then keep track of their activity within a system. It is common for users to be found using a simple search function; alternatively, each user may have a profile containing embedded folksonomy tags. Someone can then look for anyone who has self-tagged themselves as having an interest in e-learning, for example. This can be combined with top-down categorization, allowing for hybrid searches such as “people in Canada [a top-down category] interested in e-learning [a tag]”. Flickr is also a social networking site: you can mark particular users as being contacts, and then keep track of their new photographs as they upload them into the system.
During 2004 and 2005 the use of social software exploded; at last count (April 2005) there were around 380 different web services offering social networking (Home of the Social Networking Services Meta List; The Social Software Weblog; http://socialsoftware.weblogsinc.com/entry/9817137581524458/; accessed May 18 2005). Their importance has been underlined by high-profile purchases of social software by both Yahoo! and Google.

The combination of a digital repository with weblogging, folksonomies and social is powerful; these features provide the mechanism by which the artifacts can be shared. A user can upload an artifact and then mark it with folksonomy tags so it can be found by category; they can also choose which of their contacts they would like to have access to it. Finally, they can make a weblog post and embed the artifact. This might provide context and possibly allow for discussion regarding its contents.

3.3. Distributed Systems

So far we have painted an image of a learning landscape with integrated weblogging (complete with a “friends page”, comments and trackbacks), social networking, a folksonomy-based classification system and digital artifacts. However, what if a user wants to discover resources outside their institution? A distributed learning landscape would allow users to not just discover all the users interested in e-learning at their institution, but also throughout every learning landscape system. A user at Edinburgh could add a user at Stanford to their friends page, or allow them access to an uploaded repository artifact. In less ambitious terms, a user at a university’s medical school could add a user in the humanities system as a friend.

3.4. Standards

The need for standards then becomes clear. A global, distributed learning landscape can only be effective if it is not limited to a single piece of software installed on multiple servers; rather, all software using the same standards would be able to interact with each other. Additionally, this interaction should not be reliant on a centralized set of servers, in case these should be external to a particular system and one day disappear. “Peer-to-peer” is a technology that allows a global search to occur by passing requests to a server’s neighbours and aggregating the results. This methodology ensures that no school or institution is reliant on any other school or institution to remain part of the global learning landscape network.

4. Syndication

4.1. XML

XML – the eXtensible Markup Language - is an industry-standard, extensible format for self-describing data which allows for easy data transfer between computers, whatever the operating system or model. Due to its widespread use, it can be very easily written and read by a wide variety of clients. For compatibility reasons, it is therefore sensible to use standards based on this format whenever transferring data between servers on the Web. The following standards are all XML-based.

4.2. Friends Of A Friend

Friend Of A Friend (FOAF) is an XML standard that allows website owners to define who they are as well as their relationships with other website owners – effectively creating a wide area social network. Unlike traditional social networking software,
FOAF does not require relationships to be within a single system; resources can be associated with each relationship within the XML, so while one relationship link might lead to a weblog, another might lead to a photo album or a portfolio page. Relationship links can also be made to individual objects.

While the programming overhead in including FOAF capabilities in software is very small. However, the benefits can be large; following the links in FOAF files and merging the data can result in a large, continually updated directory of users.

4.3. RSS and Atom

Really Simple Syndication (RSS) is an XML format for summarizing web content (usually of the chronologically-ordered kind, such as weblogs and newspaper articles). A site’s posts or content items are expressed using XML markup, and can then be imported into specialized RSS readers or themselves added to a user’s “friends page”. LiveJournal, for example, allows RSS feeds to be viewed and commented on as if they were just another user weblog within the system.

Atom is a more advanced XML-based technology that also allows users to syndicate and aggregate web content. However, it also allows users to post to the Web using third-party client software. As there is a significant base of software growing, supporting Atom allows users to read, create and upload content using software they are already familiar with.

5. How this applies to e-portfolios

5.1. A redesign of syndication standards for portfolios

Rather than an XML file that stores summaries of weblog posts, the e-portfolio system might maintain a file containing identifying information about the user. XML files generally have a main tag, with all the other tags as children; this could simply be called “portfolio”, which might have the attribute “name”, containing the portfolio owner’s name. Another possibility may be a “portfolio-info” tag, which would contain sub-tags with the date the portfolio was created, the date it was last edited, the establishment it was last edited within and the software platform used. There would be another tag with “user-info” (or a similar name), containing contact details and so on. A sample portion of this part of the portfolio file might look something like the following, although the final XML schema would be significantly more sophisticated.

```xml
<portfolio name="John Smith">
    <portfolio-info>
        <date-created>March 07, 2004 20:45 +00:00</date-created>
        <date-last-edited>March 07, 2004 21:09 +00:00</date-last-edited>
        <establishment>University of Edinburgh</establishment>
        <software>Edinburgh e-portfolio System</software>
    </portfolio-info>
    <user-info>
        <born>January 07, 1979</born>
    </user-info>
</portfolio>
```
XML allows for binary data to be stored within its tags: this allows for artefacts to be stored as embedded objects within an XML file. There could be a tag called "objects" (or similar), with sub-tags containing particular pieces of work that the portfolio owner might want to make available. Word documents; pieces of art; the type of file wouldn't matter.

5.2. Incorporating into e-portfolios

Within the learning landscape there are three important aspects the system would need to encompass:

- **Reflection** – the student can map out his or her thoughts on a course, a piece of work, or more general experiences.
- **Communication** – the student can communicate, if they want, his or her reflections to other students, staff, tutors and lecturers.
- **Sharing** – the student can give selected other users access to their material – reflections, artifacts, resources.

Learning is not as effective in isolation; there is a great deal of discussion involved in traditional courses, this would need to be reflected in any electronic learning aid. The importance of linking together people, ideas and resources cannot be overstated.

5.3. Community of Learners

A learning landscape will foster the sense of belonging to a community of learners sharing knowledge and experiences. This sense of community can strengthen the learning environment creating a network of knowledge transfer. The driver behind this philosophy being that learners who feel part of and engaged with an online community connected to other learners, course leaders, tutors, resources, digital artifacts, social peers etc. may have more inclination to utilise the service.

5.4. Cognitive Absorption

A framework where learners engage in the process both academically and socially could augment the opportunity to build learning instead of simply being the recipient of information. This ability to form learning or social communities, interacting with peers, with the e-portfolio as the hub will create a milieu promoting user engagement and a level of deeper learning. The next generation of learners will be active in wider communities of learning without restrictive physical boundaries lending greater scope to interact, cooperate and collaborate.
6. **The Outcome: Creating a sense of community**

Social networking enables learners to create their own learning or social communities in an engaging environment – learners can use this for everyday activities, keeping in touch with each other, finding the latest resources and sharing their own experiences.

Strength of belonging to a community and the ability to share problems, experiences, resources etc with other learners can harbour a sense of confidence. Learners participating in this process will gradually build up a trusted system, a network of knowledge transfer – the learner becomes a contributor and not just the recipient of knowledge.

7. **Conclusion**

Our hypothesis indicates the learning landscape will create an online environment connecting learners, tutors, resources, etc. where the potential for greater engagement, reflective thought and making relevant connections is high.

“Learning with computers is not about programming or drill and practice, nor about multimedia, nor about fast updating or cost-efficiency – is it all about humans sharing ideas” (Leinonen).

This is a work in progress paper. More research and analysis is currently underway which is it hope will provide validity to this approach.

8. **References**


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Weblogs:
The pedagogical benefits of ePortfolios

Reflections on the implementation and pedagogical efficacy of ePortfolios.
Session: PS2C
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Abstract
The launch of the BA (Hons) Social Work programme at the University of Dundee has provided an opportunity to embed ePortfolios within the course design. This paper evaluates the experiences of staff and students during the first year of its implementation. Key issues that emerge relate to the timing, frequency and nature of IT induction; the extent to which ePortfolios encourage reflective learning; the degree to which assessment drives student engagement; and how to plan for future developments.

Key words
ePortfolio, implementation, constructivism, evaluation, reflection, social work

1. ePortfolios and the BA (Hons) Social Work Programme

In September 2004 the Social Work Department of Dundee University launched the new BA (Hons) Social Work programme. Not only did the construction of the new degree have to respond to the fundamental changes brought about by the introduction of Standards in Social Work Education (SISWE), but also created an opportunity to incorporate new methods of teaching and learning at the heart of the design of the programme.

Social work education places a strong emphasis on students developing the ability to learn and practice in a reflective manner. This has led social work education to embrace a range of constructivist approaches that shift the focus from teacher to learner, and in turn encourage students to construct and engage with their own knowledge base (Weller 2002). The introduction of the ePortfolio is directly linked to this ethos and it was hoped that this would give students a tool with which to gather and collate information and be able to reflect upon their learning processes. The ePortfolio will also be the central repository for providing evidence to demonstrate that the student has met the SISWE.

It may be useful to construct a clear understanding of what is meant by an ePortfolio in relation to this paper. A portfolio could be described as a collection of information that is constructed and maintained by an individual that can then be used as evidence of performance and achievement. To simply view ePortfolios as an electronic version of this description overlooks the heightened reflective and selective element that the ePortfolio offers. This brings in the notion that ePortfolios are not only a repository of information, but also by their nature instigate a process of engagement and reflection. Boud et al (1985) state that reflection is a “generic term
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for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations’ (p19)

This paper is informed by an evaluative piece of research that examined the implementation and effectiveness of the ePortfolio as a tool to enhance reflective learning and evidence progress. The design is a cohort study, based on a pre- and post–test model without controls (Gomm et al, 2000). In this context the intervention is the supported use of electronic portfolio. Data was collected by means of a pre-test questionnaire at a point when students were expected to begin using their portfolio on a regular basis. This survey examined the students’ understanding of ePortfolios, their experience of their use, their views on the advantages and disadvantages, as well as the extent to which they feel their portfolios may encourage reflective learning. The cohort was surveyed by a second questionnaire at the end of the module when the relevant sections of the e-portfolio had been submitted for assessment. This second wave survey re-examined the content of the original questionnaire from the basis of ongoing experience of ePortfolio usage. The assessed portfolios ultimately provided evidence of the extent to which the students had acquired the skills of reflection. In addition to these sources of data, academic staff also completed questionnaires that examined their experiences regarding supporting students during the period of implementation.

For the purposes of this paper I will identify the key themes that emerged from this evaluation in terms of student and staff experience. These themes will be examined in relation to existing literature relating to the implementation and usage of ePortfolios, and in turn I hope to illustrate the student experience and make recommendations for the ongoing development of ePortfolio use within Dundee University’s social work programmes as well as inform wider debates regarding implementation and pedagogy.

Within the Dundee University BA (Hons) Social Work programme students will undertake a module each year entitled Reflective Practice. Over four years students will be supported to establish and develop their skills in reflecting on their various sources and modes of learning and to map these against the SiSWE. The process is therefore staged and incremental. By the end of year 1, students will be expected to demonstrate the following

- an understanding of what it is to reflect
- a basic sense of how to go about this
- an ability to write about this process

The ePortfolio is offered as a mechanism to support this activity. It is one of a number of supports provided for the student within the context of the module and the cycles of enquiry and action learning underpinning the module. The Portfolio has two purposes:

- To support the student’s development as a reflective practitioner by providing an opportunity to regularly reflect on and evidence his/her learning and achievement against the SiSWE
- To provide a mechanism for the assessment of the student’s learning (both formative and summative) and achievement against the SiSWE.

During the closing weeks of Semester 1 in Year 1, students are given three introductory sessions to the reflective process. From Semester 2 of Year 1 students
are encouraged (but not required) to make weekly on-line journal entries reflecting on their learning from that week. At the end of Year 1, the student group submitted elements of their e-portfolio to evidence their ability to reflect on and evidence achievement and learning against the SiSWE and this formed the basis of the assessed work of the module.

2. Issues of Implementation

The emergence of constructivist approaches and the implementation of the ePortfolio have led to a reassessment of the role of teaching staff. The BA (Hons) Social Work programme offers a mixed palette of didactic teaching programmes with constructivist methods such as Enquiry Action Learning (EAL) groups. This pedagogical duality requires staff to move between the established roles of teacher/expert, to that of facilitator/educator. This dual role is maintained because there are elements of the programme where there are ‘right and wrong answers’, and certain theoretical and practical elements of the programme that need to be completed successfully for qualification. Gathercoal et al (2002) suggest that much of the literature looking at ePortfolio and elearning focuses on the students as being the key obstruction to the successful implementation. They argue that it is more important that ePortfolios need to be embraced at an institutional level and that staff feel supported and in turn competent to facilitate their use.

The implementation of ePortfolio has raised many issues in terms of how best to induct students to be able to engage with their portfolios independently and effectively. It was clear that students require a degree of IT literacy and confidence to use their ePortfolio (Macdonald et al 2001). The degree of IT literacy varies enormously in a social work student cohort, and some students will at least initially feel frustrated and possibly disadvantaged by this process (Richards 2002). Richards goes on to suggest that the development of IT skills may be a particularly positive by-product of ePortfolio use.

In addition to this, the notion of independent reflective learning needs to be introduced and supported. Reflective learning is viewed as an evolving skill throughout the programme, and in the initial stage students are introduced to the educational rationale behind the concept, and are encouraged to use their ePortfolio as a ‘safe’ environment to make links within their learning. Students were not required to submit a reflective account of their learning until the end of the academic year. As noted above, reflective learning is an area that sits very comfortably within the context of social work education, and this is an ethos that permeates throughout the entire programme. The aforementioned independent nature of ePortfolio construction requires students to feel that they are in control of their ePortfolio. Paradoxically it has been argued that the best way to achieve this end may be to implement compulsory assignments that necessitate engagement with the ePortfolios (Siemens 2004). The Dundee BA (Hons) programme has a formative submission in April followed by the summative submission in July. This follows an introduction to the ePortfolio in the preceding November. The associated tutor feedback lets the students make the links between the learning within their portfolio and achievements within the programme. Chapel & Schermerhorn (1999) concur with the notion that implementation must be structured and instructional. They propose 5 key rules for successful implementation:

- ePortfolio use must be mandatory
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- IT skills support must be adequate to overcome any ‘opt out’
- Students need to be encouraged to select own materials
- Students require regular feedback
- Needs to encourage involvement from the staff of a course.

The Dundee programme can be mapped against the above criteria successfully; however it is important to note some key emphases. The use of the ePortfolio is central to the completion of the module and indeed the entire programme. IT induction is offered at the time of introduction to the ePortfolio and a refresher clinic is scheduled at a later stage. As noted above students receive feedback at a formative and summative stage, but do not receive ongoing feedback as they engage with their ePortfolios.

3. Ongoing Use and the Role of Assessment

The use of IT skills is a key feature of ePortfolios, and indeed the development of these skills through this usage may be a positive by-product. Wade and Yarborough (1996) propose the following characteristics as forming the basis of a student’s experience of using ePortfolio:

- Developments- long term rather than short term
- Dual valued – 2 way process between learner and teacher
- Selective-self determined content
- Authentic-contains genuine works
- Reflective – reflection, comparison and review all possible
- Individual – personal account of learning
- Interactive- elements can be shared with others.

In essence the key purposes of an ePortfolio are summative, formative and presentational. These elements are fluid and within the Dundee programme the transition is from formative to summative throughout the module. Students compile a learning journal that can draw from educational, personal and employment experiences. The learning journal in conjunction with other aspects of the ePortfolio such as the ‘personal profile’ and ‘record of assessment’ feed into the submission of the assignment. Following induction students were given the freedom to engage with their ePortfolios at their own pace. McKenzie et al (2002) suggest that in fact a more structured approach where class time is allocated with attendant support may be a more effective way of engaging students with the process.

Richards (2002) proposes a 3 stage developmental process of ePortfolio usage. Firstly, students engage in ‘naïve doing’ when beginning their Portfolio. Secondly, as the body of content increases students are able to engage with ‘critical thinking’ in terms of reflection and selection of material. Finally students can use their ePortfolios to be applied to performance and practice.

It could be argued that the continued existence of the teacher/student hierarchy inhibits the development of ‘real’ reflection, and rather encourages students to ‘reflect’ in a manner that they feel is the ‘correct’ way rather than their own learning style being the key ‘driver’. In social work education this tension is manifest, as there are a range of incontrovertible elements of knowledge that students must acquire, whilst also a significant value placed on students developing reflective learning and practice skills. This links well with the aforementioned notion of a mixed pedagogical
palette that can meet these apparently contradictory aims. Boud and Knights (1996) warn that having and assignment driven reflective tool can be very limiting:

“Setting an assignment which the staff member believes will encourage reflection is not sufficient; the intent of the student is crucial as most activities can be turned into ones which the semblance of reflection can be portrayed.” (p28)

This chimes with the work of Taylor (1996) who notes the tension that may exist between the development of reflective learning skills and the requirements of assessment. There appears to be an inherent pedagogical difficulty with the notion that academic staff are encouraging students to construct their own learning environment with the purpose of encouraging reflection, but then for the purpose of assessment, reflective writing is quantified and given a ‘value’ that allows comparison with other students. Boud and Knights (1996) stress that this process of reflection is not ensured by merely asking a student to undertake a reflective exercise, as there is a danger that students will undertake what they view to be the marker’s view of reflection rather than actually placing themselves at the core of an unpredictable process.

The SISWE provides a clear framework of expectations that a qualifying social work student must meet. The reflective process that leads to the attainment of these conditions can be harnessed within the ePortfolio, and students are expected to submit the mapping of their learning against the SISWE at key points throughout the programme.

4. Reflection and Constructivism

Weller (2002) states that the adoption of electronic methods of teaching and learning necessitate a re-examination of the way educational programmes are constructed, because the traditional lecture-based didactic models of learning do not translate easily into the electronic medium.

Weller proposed that constructivist approaches to learning are best suited to electronic learning. Simply put, constructivist approaches focus on learning rather than teaching, and in turn the emphasis is on learner constructing their own knowledge base and seeking their own interpretations and conclusions. As noted earlier, this also requires the teacher to adopt a more facilitative role where they provide the tools and supports to allow students to explore subjects. Weller (2002) note that this process of change can be difficult and challenging for both student and teacher as there can be a sense that the ‘control’ of the learning is less clear. This can lead to frustration as there is a less definable map to follow through a programme, and students will naturally construct their knowledge bases in different ways and speeds. It may be that students require a combined didactic and constructivist approach to their education in the early stages of a programme as constructivist approaches presuppose that students have certain learning skills. This clearly links strongly with the aforementioned ‘mixed palette’ of teaching approaches. Indeed Macdonald et al (2001) found there were significant differences in the reflective and investigative skills of undergraduate (the focus of this study) and postgraduates. This may suggest that there is a developmental process in terms of learning skills that is required. The additional challenge of learning how to use electronic tools such as ePortfolio may exacerbate this issue.

It would be tempting to surmise that the increasing onus on the learner reduces the involvement of the ‘teacher’. The aforementioned facilitative role requires an ongoing
dialogue between teacher and learner, and the key change is a move away from the
traditional learner/teacher hierarchy, to an increasingly interconnected relationship.
However this new relationship is tempered by the continuance of assessment, and
limits that this places upon constructivist learning. Weller (2002) warns that teaching
staff require support and encouragement to adopt new methods of teaching, and that
any shift in mode of delivery should be for sound teaching and pedagogical reasons.
Gathercoal et al (2002) state that “our experiences indicate that a critical success
factor for electronic portfolio implementation is a culture where faculty understand
their central role in the portfolio process as resource providers, mentors, conveyors
of standards and definers of quality.” P30. The independent nature of ePortfolio use
can lead to a student experiencing difficulties either practically or academically
without it necessarily becoming evident to teaching staff. Clearly the
student/facilitator relationship is central to supporting students with the ePortfolio.
This ties in directly Weller’s (2002) suggestion that even greater attention need to be
paid to teaching and pedagogy when developing eLearning models

Central to reflective learning is the notion that students must not only be taught
information, but that they must then learn how to apply this in practice. Social work
programmes require students to be able to transfer their knowledge in a manner that
allows reflective and informed judgements in practice settings. It could be argued that
for social work education the emergence of constructivist tools such as ePortfolios
have the added value of encouraging students to develop reflective skills that are
essential within social work practice. Taylor (1996) highlights the need for students to
have ‘self agency’ as there is no preset ‘path’ to follow, and there is an onus on the
individual to seek learning opportunities. Moshman (1982) proposes the model of
‘dialectical constructivism’, which emphasises the need for a student to interact with
their knowledge base and to be able to filter this learning through their own
experiences and value bases. Students should be encouraged to reassess their
views and assumptions and then modify their knowledge base following reflection.
Chang (2001) suggests that this process of evaluation encourages not only a clear
sense of ones learning, but also of oneself. This sits very comfortably within the
context of social work where a clear sense of self is of paramount importance in
practice.

Taylor (1996) notes that the notion of reflective learning fits in with the requirement
for a flexible and responsive workforce, and ePortfolios sit comfortably with the
emphasis on lifelong learning and continuing professional development. EPortfolio
not only allow for reflection and reassessment, but also provide a robust tool for
identifying and planning future learning needs and goals. The electronic nature of
ePortfolio further supports this notion as they are highly customisable, reduce need
for physical storage and are more easily sharable (Cotterill et al 2004).

5. Key Themes from the Evaluation

The key findings that emerged from this evaluation can be contained within the
following themes:

1. Acquisition and development of IT skills to support engagement and use of
ePortfolios.

2. Nature and frequency of induction and ongoing support in relation to ePortfolio
use.
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3. Sources of motivation for students to engage with their ePortfolios and the extent to which their portfolios supported their ability to learn, think and write reflectively.

4. The student’s view regarding the advantages and/or disadvantages of using ePortfolios.

5. The tutor’s view of their role in the implementation and ongoing support of ePortfolios.

The aforementioned pre-test and post-test student questionnaires were issued to the entire year group of 36 students. There were 27 respondents to the first questionnaire and 23 respondents to the second. All 23 respondents to the second questionnaire had responded to the first. 3 of the 4 tutors directly supporting students responded to the post-test tutor questionnaire. The assessed elements of the ePortfolio provided a further source of evidence and these were able to be examined on an individual basis as well as the spectrum of grades being examined both in terms of the module and in comparison to other modules within the programme. The following presentation of the key findings will consist of qualitative data in the form of direct quotes from respondents as well as quantitative data that is presented in graph or chart form.

5.1. Acquisition and development of IT skills to support use of ePortfolios.

The student group presented wide-ranging levels of IT literacy at the outset of the programme. In addition to this their engagement with the ePortfolio must be set against the backdrop of 93% of the student group stating that they did not have any prior knowledge about the use of ePortfolios prior to the course. The implicit requirement to possess and/or develop the relevant IT skills to engage with the ePortfolios was a strong theme within the qualitative and quantitative data.

Students were asked in the pre-test questionnaire whether they felt equipped to engage with their ePortfolios following their induction.

The induction adequately equipped me to begin to use my e-portfolio

The graph shows the responses to the question: The induction adequately equipped me to begin to use my e-portfolio. The distribution of responses is as follows:
- Strongly agree: 9%
- Agree: 39%
- Neutral: 39%
- Disagree: 13%
- Strongly disagree: 0%
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The above chart illustrates that only a minority of students felt that the induction session had not equipped them to engage with their ePortfolio. This positive response was less evident within the qualitative responses and appears at odds with the recurrent theme of students feeling ill-equipped to use their ePortfolios.

When responding to questions relating to changes that they would make to the way ePortfolios were introduced and what they perceived to be their ongoing needs, the issue of IT skills development was overwhelmingly the most commonly cited issue:

- “IT skills should be part of course. All IT that has been explained assumes prior knowledge of computers. This is not always the case”
- “More IT teaching to help us make fuller use of the ePortfolio”
- “Would be good to see examples of other ePortfolios….and more practice in class using it”

Students suggested that the nature and frequency of IT skills training should be aligned more closely with student use of ePortfolios, and that they should have an opportunity to receive ‘on demand’ IT support when they encountered difficulties. This was linked to the suggestion from some students that the time lapse between induction and the compulsory submission of their assignment was too long to retain knowledge of IT skills. This is an issue that we will return to in section 5.3.

The issue of IT skills raised some interesting and apparently contradictory responses from the student group. When discussing the advantages of e-Portfolios, the majority of responses cited the flexibility of ePortfolios and the heightened presentational opportunities as being a key benefit. This was balanced by the key disadvantage identified as being difficulties in being able to engage with their ePortfolios to make the most of the opportunities it presents. It was interesting to note that several students discussed the difficulties of limited IT skills as being located in other students rather than themselves. This makes it difficult to ascertain the real level of difficulty experienced by students.

One student who stated that they had previously extensive IT experience found that they became an informal and involuntary source of advice and support for students, with many students contacting them by phone and email with increasing frequency at the time of submission. This may reflect a positive degree of peer support, but may also have potentially disadvantaged this student:

- “I was still receiving calls at 9.30pm on the night before the submission on how to upload file…not complaining but maybe people should be using it from day 1 so that by the time the assignment comes they will be on the ball….Perhaps submitting a learning journal at different points “

It is very clear that IT skills have become a key focus and concern for the student group. It was the key issue that students felt they still required ongoing support with. However, 30% of students felt their use of the ePortfolio had been directly responsible for the enhancement of their confidence in using computers.

5.2. Nature and frequency of induction and ongoing support in relation to ePortfolio use

The feedback in relation to this theme has strong links with theme 5.1. The qualitative feedback from students gave significant consideration to this issue. The student group was introduced to the ePortfolio in November 2004, but were expected (but not
required) to begin to maintain a learning log. However, the students did not need to provide any formative evidence of work until March 2005, and their summative assessment was not submitted until May 2005. A key issue emerging from the student group was the gap between induction and the requirement to engage with their ePortfolio. Some students felt that the assessment should have been earlier in the academic year so that they could have immediately made links between their learning in the induction and their use of the ePortfolio. Others felt that they were introduced too early to the ePortfolio. What does seem clear from the majority of students is that IT/ePortfolio induction must be undertaken or at least repeated just prior to completion of the assessed task.

The student group had completed a departmental evaluation form following their induction, and 100% of the 23 students that responded stated that they felt that the induction had met their learning needs. This suggests that it is the timing and frequency of support rather that the content that students felt could be improved.

5.3. Sources of motivation for students to engage with their ePortfolios and the extent to which their portfolios supported their ability to learn, think and write reflectively

The above debate regarding the frequency and more importantly timing of the introduction of ePortfolios raises a key issue. Namely, the extent to which engagement with the ePortfolio is assessment driven. The following graph clearly illustrates the response of the student group post-test to the question regarding how much they would have used their ePortfolio without a compulsory assignment.

This chart provides a clear illustration of the extent to which students felt motivated by the existence of an assessed task. The issues raised in 5.2 when linked with these findings suggest that the difficulty in terms of timing instruction close to assignment completion reflects a lack of ongoing self directed usage of the ePortfolio. However a clearer picture emerges in the following graph, which illustrates which aspects of the ePortfolio students had ‘used’ at a pre-test and post test stage.
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Whilst these figures show a marked increase in usage upon completion of the assignment, they also do reflect some limited engagement at an early stage. Indeed it is the **reflective** element of the ePortfolio (learning journal/reflective account) that appears to have been particularly boosted by the assessment process. However, the majority of students gave clear reasons for how they felt the ePortfolio supported them to learn and think reflectively:

- “Reflective account useful for this as it ties in thoughts and feelings from all points in portfolio”
- “It forces me to sit down and think about my learning”
- “Allows me to review and omit some data”

In terms of the results of the summatively assessed piece of work, 34 of the 36 students in the group passed the module at the first submission. These results compare favourably with other modules undertaken during the first year of the BA (Hons) Social Work programme, and would suggest that students had engaged with their ePortfolios appropriately and had also achieved the level of reflection required of students at their stage of learning.

It is also interesting to note that in the post test questionnaire students were asked to what extent they viewed their ePortfolio as belonging to them and the following results were produced.
These results sit uncomfortably with notion that student engagement was assessment driven, and suggest that in other ways students were still developing a ‘relationship’ with their ePortfolios that exists outside of the assessment process.

5.4. The student’s view regarding the advantages and/or disadvantages of using ePortfolios

The perceptions of students in terms of the advantages and/or disadvantages of using ePortfolio can be illustrated through qualitative and quantitative data. The key themes that emerged resonate with many of the issues raised above. The qualitative responses from students raised many issues and had a strong focus on the benefits that they had perceived from their use of the ePortfolios. In particular students highlighted the presentational advantages and flexibility in terms of content that the ePortfolios gave them. The accessibility to their ePortfolio was also seen as a positive aspect, with only 2 students stating that they did not have home-based access to their ePortfolios.

- “Good for IT skills…though I gave up trying to add a scanned document – would have been easier to clip on paper”
- “Easy to access from home and am able to use it when and how I want.”
- “Good for presentation and order, though I found it hard to fit access to my home computer with family life. Also need to be told of level of IT expectancy PRIOR to course.”

The perceptions of the merits of the ePortfolio were perhaps understandably rooted in their practical experience of using and learning the required IT skills to use the ePortfolio. This has led to rather mixed range of qualitative results which perhaps better illustrate IT confidence rather than a clear view of the ePortfolios itself.

- “My ePortfolio is quick and easy to use. I like the being able to add and subtract information when I want.”
- “I’m scared I may lose all the data”
- “The ePortfolios seems very safe and I like it being password protected”.
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- “I find it hard to grasp”
- “It is so easy to use”

5.5. The tutor’s view of their role in the implementation and ongoing support of ePortfolios

There were 4 tutors assigned to the year group being studied, and they had a role as assessor of the submitted element of the ePortfolio. Much of the ongoing support that was specific to the ePortfolio was provided by one of the tutors who also held the role of module leader. This division of responsibilities meant the tutor role allowed for students to engage with their ePortfolios on an individual basis rather than tutor directed.

A key theme that emerged was that the ePortfolios allowed tutors to have an insight into the student’s perception of their ‘learning journey’ rather than the ‘snapshot’ afforded by an end of module essay. In terms of supporting the process of reflection it was felt by majority of tutors to compliment existing supports such as groupwork rather than being the sole support in this.

- “The gain for the ePortfolio is not that it encourages reflection, but that it allows it to be kept and catalogued more easily by the student (better than on written diaries) and is easily read and fed back on by tutors and a whole monitoring system is set up.”

The views of tutors chimed with the issues raised above regarding the role of assessment in motivating students to engage. One tutor suggested that having an ‘end loaded’ assessment meant that students could be tempted to leave their engagement with ePortfolio until near the end of the module and then this leads to student anxiety and in turn a greater requirement for tutor assistance. A suggestion was that there be more ‘anchor points’ in the form of formative submissions throughout the module which would ensure that students had an ongoing involvement with their ePortfolios. This would allow a greater degree of tutor feedback and monitoring, yet would still sit comfortably with the notion of facilitator.

6. Reflections and Conclusions

The evaluation of the implementation of ePortfolios in the BA (Hons) in Social Work programme must be viewed in the context of it being the first year of a four year programme, and that the student experience and view will evolve throughout the course. The student group emphasised the impact that the challenges relating to the acquisition and development of IT skills had on their experience of the implementation. This is perhaps an understandable viewpoint at this stage in their programme, and it would be anticipated that ongoing evaluations of their ePortfolio usage would demonstrate a shift away from ‘how to use’ ePortfolios to greater consideration of the content of their inputs. Indeed it could be viewed as encouraging that students are identifying their learning needs in relation to the practical use of ePortfolios at this stage, as the ePortfolio will become a pivotal tool when demonstrating their learning in the final stages of the course.

This study has highlighted a range of tensions in terms of ethos. A key theme that emerged was that the assessment was a significant factor in encouraging students to engage with their ePortfolios. This would appear to compromise the notion that ePortfolios are a tool with which students ‘drive’ their own learning and engage with
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their learning in an increasingly self directed manner. As students progress through the course the ongoing ‘value’ of the ePortfolio will become more apparent, and as the aforementioned IT related anxieties lessen, students may feel more able to engage in a less structured way with their ePortfolios. The marking of the ePortfolio submission was undertaken by the personal tutors of the students. This limits the extent to which the tutor can achieve the shift from teacher to facilitator. The duality of this role is difficult to balance, and may have exacerbated the student view that their engagement with the ePortfolios was assessment driven. The programme is taking steps to overcome this tension by separating the tutor role from the marking responsibility in the coming academic session. Whist there is an inherent tension between constructivist and didactic approaches to teaching and learning, there appears to be little evidence that the combination of approaches is unmanageable. Indeed, the assessed outcomes relating to the ePortfolio reflect the students’ ability to draw from learning in lecture based sequences and merge these in a reflective manner with those acquired through approaches such as EAL groups.

The recurrent theme of IT induction suggests that the one needs to look closely at the frequency, timing and content of the support offered. It could be argued that students need the support as they interact with their ePortfolios rather than in a separate teaching session. For those students who then proceeded to have minimal involvement with their ePortfolios until the time of submission, it is unsurprising that they had difficulty applying the IT teaching offered 4 months previous. It has been planned that the next first year group will have much less time between induction and when the first formative ePortfolio task must be completed. Within Dundee University’s newly launched MSc in Social Work programme, ePortfolios have been introduced within the first week of the programme in a manner which immediately requires task completion, and will ultimately be the central tool in the assessment of students. This creates the possible opportunity to examine the effect this different approach may have, as well as the differences between undergraduate and postgraduate ability to engage with ePortfolios.

An unexpected theme was that of the ‘expert’ student becoming a source of support to students who were struggling with the practical aspects of the ePortfolio. This may on one hand reflect an encouraging degree of peer support, but also runs the risk of disadvantaging the student in terms of time and the implicit suggestion that they have responsibility for the advice they impart. Perhaps the separation of the tutor role from that of assessor will facilitate greater use of the tutor in offering practical advice.

One of the key strengths of the ePortfolio is the notion that one can access it from a range of locations. Only 3 of the 27 students sampled stated that they had no access to their ePortfolio outside of the university. For these students it is clear that they are potentially disadvantaged in terms of fully accessing the benefits of the ePortfolio, and raises questions regarding the potential exclusivity of such an IT dependant tool. The evaluation also shed light on the effect that one’s personal circumstances (i.e. sharing a computer with family members) can have on access and in turn engagement with the ePortfolio.

The submitted assignments from the students provided an encouraging insight into the extent to which they had developed the ability to express themselves in a reflective manner. There was evidence that they were able to use their ePortfolio to collect and collate learning materials from throughout the programme. The ability of students to input, review, edit and improve on the content of their ePortfolios was identified as a key factor. The students were expected to be able to demonstrate a
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developing ability to learn reflectively at a level suitable for students completing their first year, and this was achieved. The expectation is that the ePortfolio will continue to be a key tool in supporting students to develop further.

The experience of implementing ePortfolios has raised many issues and the themes contained within this paper will contribute to the planning of subsequent developments. The study also gives rise to possible foci for further research including the ongoing evaluation of the student experience as well as the effect that modifications to the implementation of ePortfolios has on future performance and experience.

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The portfolio system in competence-based education with INHOLLAND.
Session: PS2C
Type: Work in progress
Marcel Kemper

1. Introduction
With approximately 38,000 students and more than 3,000 employees, INHOLLAND, the result from a merger of four universities, is one of the largest institutes for higher education in the Netherlands. INHOLLAND has introduced competence-based education with a strong emphasis on cooperative learning in projects. These projects offer students experience in working in a team, in which more or less authentic professional situations are the starting point.

The paper “e-learning in higher education” from the Ministry of Education, emphasizes that e-learning plays a role in education innovation and that the emphasis lies on the quality of learning (Ministry of Education, Culture and Sciences, 2005). Apart from the use of e-learning in supporting new educational concepts, e-learning is ascribed a strategic meaning in this paper. With INHOLLAND too, the design of e-learning stems from the strategy of the institute.

Just as with most institutes for higher education, both the use of ICT and the implementation of competence-based education are high on the agenda of INHOLLAND. Here a digital learning environment is used, for which educational material is digitalized and educational methods are adapted. The idea with that is that the technological progress will contribute to the design of competence-based education.

The institute plan 2003-2006 pays explicit attention to this. Here it is indicated that “… the use of ICT in education follows the educational vision of INHOLLAND and fills an important role in the support of competence-based education” (Institute plan 2003-2006). The educational concept of INHOLLAND as described in the Backbone strongly relies on blended learning, in which an optimal mix of contact education, ICT-supported learning and organisational demands are sought (a mix of a mix of a mix). In this blend, an optimal personalized strong learning environment should be available for the student.

In order to develop an adequate infrastructure for competence-based learning, INHOLLAND has started from a systematic analysis of the value chain. The question that presents itself is: in which way can IT deeply influence the value-adding activities? A major support of the process of competence-based learning is provided by the e-portfolio.

During a number of years, INHOLLAND has experimented with several other applications and e-portfolio concepts, but none of all the possibilities sufficiently matched with the desired functionalities and with the desired scale of use. Since the Intranet was designed in a Microsoft SharePoint environment, it was an obvious decision to design the portfolio system also in Sharepoint. In a brief period of time, a plan was developed for an e-portfolio based on Sharepoint Portal Server 2003. After three months, on 1 September 2004, the first version of the e-portfolio came into use so that it was functional in the study year 2004-2005.
The e-portfolio was made available to all 15 Schools with over 14,000 first-year-students. Some of these Schools had experience with the use of an e-portfolio, other Schools used a portfolio on paper and for some Schools, the portfolio-concept was still relatively new. The wide implementation course was supported by a project team with ICT-experts, educationalists, trainers and functional applications managers. Objective of this project was that the e-portfolio should be put into use with study coaching or assessment in a meaningful way.

In this article, the choices that INHOLLAND made with the implementation of the e-portfolio are explained. To this end, the background is outlined in section 2. The abovementioned concept of the value chain is further explained here. In section 3, the role of ICT in competence-based learning is explained. Especially the way in which the use of an e-portfolio has meaning in competence-based education will be discussed in depth. In section 4 it is described which processes of choice came up during the construction of the system. In section 5, the implementation course is described. Finally, the future developments will be considered and the present discussions are briefly described.

2. **Strategic relevance and impact of ICT in education**

The use of ICT in education is affected by change. Some years ago, the applications of ICT were restricted to so-called “back office” processes. In recent years a sweeping change towards the primary process has taken place. The use of ICT strongly influences the primary process and the company strategy. Applegate (1999) describes the strategic influence of ICT with the help of the strategic matrix. Here, two criteria are important for the description of the IT function in an organisation:

- the strategic impact of existing IT systems;
- the strategic impact of IT applications under development.

If these two criteria are used, the strategic importance of the present applications and the planned (and/or developing) applications for the organisation can be visualised.

<table>
<thead>
<tr>
<th>Low Impact of IT Systems</th>
<th>High Impact of IT Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory</td>
<td>Strategic</td>
</tr>
<tr>
<td>Support</td>
<td>Turnaround</td>
</tr>
</tbody>
</table>

It is self-evident that within the higher education, recently a shift has been made towards the quadrant “Strategic”. This means that the undisturbed functioning of the information supply is considered as critical for the daily company activities. The future developments in the information supply are seen as critical factor for the competitive position. Both the existing and the planned information systems are of major strategic importance for the organisation.
Now that is known, that ICT is of strategic importance for the organisation, a structured internal analysis on ICT opportunities is necessary. This analysis can be based on the value chain of the company (Porter, 1980). This framework shows the basic processes of the organisation subdivided into the primary processes and the supporting processes. Here, it is not about departments, but about functions in the organisation. By the function of an element, the contribution of that element to a larger entity is meant, in this case: competence-based learning. ICT can thoroughly influence one or more of these value-adding activities. Sometimes this happens through improvements of the effectiveness, sometimes through a fundamental change of this activity and sometimes through altering the relation between the activities.

In the figure below, the separate elements of the primary processes and the supporting processes for INHOLLAND are indicated. The design of the digital campus of INHOLLAND is based on this value chain (Ogg, 2005).

![Figure 2: The value chain of INHOLLAND](image)

In order to substantiate this subject well, it is necessary to have a good insight into the extent to which new ICT facilities influence the set-up of learning processes. The set-up of these learning processes, however, is also affected by change.

3. **Competence-based learning and an E-portfolio**

The changes in higher education connect with the desire to better prepare students to professional expertise. In the present view, learning is an active and constructive process. Within the constructivism learning is considered as an active process in which you construct and adjust your own knowledge structure, own meanings, by experiences (Dochy, 2002).

3.1. **Competences**

Under the influence of the constructivism, education changes itself towards powerful learning environments. These learning environments should contribute to the constructive nature of learning and to the necessity of fitting learning into a realistic context. A powerful learning environment is characterized by the good balance between discovering learning and a personal exploration on one side and systematic instruction and guidance on the other side. (Dochy, 2002). Such a powerful learning environment contains a large amount of learning material for various students. Here, the learning activities are related to “authentic” professional situations in which mutual cooperation between students is supported.

The competence-based education is the concrete interpretation that higher education gives to constructivistic views. Then, the term competence refers to the performance
a person may carry out under ideal circumstances. Parry (1996) defines the term competence as “a cluster of related knowledge, skills and attitudes that affects a major part of one’s job (a job or responsibility), that correlates with performance on the job, that can be measured against well-accepted standards, and that can be improved via training and development”. Though the term competence is popular, there is still no generally accepted definition (Stoof et al., 2002). From that follows that there are several definitions and that the term competence is operationalized in various ways. In section 5.2 we will see that these different interpretations have effects on the implementation of the portfolio system.

In the competence-based curricula that are being developed in higher education, portfolios play a role in various ways. Arter and Spandel (1992) give the following definition of a students’ portfolio: A purposeful collection of student work that tells the story of the student’s efforts, progress, or achievement in (a) given area(s). This collection must include student participation in the selection of portfolio content; the guidelines for selection; the criteria for judging merit; and evidence of student self-reflection.

3.2. The role of portfolios in competence-based education

Portfolios play an important role because they are pre-eminently suitable for monitoring the individual learning course of the student and steering it on the basis of that (Elshout-Morh & Oostdam, 2001). In this respect, the portfolio is considered as a work area, something that grows continuously and that reflects the growth of the “composer”. This work area plays an important role as a tool for formative evaluation and with the integration of instruction and assessment in which evaluation is integrated into the process of learning and instruction. In traditional educational concepts, the evaluation takes place after the performance, in new educational concepts, the evaluation is integrated into the learning process. While the process of learning is still going on, the portfolio system offers an insight into the progress of that process, thus enabling faster adjustment and faster and relevant feedback sent to students. This should lead to a better quality of instruction, a greater task-orientedness and a more profound assimilation of the learning contents. (Struyf e.a. 2001). Davies and LeMahieu (2003) emphasize there that the concept of “life-long-learning” means that students should be involved in the assessment process so that the “learning loop” is complete. There, reflection and assessment are essential for the learning process. In this respect the term: “assessment for learning” is used contrary to “assessment of learning”. The general recognition is that a correct and consistent gearing between instruction, learning and assessment (ILA) is important for realizing the objectives of the education (Birenbaum, 2003; Biggs 1999).

In relation with portfolio systems four components are discerned from competences (Janssens, et al.,2002).

1. Domain-specific knowledge, the learning contents of a professional field.
4. Affective components, such as emotions, attitudes and beliefs.

It will be clear that with the first two components, testing and proving (and therefore summative use) will be more emphasized and that with the third and fourth
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Component the emphasis will be more development-oriented and will lie on formative use. In relation to the portfolio, various authors explain the double value of the portfolio in this connection (Paulson et al., 1991). On the one hand, the portfolio is a work area. On the other hand, the portfolio is a signboard, with which someone shows what he is able to do. The meaning of a portfolio in competence-based education should regard all components of a competence. In that sense, the composition of the portfolio should be such that the competence gets full attention.

Though much research has been done about using an electronic portfolio, most researches leave the set-up of the digital portfolio implicit. The technique is considered as a “black-box” that is present it is true, but does not have an independent influence on the use of the system. Barrett (2000) discerns four possible variants of a students’ portfolio in which a shift is mentioned from an analogous form through word processors and structured “formats” towards a fully multimedia entity including digital audio- and video-fragments, in which hyperlinks enable back and forth clicking between pieces of evidence and captions.

Besides, an electronic portfolio has two major advantages on a non-electronic portfolio. In the first place, the internal structure, by using hyperlinks, offers the opportunity to breach the linear structure of written material and in this way show different connections. In the second place, it offers the guiding tutors the opportunity to continuously follow the process and to interfere if necessary.

3.3. Application of portfolios with INHOLLAND

Since the composition of a portfolio is a reflective activity, it is obvious that the first application of a portfolio is found in the integration of metacognitive knowledge and skills. Within INHOLLAND this reflection is expressed within the aspect study coaching (SLB). In this article we prefer the international terminology and Personal Development Planning (PDP) is chosen.

The basic assumption of this is that the student is the owner of the portfolio and gives the study coach access to its relevant elements. In this portfolio, the student has included a personal development plan, in which the learning targets are expressed that are based on the development of competences. The way in which those learning targets are realised is included in his personal activities plan. In practice, the personal activities plan is a further elaboration of the personal development plan.
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Figure 3: The process of Personal Development Planning

Working with a digital portfolio will become more relevant as the education becomes more individual. In the schedule shown below, a survey is given of accents within education and the relevance of the digital portfolio within that.

Table 1: Meaning of the portfolio

<table>
<thead>
<tr>
<th></th>
<th>study path</th>
<th>assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>instruction</td>
<td>no application</td>
<td>no application</td>
</tr>
<tr>
<td>skills</td>
<td>PDP</td>
<td>no application</td>
</tr>
<tr>
<td>competences</td>
<td>PDP</td>
<td>assessment</td>
</tr>
</tbody>
</table>

This division leads to three scenarios that can be recognized within the education of INHOLLAND. (Kemps, 2004)

In the first scenario the study course is added as a guidance system to an educational programme. The guidance especially aims at paths of choices and personal development. This scenario can relatively simply be implemented in combination with a diversity of didactic concepts such as for instance: modular, project education, problem-based education and the concept of De Bie.

In the second scenario, within the educational programme the guidance, the individual development of the student in the professional competences are at the focus. Guidance aims at the competence development: what did the student learn from the completed activities, how will the student take the next step? Because of purposefulness, the coach is able to guide effectively; guidance and (self-, peer- and expert-) assessment grow towards each other. In this scenario a standard ‘format’ or ‘stereotype’ for the portfolio will also fit for all students to fill in with reflections and assessments: for instance per block or per competence.

In the third scenario the individual competence development of the student, and its planning, are at the focus with the guidance. Guidance is at the focus in the study; what have you done, where do you stand and what are your next activities? The student is self-responsible for his study activities and their programming. Two roles of the education become more and more prominent: guidance and facilitation.

Table 2: Division into scenarios

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Role PDP</th>
<th>Set-up PDP</th>
<th>Set-up Curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Separate</td>
<td>Self-reflection</td>
<td>Guidance interview</td>
<td>Split into fragments</td>
</tr>
<tr>
<td>2 Half-integrated</td>
<td>Self-reflection</td>
<td>Educational units</td>
<td>Arranged by topic in clusters</td>
</tr>
<tr>
<td>3 Fully integrated</td>
<td>Self-reflection</td>
<td>Competences</td>
<td>Competence-oriented</td>
</tr>
<tr>
<td></td>
<td>Deficiencies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Selection processes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. The construction of the portfolio system

The Digital portfolio system is part of the Digital Campus to be developed, an integral system of functionalities and subsystems that is being developed and gradually will be extended.

In this section, the digital campus of INHOLLAND will be explained, thus indicating the relation between the digital campus and the e-portfolio. Then the functionalities of the portfolio system will be discussed.

4.1. The digital campus of INHOLLAND

The construction of the digital campus is based on the value chain as it has been set by INHOLLAND and is described in section 2. This value chain is a starting point for a systematic approach of an effective and efficient use of ICT in education.

Therefore, the process of adding value is leading in the choice of systems. In this process of value-adding, the student is helped to get an insight into the learning processes to be passed, to come to an individual setting up of the learning process, to gear the learning process to one’s own wishes and to get an insight into the extent in which the set learning targets have been achieved. Finally, the student can be helped with mediation on the labour market. (Ogg & Snippe, 2005). These targets can be supported with various systems. Table 3 shows to which extent the various planned systems of the digital campus have been realised.

<table>
<thead>
<tr>
<th>Function</th>
<th>System</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELE</td>
<td>Blackboard</td>
<td>Implemented</td>
</tr>
<tr>
<td>DPF</td>
<td>INHOLLAND</td>
<td>Implementation path 2004-2005</td>
</tr>
<tr>
<td></td>
<td>Portfolio</td>
<td></td>
</tr>
<tr>
<td>LCMS</td>
<td>HIVE/Hummingbird</td>
<td>Selection on the basis of shortlist</td>
</tr>
<tr>
<td>PDP</td>
<td>Own design</td>
<td>Initiated design</td>
</tr>
<tr>
<td>Optional subjects guide</td>
<td>Design study</td>
<td></td>
</tr>
<tr>
<td>Assessment</td>
<td>Not available</td>
<td>Design</td>
</tr>
<tr>
<td>CompetenceManagement</td>
<td>Not available</td>
<td>Design</td>
</tr>
</tbody>
</table>

During the study year 2004-2005 students worked directly with 4 different educational applications.
Table 4: Applications used

<table>
<thead>
<tr>
<th>Application</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blackboard</td>
<td>Exchanging documents and messages and having a discussion from a distance; co-operation within the framework of assignments.</td>
</tr>
<tr>
<td>E-portfolio</td>
<td>A collection of students’ work that shows the efforts, progress and achievements in one or more fields.</td>
</tr>
<tr>
<td>Intranet</td>
<td>Putting available documents to large groups of students through a website.</td>
</tr>
<tr>
<td>Marks registration system</td>
<td>The registration of assessments of students’ work in figures</td>
</tr>
</tbody>
</table>

People experimented extensively and it has successfully been introduced in the educational environment. The implementation of Blackboard started shortly after the merger. At that time the various merger partners had different ELE’s available. Blackboard was used in different versions and besides that, various other applications were used that were set up as ELE (such as Viadesk, Sharepoint etc.)

The implementation of the educational concept necessitated an exchange between the various elements. Apart from that, it was deemed important that students can learn independent of time and place and that they can co-operate from a distance. That could only be realised if within the organisation one ELE would be used.

Because Blackboard was implemented as first application, there was a tendency to also use this application as a full tele-learning platform and to have it fulfil functions that hardly matched with its intention. Specific functionalities such as desired in our educational set-up, can however better be served by other applications, such as e.g. the e-portfolio or the intranet.

From the point of view of the student, the INHOLLAND campus at the moment looks like this:

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5 For instance set up a course in Blackboard as digital portfolio with which the student has instructor rights, or set up a course in Blackboard for general information supply to students.
4.2. Functionalities of the portfolio system

The e-portfolio is closely linked with the Intranet. Every student has his MySite at his disposal, a part of the Intranet that the student can set up as a personal dashboard. From the MySite the student (or employee) has access to his portfolio.

In the current portfolio system the student should make a selection from the material from his personal documents archive, include this in an essay, comment on it and present it to the tutor.

An essay is a website in which a reflection of the student on a certain process is included. In this essay various pieces of evidence from the documents archive can be included.
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Figure 6: Functionalities of the portfolio system

The student motivates his choice of these pieces of evidence in his essay. In principle, an essay is drafted for a certain purpose: an objective. Every essay can be linked to maximally one objective.

Figure 7: Example of an essay

The student can then put the essay before a tutor for inspection, with a request for feedback or to assess the essay. After the essay has been positively assessed by the tutor, it can no longer be amended, neither by the student, neither by the tutor. Still, the student can once again link the documents linked to his essay from his documents archive to another essay.
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Connection of the system to the outlined growth model of the three scenarios as described in section 3.3 has been realised by offering the opportunity, when drafting an objective, to indicate whether this objective regards an SLB interview, an educational unit or a competence.

Figure 8: Example of a request to a tutor

The current draft of the portfolio system of INHOLLAND can be called simple. The functionalities are rather general, making the system suitable for all kinds of applications.

However, when drafting a system, there is a tendency to reach for and sometimes across the limits of the intended functionalities of the system itself. It is for that reason that a sharp definition of the limits of the system is important when developing it. During the construction of the portfolio system, the following definitions have been set.

- A portfolio is the property of the student. It is exclusively the student himself who grants others rights to view parts of the portfolio.
- Following naturally from this, the DPF is no student control and tracking system and therefore does not have any functional characteristics of a “qualitative” student control and tracking system.
- A portfolio is no co-operation environment. To create products and the functionalities required for that, the communities in Blackboard are used.

5. The implementation of the portfolio system

Since some years, experience is gained in various ways with working with a (digital) portfolio. More and more, the student’s actions in the profession-specific context is at the focus, thus having made testing on the basis of professional products and
reflection about the actions of the student himself more relevant for the study. In various programmes and within various Schools, this has led to educational programmes with which students provide products by e.g. composing cd-roms of their own, putting files on Internet sites or offering folders with printed documents to tutor/coaches. For instance, the School of Education in Rotterdam made students hand in their burden of proof on a cd-rom. Since some years, the School of Economics in Alkmaar used Viadesk and the School of Communication in Diemen gained an extensive experience with the EFA portfolio.

At many a School, not only the expertise is there to embed the digital portfolio in education, because of the introduction of the new educational concept there is also a strong need to work with the portfolio. As described in section 3, the constructivist view on education and its design in competence-based education cannot be dissociated from handing in (professional) products. Thus, the digital portfolio is a major cornerstone of the competence-based education and of the system architecture of INHOLLAND.

5.1. The project DPF-I

After the realisation of the construction of the portfolio system, a separate project was started for the implementation of the system. The objective of the project was to introduce the use of the system in a meaningful way for all first-year-students.

The project provided the information and communication towards users, the set-up of a consultation structure of contact persons within Schools, the set-up of the management of the digital portfolio, offering various users’ training sessions, the migration and phasing of other portfolio applications and knowledge dissemination regarding the use and the educational deepening of the digital portfolio.

In the project group, employees from the OKR-department (Education, Quality, Research & Development) participated with an educational or a technological background. On every location, a subproject manager from the project group was designated. The project group co-operated with delegates from the Schools, the so-called DPF-coordinators. Together with the project group, these DPF-co-ordinators formed the reference group. Here, educational and technical experiences with the system were exchanged and proposals for improvements on the system and the design of a new version were established.

![Figure 10: The project team and the Schools](image)

Schools wrote an implementation plan that was supported by the project group. The Schools were offered three types of training:
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- a basic button course for tutors in which the standard functionalities of the software were explained;
- a didactic workshop in which the set-up of the e-portfolio in each of the three scenarios was discussed and in which attention was paid to the transfer from one scenario to another;
- a super user training: a training to DPF-co-ordinators in which specifically the division of the competences in the digital portfolio was discussed.

Besides, the project group provided presentations to tutors, drafted manuals and quick references and advised on the use and set-up of the system in the context of the curriculum set-up in use.

5.2. The connection of the system with the education

On the introduction of the system, it turned out that the Schools had different desires with regard to improvement of the application. These desires related among other things to the possibility of removing essays and objectives, improvements on the user friendliness of the tutors’ interface, the desire to link several objectives to one essay and vice versa to link several essays to one objective. The two first-mentioned desires were realised in version 2.0 that was introduced in September 2005. This is described in section 5.2.1. The discussion about the relation between essays and objectives has an educational impact and cannot be dissociated from the transfer from instruction-based education to competence-based education. This will be described in section 5.2.2.

The Quick Wins

After the introduction of the system in September 2004, the users indicated various possible improvements. These improvements were realised, tested and produced during the spring of 2005.

During the basic courses, the users had entered several objectives and essays in the system that were only intended to try out the system’s functionalities. However, the possibility of removing these objectives and essays again was not provided. Nor was there a possibility for tutors to refuse requests to read an essay, give feedback or an assessment. For tutors who actively started to use the system this created extensive task lists that included test essays, which did not help the surveyability. For this reason, the possibility was created to remove an essay as long as the essay is not brought before a tutor, furthermore the possibility was created to remove objectives and task allocated to tutors.

Figure 11: Task list of the tutor with the possibility to remove a task
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The relation between essays and objectives

Schools are in a transitional phase between competence-based education on the one hand and profession-based education on the other. It is true competences have been named, but the curriculum still contains many separate elements that are preferably tested separately. Various Schools indicated that they prefer a multiple link between essays and objectives. From the present set-up of the education it is easily understandable.

Starting point in the set-up of the curriculum in most education programmes was the competence matrix. This matrix indicates at which moment which competence is tested at which level in the programme. That shows how the division of the curriculum relates to the competences.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bloc k 1</td>
</tr>
<tr>
<td>Draft Plan of Action</td>
<td>Leve 1</td>
</tr>
<tr>
<td>Implement Plan of Action</td>
<td>Leve 1</td>
</tr>
<tr>
<td>Applied Research</td>
<td>Leve 1</td>
</tr>
<tr>
<td>Project-based/Process-based working</td>
<td>Leve 1</td>
</tr>
<tr>
<td>Create support by interactive plan formation</td>
<td>Leve 1</td>
</tr>
<tr>
<td>Communicate</td>
<td>Leve 1</td>
</tr>
</tbody>
</table>

Figure 12: Example of a competence matrix

Schools used these competence matrix as a starting point for the division into objectives. To do justice to competence-based education, competences were taken as a point of departure to name the objectives. In the curriculum, however, with the testing the set-up of educational units is the starting point. The relation between objectives and the educational units then requires an n:n relation because a competence may be dealt with in several educational units and because in an educational unit several competences should be dealt with.
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Figure 13: An N:N relation between objectives and essays

Though it is possible to still define a competence on several levels and to define several subcompetences within an objective defined as competence, this division provides a unorganised structure and a large number of essays. Some schools come to 20 essays in the first study year. The danger coming up there is that the portfolio strongly increases the work pressure for the tutor/assessor.

Figure 13 shows that the desire to add an n:n relation between objectives and essays to the functionality arises from the need to define the objectives in terms of competences, while testing is done within the educational units. However, within CSE it is in principle not about completing educational units, but testing competences. In an educational unit, competences can still be worked on, but educational units are no longer completed, competences should be tested.

After the test and assessment, the portfolio also has a certifying function. If a student establishes proofs for a certain competence and these proofs are sufficiently qualified through an assessment, the student has completed a part of his study. Then, the student can demonstrate, on the basis of the assessed essay, that (s)he commands a certain competence. If the assessment of this competence is spread over several essays, the student does not have this possibility anymore. After all, it is true that parts of competences have been assessed, but in that case there are no guarantees that the whole competence has been assessed as satisfactory.

As long as educational units are tested as a whole, it is preferable to name educational units, also in the objectives, and not to start from competences. In that case a 1:1 relation will suffice and the portfolio of the student remains surveyable. Then, the relation between competence and educational units can better be expressed in a competence matrix as shown in figure 12, than in the portfolio system. In figure 14 an example is given of the structure if educational units are the point of departure with the naming of objectives.
The Pedagogical benefits of ePortfolios

Figure 14: A 1:1 relation between Objectives and Essays based on educational units.

An alternative for this may be: link the competences to an own essay and let the student work on the essays in the various educational blocks without completing the essay per educational unit. Then figure 15 shows that a student can work, for instance, on the same essay C both in block I and in block IV. In this way, there are maximally as many essays as competences have been defined.

Figure 15: A 1:1 relation between Objectives and Essays based on competences.

Summarized, it can be said that with the implementation of the system a discussion arose about the n:n or 1:1 relation between competences and essays. Maintaining the 1:1 relation is the most pure within the framework of the university-wide development around competence-based education. The idea here is to come to a limited number of competences with which their assessment is disconnected from the existing learning paths. During the discussions it has become clear that the introduction of the system does not prescribe educational choices but it does make them explicit. By the introduction of ICT, the division of the curriculum therefore becomes more transparent.
5.3. Results of the project

In September 2004 the digital portfolio system of INHOLLAND was made available to over 14,000 first-year-students and for a limited number of other students of Schools that had more experience in working with portfolios and for the over 3,000 employees of INHOLLAND. The project group provided more than 50 training and information sessions to tutors and educationalists at the Schools.

During the study year 2004-2005 all Schools have cautiously started to use the system. However, the system is not yet fully integrated into the education with every educational programme. During the study year 2004-2005 many programmes carried out pilots with the system and trained tutors so that the system was implemented widely during the study year 2005-2006. For instance, the joint Schools of Economics (5) set up a study coach path in which the portfolio plays a prominent role. The Schools of Education (2) have an assessment and a propedeutic assessment on the basis of the portfolio. For example, with the School of Education in Oegstgeest students make a portfolio in the field of youth literature.

![Figure 16: Portfolio juvenile literature](image)

With the School of Education in Alkmaar, the portfolio is used to provide a personal development plan, internship plans and for feedback of the mentors at the internship school.

![Figure 17: A personal development plan in a portfolio](image)

The use of the portfolio system is closely linked with the set-up of the education. The extent to which competence-based education has been introduced determines the extent to which the students experience the portfolio as meaningful. The use of the portfolio with a more or less traditional educational institute is described by scenario
The Pedagogical benefits of ePortfolios

1 (see section 3.3). At most Schools the implementation path starts with a wide introduction for all students in which the meaning of the portfolio is restricted to aspects of study coaching. Then, the development goes towards a more meaningful introduction of the system with applications in forms of e.g. self- and peer-assessment with a progressing introduction of competence-based education. As shown in section 5.2.2., it is essential that the competences are at the focus in the construction of the curriculum.

![Figure 18: Implementation paths](image)

Some Schools had more experience in working with portfolios. For instance, there were other systems in use, files were collected on a CD-ROM or a paper portfolio was kept. These Schools had a distinct lead in the introduction of the new system. They had previously used a scenario in which the professional competences are at the focus.

6. Future developments

In many respects, portfolio systems at various institutes seem to have similar functionalities, these, however, should especially be geared to their meaning with which all aspects of use are derived from the objective desired (Davies & LeMahieu, 2003). It is for this reason that INHOLLAND sets great store by improvement of the functionalities of the portfolio system. In the next version of the system, four major points of improvement are discerned.

In the first place, it is desirable to make the competences available to students from a database. Here, it matters greatly to closely connect with the set-up choices of the educational programmes. As has been remarked in section 3.1 still there is no generally accepted definition for the concept of competence (Stoof e.a, 2002). This means that within INHOLLAND, the concept of competence is operationalised in different ways. This makes it especially awkward to make competences available to students from a communal database in an unambiguous way. This problem must be solved in the period to come.

In the second place, essays should contain more possibilities to show the development of the student in the longer term. Through this, the function of essays as work area as described in section 3.2 can be improved. To this end, an essay should have the possibility to incorporate additions and developments and to add
feedback. For this reason it should be possible to add additional pages to the essay. An essay can then contain a second and third (etc.) page.

Another improvement of the system regards the writing of a reflection report. Within this reflection report, the student should make a relation with the competences on which (s)he worked previously. The study coach should have the opportunity to view the previous essays when viewing the reflection report. For this reason, the student should have the opportunity to add an essay to his "evidence list". In this way, the student is able to produce a longitudinal essay with references to other essays. By inviting a tutor, for instance a study coach, for this longitudinal essay, (s)he will also get access to all essays related by the student. This automatically applies for all related pages within this essay then.

In the third place, the student should have the possibility to make a showcase in his portfolio. This should be a specific type of essay that the student makes available to the outside world through the Internet. The student should have the possibility to publish the showcase in a special layout, for instance with the help of an HTML editor. These showcases are publicly accessible through the Internet. Apart from that, a student should be able to add essays to his showcase. Within the showcase, the reader of the showcase can then click on to the available student’s essay.

The student, however, should have permission of an assessor for publication of his essay within his showcase. It should only be possible to add an essay to a showcase if the assessor has added permission for publication with his assessment. So an assessor should be able to add the possibility: <suitable for publication> to his assessment of an essay.

The showcase within the portfolio is intended to give the student the opportunity to present himself to the outside world, such as employers. It is stressed that more development-oriented essays, for example for internships, can also be made accessible for people outside INHOLLAND by granting them a temporary account in the Active Directory.

7. References
The Pedagogical benefits of ePortfolios


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The Pedagogical benefits of ePortfolios

Not just flashy! The development of an ePortfolio for Life

Session: PS2C
Type: Work in progress

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Abstract

ePortfolios are supposed to support life-long and life-wide learning. Why then, when it was seeking an eportfolio for its learning community, did the University of Wolverhampton only find systems which were tied to course competencies; course management systems; and course mentalities? Students at Wolverhampton experience significant learning beyond the institution and their learning is more than the sum of pre-defined competencies and outcomes. This paper describes our conception of an eportfolio system for life and how that conception developed into a tool which has been widely acclaimed by staff and students within and beyond our own university, and within and beyond Higher Education.

1. The Design Context

In early 2004 Student Support Coordinators, linked to the Centre for Learning and Teaching at the University of Wolverhampton, were seeking an integrative method for delivering the university’s widespread, but disparate, Personal Development Planning (PDP) practices as a more coherent, institution-wide offering. At the time of their work it was clear that ePDP and eportfolios were in the ascendancy and that earlier concerns with software reliability, system access, and sustainability were now largely redundant. Previous studies into eportfolios-type approaches was updated and the findings consolidated before it was recommended to the student support committee that an electronic portfolio was the most efficient and effective route for further exploration.

The research identified that most eportfolio systems tended to be designed for specific groups of students, undertaking definite courses, at particular times. They are often expressly concerned with students addressing a pre-described or pre-determined organisation of competencies and so do not lend themselves to broader learning contexts or to life-wide learning. Extensive experience of working with Virtual Learning Environments (VLEs) at the institution suggested that the administrative burden inherent in an approach which required competencies to be entered, checked and updated was not sustainable. Further, any approach which added to the existing teacher burden would serve only to detract from the personal tutoring element of an eportfolio designed to support (and celebrate) the twin processes of learning and of learning about learning.

The student body at the University of Wolverhampton is a diverse one: the institution is nationally regarded as a leader in widening participation. Typically students will be working to fund their studies and through their work many experience significant learning events beyond the consciousness of the institution. Add to this working majority those that also follow contemporaneous study at college or as part of social and community activity and it becomes self-evidently important that any product/process adopted should be capable of recording all of the wider experiences of our learners. In searching for an existing system a central tenet was that all events
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should remain private and personal to the learner unless they elected to share them with others. We were unable to find an eportfolio system which provided for our requirements and so decided, naively some might argue, to develop our own.

We believed that it was possible to develop a system which was uniquely user-centric and which allowed users to record, reflect, review, discuss and share thoughts, feelings, achievements and plans related to any aspect of their learning: the formal or informal; the structured or serendipitous; the institutional or community. It was essential that the eportfolio should feel much more like a personal learning system than an assessment system and that the individual learner should retain agency over their assets. We chose the word asset to describe any item stored in the eportfolio store because it suggests an artefact of personal worth. The first design goal then was to design a system which was analogous to a diary; a personal learning diary. It allowed users to record anything they chose and those assets remained private unless the user determined to share a page or pages (of their diary) with someone else.

Reflecting on learning is a core concern of the Dearing (1997) inspired Progress Files initiative but reflection is far too important to be tacked on to the learning experience. Reflection has to be encouraged and supported at every level of interaction with the eportfolio system. Many models of reflection are available, from Dewey (1933) to Moon (2000), and purists will often champion a very particular style or expectation to the exclusion of alternative methods. Ultimately, reflection is about making sense; sense of self; of subject and of society. Writing itself is a reflective act; it is a dialogue with self before committing the thoughts to the recording media. The wizard-based approach prompts dialogue with the system – which prompts dialogue with self. The selection of evidence to portray stories of learning is narrative-based. There were to be no simple checkboxes of evidence in this learning system! Feedback received from both teachers and their students attested to deeper and more meaningful reflection than had previously been experienced. Indeed, learners spoke of being engaged in a reflective dialogue with the eportfolio system; one which felt comfortable because ‘the eportfolio felt like a personal system’ [not an institutional system]. Some would rightly argue that written reflection excludes some learners. We would agree and plan to provide tools to allow users to enter records directly as audio or video, utilising the increasingly ubiquitous (because they’re increasingly more affordable) webcams that so many of our learners already use on MSN or other social learning systems (Sutherland, 2005). This is a new system, still developing and it may be some time until we are able to delight all users with direct recording: meanwhile audio and video files can be uploaded and shared like all other assets.

The next goal related to the usability, or stickiness (Jafari, 2005) of the eportfolio system. It doesn’t matter how technically clever a system is; if it is dull, uninspiring or just difficult to use then users won’t be motivated to engage with it or to maintain engagement once any compunction is removed. Given that the underpinning ideology drew upon concepts of life-long and life-wide learning it was essential that the system be both easy to use and entertaining to use. There is little point designing an ‘eportfolio for life’ if its users only approach the system when told to do so. The words creative, flexible and fun feature in the conceptual plan and so, with these design ideals in mind the development team chose Macromedia Flash for the user interface. The use of Flash has not been without its critics especially because of Flash’s less well-developed accessibility credentials. Advice has been sought from a variety of technical experts though guidance remains singularly unauthoritative.
Ultimately usability has retained primacy over accessibility as it was felt strongly that an eportfolio which was difficult or uninspiring to use would atrophy quickly. This is not to argue that accessibility is unimportant. Rather than ignore accessibility the development team undertook the more arduous challenge of making a rich environment accessible rather than building an accessible, but ultimately uninspiring system. The feedback from users and reviewers alike has been pretty unanimous; the system looks good, is easy to use, it invites participation and “it’s actually a little bit addictive”. One pilot user even remarked “it has made me want to use a computer”. This is far to bold a claim to leave without comment. It is hoped that the design of the system did nothing to deter the user from engagement with the system and probable that the activities this learner undertook as part of an evolving community of practice were the strongest motivating force. Importantly the design is not just concerned with form, it’s also incredibly functional. The design lends itself to use from a PDA or smart phone where users are able to add new entries which can be sent via WAP or GPRS, or which will synchronise when they are next online. Indeed, such is the flexibility of design and ease of use that the development team have been recruited to develop a mobile version to be used in primary schools.

That PebblePAD has achieved its goal of looking visually appealing is gratifying but there is a danger that it becomes regarded for its looks alone. If an eportfolio system is to engage users in a lifelong activity of recording and reflecting then it has to be fun and easy to use: but it also has to be powerful and flexible.

2. **About Assets**

Assets are all of the items saved into the eportfolio. They are called assets because they have some value or worth to the user. Types of assets include records; WebFolios; WebLogs and any files which the user chooses to upload. All assets are created or uploaded using very simple ‘wizards’, which follow a familiar pattern from the simplest to the most complex entry. All of the assets are saved in a Personal Asset Store which is part of the eportfolio system. Assets in the store can be copied, shared, reviewed, edited or removed. All of the assets remain private and secure except where the user chooses to share them with others or publish them to a Gateway. Sharing and publishing permissions are applied to each individual asset: permissions do not extend to other assets in the store unless they are also shared. Where aggregated assets, including WebFolios and WebLogs, are shared the permissions extend to all of the items linked to the main asset being shared. So, for example, a trainee teacher developing a professional WebFolio for assessment (ideally assessment for as well as of learning) might share their WebFolio with their teacher/mentor/colleague. As further items are linked to the WebFolio from the asset store the recipients of the shared WebFolio remain party to the developing ‘story of learning’. A conceptual diagram of the system is provided below.
### The Pedagogical benefits of ePortfolios

<table>
<thead>
<tr>
<th><img src="image" alt="User" /></th>
<th>An experience or event prompts the user to record something in PebblePad</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Entry" /></td>
<td>The entry could be new or an existing item can be edited. Reviewing helps to create a ‘learning trail’</td>
</tr>
<tr>
<td><img src="image" alt="User" /></td>
<td>Users can create records for their abilities; achievements; action plans; experiences; meetings or thoughts. They can also create WebLogs, WebFolios and upload common file formats.</td>
</tr>
<tr>
<td><img src="image" alt="Asset" /></td>
<td>Once created assets can be printed; published to a gateway; shared or linked to other assets</td>
</tr>
<tr>
<td><img src="image" alt="Store" /></td>
<td>Assets are saved to the Asset Store. Assets can be returned to over time for reviewing; sharing, linking etc.</td>
</tr>
<tr>
<td><img src="image" alt="User" /></td>
<td>Users can create multiple WebFolios in which they make links from the text to other assets in the eportfolio asset store or to external URLs or email addresses. WebFolios can be shared or published</td>
</tr>
</tbody>
</table>

Records are created using simple ‘wizards’. The records available include abilities; achievements; action plans; experiences; meetings and thoughts. *Thoughts* was chosen to describe the main reflective entry as it is less ‘loaded’ or misunderstood as a term. As users move through the forms they can choose to be prompted by hints such as ‘what have you learnt from this experience or from thinking and writing about it’. Files can be added to the system in support of any input type or can be independently added to the eportfolio asset store. Files may be owned by the user or
The Pedagogical benefits of ePortfolios

may be ‘pulled’ or ‘pushed’ by an external system e.g. the student information management system.

A more complex type of entry is the WebFolio which is also created through an intuitive wizard and which offers the user a wide choice of templates, colour schemes and image options. The wizard allows the user to choose any number of pages which are named according to the user’s preference. Multiple WebFolios can be created and can be shared, commented and reviewed in the same way as the individual assets. As well as being able to share assets with a person, the user is able to publish them to a place – called a Gateway. Gateways are created by a teacher and allow them to oversee the assets of a defined group. The implementation of Gateways arose early in the piloting of the system as a direct result of feedback from teachers. Two colleagues in particular were experiencing so much activity from their students that they were in danger of becoming inundated with assets shared by their students. Gateways provide a secure webpage where assets can be published by their owners. The assets appear in the form of a list and are organised by title, author, date of upload/modification and other management information. One teacher reported that the publishing of WebFolios to her gateway improved the quality of the work being submitted by students for assessment. This was, she thought, because students were able to see each others work and know that theirs could also be viewed by others which created an element of competitiveness. This may not always be desirable so Gateways can be configured so that users can only post rather than post and view.

There are many different types of eportfolio, each serving a different purpose or a different master and this has made defining an eportfolio a very messy business. One widely used definition is that offered by Educause NLII (cited by Barrett, 2004):

A collection of authentic and diverse evidence, drawn from a larger archive, that represents what a person or organization has learned over time, on which the person or organization has reflected, designed for presentation to one or more audiences for a particular rhetorical purpose.

One concern with this definition is that it tends to limit an eportfolio to an aggregation of evidence assembled for the purposes of presentation: whether for assessment, selection or monitoring processes. An eportfolio has much more potential than this. Our early evaluation has already identified that even simple use of the wizard-based forms has had a dramatic improvement on student learning and behaviour. In a simple piece of research Dr Eleanor Cohn (2005) at the University of Wolverhampton split a group of 80 students into roughly equal groups. Each group was asked to record their performance in a previous module and to reflect upon it. They were also asked to create an action plan for improving their performance in any area. The first group were asked to record the experience using the eportfolio; and the action plan using any method of their choice. The second group were asked to do the same though the activities were reversed. The third group were allowed to approach both activities however they chose. Cohn found that from the total number only one student chose to submit their work outside of the eportfolio. She reports that, overall, the quality of work surpassed any she had previously received using a range of other methods. Cohn went on to conduct a similar activity with a second group and experienced the same results. None of the records produced by these students were destined to form part of a WebFolio (described by others as a presentational or assessment portfolio). It would appear that the pedagogic design of the system encouraged the students to reflect and plan more effectively and, even though the
records were being made with the express intent of being shared with their tutor, students seem to have been more at ease recording into their eportfolio.

The basis of this paper, and accompanying presentation, is an examination of how PebblePad, a generic eportfolio system, has developed from an ideological construct. Other than the criteria already expressed: the ease of use; the flexibility; the centrality and agency of the learner and the importance of making sense - it is difficult to tell now whether the system did in fact develop from a stable, coherent conception of what an eportfolio should be, or whether the definition and solution developed contemporaneously and symbiotically. None-the-less, it would seem that the definition and the product remain in accord and both help illuminate our eportfolio ideology:

A system which allows users to record any abilities, events or plans which are personally significant and which occur in any of their learning identities; which allows these records to be linked, augmented or evidenced by other data sources; which promotes reflection on these entries and which facilitates self-awareness. It allows the user to integrate institutional data with personal data, recorded and reviewed over time, and which has been enriched by commentary and feedback from the recipients of shared assets. It is a system with tools for aggregating assets in multiple forms; for telling myriad stories to diverse audiences and which provides absolute user-control over what is shared, with whom, for what purpose and for how long. It is a personal repository; a personal journal; a feedback and collaboration system; and a digital theatre - where the audience is by invitation only.

3. Evaluating PebblePad

The system has now completed its pilot phase; it has been robustly evaluated in a year-long exercise led by the Dean of Learning and Teaching, strongly supported by the Student’s Union and external experts. As a result of the evaluation the University of Wolverhampton, in June 2005, adopted the system for all of its staff and students; we believe it was the first institution in the UK to do so. However, University of Wolverhampton is not now alone, the system has been adopted institution-wide at Coventry and is being used at Gloucestershire University; Queen Margaret University College; City University, London; Leeds Metropolitan; Bradford University and a growing number of FE colleges. Fascinatingly the system is proving popular with a number of schools who are using it in a broad range of courses, which seems to support claims that it is flexible, fun and easy to use!

One feature of the pilot implementation has been the significant interest shown by academic staff at the university (and beyond). In previous eLearning implementations, most notably with Virtual Learning Environments (VLE [LMS or CMS]), staff have tended to engage with the technology as a result of local pressures or sanctions. In implementing the eportfolio we have discovered quite the opposite. It has been necessary, because of the strict pilot framework, to prevent people from using PebblePad, despite their determined enthusiasm to become involved. Throughout this ‘exclusion period’ we have worked closely with a large number of staff to help them plan their courses for future inclusion of the eportfolio system and the learning processes it supports. It is being implemented in a bewildering variety of ways; ways which were unexpected but entirely valid and exciting. Teachers are using the output tool, WebFolio, to created mini courses for their students; they are sharing resources with students through the eportfolio because it is far easier than the VLE; they are creating semi-formed assets and WebFolio templates which they
are sharing with their students as prompts or scaffolding for the students to complete, and graduate students are using the system to record their ideas and works as a means of protecting their intellectual property.

Colleagues in the School of Health cannot be contained in their enthusiasm to use the system for everything from simple critical incident diaries to developing professional accreditation WebFolios for the Nursing and Midwifery Council. Colleagues in the university’s Learning Centres are developing their own accreditation WebFolios for continued membership of their professional body. The IT department, not originally in favour of the development, are exploring ways of maintaining personal development records and the Centre for Excellence in Learning and Teaching, the original advocates of eportfolios for learning, has required all of its staff to use the system for their annual appraisal.

The innovative use of eportfolios has been rewarded by improved student performance, as reported by all teachers in the pilot; by the award of three National Teaching Fellowships, all to participants in the eportfolio pilot; and the award of Centre of Excellence status to the university - central to which is a five-year project to improve student attainment through use of eportfolios.

We have really only just started finding out what is possible with an eportfolio but what is clear is that a well designed system supports far more than presentational collections of evidence.

4. References


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Abstract

This paper addresses the use of Semantic Web technologies for the provision of new e-learning opportunities. It describes two alternative approaches for using the Topic Maps paradigm to improve learning: a top-down and a bottom-up approach. The first approach is present in a framework for ontology-centered development, illustrated in terms of TM4L (Topic Maps for eLearning). The BrainBank model illustrates the second approach and the paper summarizes the experience of using BrainBank.

1. Introduction

Web-based learning is becoming increasingly popular in college education and business training. However, abundant digital resources and tools do not necessarily solve any problems if they by the end of the day contribute to increase the chaotic pressure of information on the learners. Its effectiveness and efficiency for both learners and instructors depend crucially on the organization of the online learning resources, which determines the easiness of their creation and retrieval. Currently available online educational materials, such as electronic textbooks and web-based courses, are mostly hypertext containing hierarchical links that represent the book or course structure, and possibly simple “horizontal” (contextual) links from a page to associated pages that are similar (Eklund et al., 1998). The main problems related to using educational hypertext for learners are cognitive overload, disorientation and distraction, poor narrative flow, and poor conceptual flow (Jacobson et al., 1996). To overcome these problems e-learners need support in retrieving and evaluating online information.

Electronic portfolios have traditionally been defined as an organized collection of digital and/or analog artifacts and reflective statements that demonstrate growth over time (Barrett, 2001). In a broader perspective e-portfolio has been defined as a tool that can provide sophisticated control of one’s virtual identity (Treuer and Jenson, 2003). A fundamental characteristic of an ePortfolio in this perspective is that the
virtual identity is stored using a common set of functional and organizational standards. Wilbert Kraan puts it this way: “Without the means to output e-portfolio data in a standard format, it's next to useless” (Kraan, 2003).

Educational practices are changing from being predominantly teacher-led to largely student-centered. But how can the students themselves be able to assess their position relative to a future learning environments consisting of a diverse set of learning activities from which learners somehow may take their pick? The learner’s history and goals define an entry position relative to the learning activities. A different entry position is likely to result in a different partition of the set of available activities in activities to skip and to complete. Different entry points will thus result in different paths through the set of relevant learning activities. Computer supported positioning in learning networks could contribute to the formidable set of hurdles that arises in such a scenario. In fact, it assumes answers on a substantial number of the research questions that were recently proposed for intelligent information systems (Cherniavsky and Soloway, 2002). The student’s ePortfolio would be an obvious place to look in order to support automatic positioning of the learner relative to the curriculum, learning activities and learning resources. However, this would require that there exists a glue that connects the top-down (curriculum etc) and the bottom-up (ePortfolio etc) levels. In this paper we argue that the glue is concepts represented in an open standard.

Topic Maps (TM) (Park and Hunting, 2002) is a hypertext navigation meta-layer above electronic information sources supporting topical finding of various kinds of resources, e.g., documents, graphics, images, database records, audio/video clips. As a result of a special characteristic of the topic maps model is a clear separation between the description of the information structure and the physical information resources. The navigation meta-layer is independent of the format of the actual resources and enables the creation of an external index that makes the information findable. The main TM components are topics, associations, and occurrences (Biezunski et al., 1999). Using those elements, one can create maps in document repositories.

In the context of education and learning, TM can be used as a means to express knowledge and to organize and retrieve information in a more efficient and meaningful way. The expressive power of TM, commonly perceived as a method for indexing information resources, places the standard very close to artificial intelligence and knowledge modeling. TM resemble semantic networks and conceptual graphs, but offer more: A unique, standards-based way of encoding and exchanging knowledge on the Web. TM provide an external meta-structure (a knowledge navigation layer) in form of a dynamic, semantically based hypertext. As a result, TM can offer the following benefits:

- For curriculum developers: Learning goals, requirements and constraints expressed as topics – the smallest units of meaning; better overview of the subjects domain; visualized relations between topics across subject domains and levels; easy to relate different curriculums to each other; facilitates planning, design, implementation, validation and management through different academic entities.

- For providers of learning resources: Option to connect learning resources directly to the curriculum, resources marketed directly to the relevant goal/problem, one resource can be connected to several learning goals if consistent with the subject domains, means of learning, modes of evaluation.
For courseware developers and instructors: Effective management and maintenance of knowledge and information; personalized courseware presentations; distributed courseware development; reuse and exchange of learning materials, collaborative authoring (Dichev et al., 2004, Karabeg, 2005 #50).

For learners: A framework for concept-based knowledge building; efficient, intuitive context-based retrieval of learning resources; better awareness in subject-domain browsing; information visualization; customized views, adaptive guidance, and context-based feedback (Lavik and Nordeng, 2004a, Lavik et al., 2004, Nordeng et al., 2005, Dichev et al., 2004, Karabeg et al., 2005).

2. Semantic Web or Seamless Knowledge

The recent move towards semantic technologies has resulted in two standards for interchanging semantic information: Resource Description Framework (RDF) (Berners-Lee et al., 2001) and Topic Maps (TM) (Park and Hunting, 2002). TM is an ISO standard that originates from work on back-of-book indexes, and has much in common with library science tools like glossaries and thesauri. RDF, on the other hand, has its roots in formal logic and mathematical graph theory and is the W3C standard framework for expressing metadata (including taxonomies and ontologies).

The relationship between these two standards has long been a hot research topic, as well as a source of confusion for users. The exact relationship is difficult to pin down, since although their application areas have substantial overlaps, the technologies themselves are very different. Perhaps the biggest difference is that Topic Maps approach knowledge representation from the point of view of human beings, whereas RDF takes a machine (or logic) approach (Pepper, 2002).

The design goals for TM to be able to have advanced indexes that could support information findability via navigation and searching, and where the indexes could be automatically merged to create new, more complete indexes. To do this support for global identity of concepts is needed, and TM have this. TM have been variously described as "the GPS of the information universe" and as "the enabling technology for Seamless Knowledge". RDF, on the other hand, comes out of the attempt to create the Semantic Web, and so is meant to support global, public knowledge interchange (Berners-Lee et al., 2001).

The organizing principle of TM is topics, which represent entities from the application domain (known as subjects). Topics can have types (such as person, organization, country,...), and any number of names. The names can have a context attached, so that it is possible to distinguish between default name, obsolete names, names specific to a language, corporate culture, or specific technical jargon, and so on. However, most of the power of TM comes from associations, which represent relationships between the subjects in the domain. Associations are typed, so that they can be used to make specific statements like "this person is born in this country", "this document was written by this person", and "this city is located in this country". Associations are, through the use of roles, inherently bidirectional, and can support relationships involving any number of topics. Occurrences are used to connect topics to information resources that are relevant to them. The information resource can be any kind of resource, as the topic map references it via a URI. Occurrences are typed, and so for a person, for example, one can distinguish between the biography, a portrait, and the person's home page. Occurrences can
also be simple properties, which can be used to capture information like date of birth, phone number, etc.

Any statement in a topic map (such as the assignment of a name, an association, or an occurrence) has a scope attached to it. This defines the validity of the statement, and can be used to capture differing points of view in the same topic map. (Karabeg et al., 2005). Another key concept in TM, hinted at above, is that of identity. Topics can be assigned identifying URIs, which give them a global identity, allowing a topic map system to tell whether or not two topics in two different topic maps represent the same subject. This is extremely powerful, and allows topic maps to merged automatically, and can also be used to automatically aggregate information from disparate sources. In short, TM provide a language for representing the conceptual knowledge that a student acquires during learning. This knowledge can also be used to distinguish learning resources semantically, by connecting the resources to the concepts in the topic map. To realize their main purpose, indexing information resources, TM embody knowledge. TM are very suitable for representing the knowledge taught in a course unit (oxygen and hydrogen are chemical elements, and water is a chemical substance formed from oxygen and hydrogen, etc), and so including a topic map of the contents of a teaching unit would substantially enhance its value.

3. Top-down: eCurriculum and digital course libraries

In this paper we present an innovative approach to creating ontology-oriented curriculum and courseware. TM offer a standards based approach to building educational ontologies and courseware components that allows reuse, sharing, and the navigation support (link adaptation). In concept-based courseware support systems, the conceptual structure is explicitly represented in the system, that is, there is a clear separation between the teaching and learning materials (a set of Web pages or a library of educational documents) and the conceptualization of the subject domain, which is represented by a set of concepts connected to each other. There is great diversity in the depth of the conceptual domain representation on the “conceptual layer” and in the ways of its usage (Aroyo and Dicheva, 2001, Aroyo and Dicheva, 2002, Lambiotte et al., 1989, Sowa, 2000). The latter include identifying gaps or misunderstandings in a learner’s knowledge, predicting and controlling a learner’s problem-solving performance, or using a learner’s represented knowledge as a guide for instructional design purposes, such as course sequencing and task-based information handling support.

One of the main problems for authors of hypertext and concept-based courseware is the difficulty of reusing and sharing existing instructional units. This is a very serious problem in the light of the exponential growth of web-based courses. Obviously, there is a pressing need for course content “interaction.” To achieve this we need courseware that is reusable (modular), discoverable (tagged for search and retrievable), and interoperable (cross-platform). One feasible approach to this problem is standardization. This should be achieved at two levels: knowledge level and technological level. At the knowledge level the courseware standardization efforts require the creation of specialized ontologies - well-founded and agreed-upon systems of concepts and the relationships that exist between those concepts - to be used as a backbone in curriculum and courseware development. By providing common vocabulary for domain knowledge representation, they can support sharing, reuse, and exchange of knowledge bases and courseware functional components among different courses and authors (instructors). More and more general and
specialized task and domain ontologies, such as ACM computing classification system (http://www.mi.sanu.ac.yu/~zorano/acm/ccs98.html), are becoming available and will need to be shared, reused, and easily maintained (Sowa, 2000, Breuker and Bredeweg, 1999, Devedzic, 2001, Mizoguchi et al., 1997). That is why new methods for knowledge organization and processing are required to facilitate knowledge sharing among authors, including support for merging and reusing knowledge structures.

3.1. The national K12 curriculum of Norway expressed as a topic map

The new national curriculum for primary and secondary schools in Norway, valid form 2006, is less detailed on learning activities but more focused on learning goals compared to its predecessor (Clemet, 2005). The Directorate for Primary and Secondary Education has decided also to express the new curriculum as a topic map. The first step is to develop an ontology that is suitable for data interchange between various school administrative systems. The next step will be to develop a web application for visualization of the eCurriculum topic map. The learning goals will be the smallest units of meaning in the eCurriculum topic map. When it comes to education and learning, the learning goal topics can be used to tie different educational portals together semantically, to refer to digital learning resources, both free and commercially available, and to serve as a common semantic framework for seamless knowledge building.


Digital course libraries are educational Web applications that contain instructional materials to assist students’ learning in a specific discipline (course) and support students’ course-related work aimed at reinforcing their knowledge. They play a vital role in out-of-class learning, especially in project-based and problem-based learning, as well as in lifelong learning. Digital course libraries are expected, from one side, to provide learners with powerful and intuitive search tools that allow them to efficiently access learning resources, and from another, to support instructors with powerful authoring tools for efficient creation and update of instructional materials. The latter is closely related to the issue of reusability and shareability of learning content, which in turn is concerned with both the existence of shared agreement on the content and the standards-based representation of the materials. We address the problems of findability, reusability and shareability of learning materials in digital course libraries by suggesting the use of Semantic Web technologies in creating them. More specifically, we propose a framework for digital course libraries that incorporates a meta-layer – semantic layer, based on conceptualization of the course subject domain. The fundamental idea is to build those libraries as both concept-based and ontology-aware repositories of learning objects (Dicheva and Dichev, 2004).

The proposed framework is aimed at supporting the development of ontology-aware repositories of learning materials. It is focused on enabling authors to capture, share and access knowledge. Subject ontologies aim at capturing domain knowledge in a generic way, and provide a commonly agreed upon representation vocabulary of a subject domain, which may be shared and reused across people and applications. Ontology editing is an essential aspect for all ontology-aware systems. An important issue within ontology editing is the underlying ontology model or “structure” that is to be edited. In our framework for developing repositories of learning resources it is a network of concepts. This involves creating views of a specific domain in terms of domain concepts and relationships among them that suggest the semantics of the
resources relevant to that domain. Such a conceptual structure would enhance information retrieval within the repository since the set of concepts, relationships, and inference rules defined by the domain ontology constrain the possible interpretations. Thus the proposed general framework of ontology-aware discipline-specific repositories is based on building a conceptual structure that represents the subject domain ontology and using it for structuring and classification of learning content. The classification involves linking learning objects (content) to the relevant ontology terms (concepts), i.e. using the ontological structure to index the repository content. This will allow applications and users to understand the relationships between the resources and insure efficient topical access to them.

By providing shared agreement on the subjects meaning, ontologies can serve as a means of establishing a conceptually concise basis for communicating knowledge for many purposes, for example, in ontology-based merging of digital repositories. The framework utilizes the advantages of concept-based and standards-based content organization to benefit both learners and authors. For learners it supports efficient contextual retrieval of information relevant to their needs and for authors - the reusability, shareability, and exchangeability of created instructional materials.

We have proposed a layered information structure of the learning material repository consisting of three layers, each of which captures a different aspect of the library information space - conceptual, resource-related, and contextual:

- **Semantic layer**: contains a conceptual model of an application area in terms concepts and existing relationships grounded on the knowledge and terminology that is in use in this application area.
- **Resource layer**: contains a collection of diverse information resources that are relevant to the topics describing specific application domain.
- **Context layer**: contains specifications of different views of domains, dependent on the user, organization, etc., and their needs and intents, by associating concepts and relationships among those concepts that describe the intended view.

The developed framework for ontology-aware digital course libraries has been described in detail in (Dicheva and Dichev, 2004). This framework provided design principles for creating the digital course library environment known as Topic Maps for e-Learning (TM4L) (Dicheva et al., 2004).

### 3.3. The TM4L Environment

TM4L has been designed to supporting authoring and presentation of learning material in a digital course library. The modeling language of TM4L is based on the TM standard. It consists of two major components, TM4L Editor and TM4L Viewer. Two groups of users are targeted by the TM4L design:

- authors with a limited background of ontologies
- learners seeking information support in their course tasks

The TM4L Editor allows authors to create, organize, edit, and reuse topic maps-based educational content. It supports human knowledge acquisition, i.e. is designed as a tool, in which instructors externalize their subject knowledge in cognitive schemes represented as topic maps.

Since editing is made by the user via interface we offer a number of alternative interfaces that may be accessed within the same editing session. Interfaces that
provide multiple views offer users different perspectives on learning units. The user chooses the type of interaction according to their decision, situation and personal preference. TM4L incorporates three views: partonomy, taxonomy and typing views. Whole-part relations play an important role in the topology of e-learning. We support whole-part to enable users to express the inherent composite structure of the learning content. For example, Fig. 1 depicts an editing session based on the partonomy view. Instances of a particular class along with the resources attached to it play a key role in e-learning, while superclass-subclass relationship capturing learning domains taxonomy trees. With this enhancement we intend to provide alternative insights into the learning content structure.

![Figure 1. Compositional view of the topic “Prolog Lists” in the context of its wholes and its parts.](image)

In addition to the three primary relationships TM4L contains two other predefined relationship types, including similar-to and related-to relations. By offering this minimal set of five relation types we support TM4L authors that experience difficulties in articulating and naming relationships. In this aspect the related to relation, which carries weak semantics by enabling us to express the fact that two concepts are in some way related is intended for expressing unknown relationships. Another aspect playing role in the selection of the predefined relation set is to reduce the subjective factor. Consensus assumes minimum subjectivity. Relations such as whole-part and superclass-subclass have logical foundation in contrast to relations with subjective flavor such as based-on and depend-on.

The task of the TM4L Viewer is to support efficient retrieval of learning resources in the digital course library through navigation or search. The topics modeling the semantic layer’s concepts represent the subjects, which are expressed by the resources. The semantic and resource layers are connected by occurrence links pointing from topics to resources. From the topic layer the user can access the needed resources. Learners can use different contexts for navigation. The TM4L Viewer’s functionality includes the following capabilities:

- Browsing the e-learning repository (supporting adaptive navigation depending on the selected view).
- Visualizing the structure of learning objects within a selected view.
- Keyword-based search for learning objects within the e-learning repository.
- External search on the Web.
The contextual framework of TM4L is utilized in the creation, maintenance, and use of ontology-aware courseware. In TM4L the initials set of relations is predefined. It includes five relations: Whole-Part, Superclass-Subclass, Instance-Of, Related and Similar. This set can be extended with arbitrary user defined relations. For a given topic \( t \) the surrounding context is displayed as a graph structure with edges linking \( t \) to all topics playing role in any association where \( t \) is one of its role players (Fig. 2).

Figure 2. Topic “Prolog Lists” in the center of its context.

TM4L is currently available as a standalone application. It can be downloaded from <http://www.wssu.edu/iis/nsdl/download.html>.

4. Bottom-up: Self-constructed knowledge maps and ePortfolio

4.1. Portfolio as a method of assessment

Portfolio assessment is a method of assessment that is actualized on all levels of the Norwegian education system. Within 2008 all parts of the educational system should be able to use digital portfolio assessment. (UFD: Program for digital kompetanse 2004 – 2008, UFD: Stortingsmelding 30 2003-2004: Kultur for læring). Portfolio assessment is a method inspired by Bakhtin, Vygotskij, Mead and Dewey, and is based on the theory that learning is a social activity and that social cooperation, dialogue and learning are closely connected (Dysthe, 2001). The method evaluates the learning process and the product of the work. The pupils/students pick out pieces of work that they want to be evaluated by, and collect those in a folder, either physical or digital. The portfolio can contain finished work, sketches, reflections, responses from teachers a.s.o. This makes it possible to document both the learning process and the knowledge that’s developed through the work. The dialogue is basic in the method. During the process, dialogues in between pupils and between pupils and teachers are important. Knowledge develops through dialogue. Responses from teachers and co-learners give the learner possibilities to question and rethink their own understandings.

The portfolios are basically two different types:

- work portfolios
- presentation and assessment portfolios
Work portfolios are portfolios where everything connected to the specific work/task are collected (concerning a subject, topic, project a.o.). There can be several such portfolios.

Portfolios for assessment, exam or presentation are meant to express something about the process and the results of the work through a choice from the work portfolio. They are evaluated by a teacher or an external examiner and use specific criteria that are known for all parts. The products can be developed and improved until the final time for delivery.

Process writing is a method that is closely connected with portfolio assessment. Many Norwegian teachers base the portfolio pedagogy upon the method of process writing. The products can be of all formats; written text in different genres, pictures, film, sound a.s.o. It is the portfolio’s format that sets the limits of the content, but most, both physical and digital portfolios can actually contain a lot already. With an average PC most formats can be copied to a CD/DVD and kept in a folder of any kind. The portfolio can be used not only for the assessment of education, but also for instance in connection with job interviews, further studies, or as web-presentation.

Benefits from portfolio assessment
According to Dysthe (2005) the most common arguments for using portfolio assessment are that the portfolio pedagogy will

- promote quality and continuity in the work of learning
- promote the pupil’s/student’s motivation for learning and knowledge of their own learning processes
- give a better basic of assessment than traditional exams
- emphasize the connection between issues, work effort, guidance, criteria, systems of assessment and knowledge acquirement

Portfolio assessment is a way of seeing different aspects of the knowledge development as an entirely. The portfolio will have possibilities to show how the learner “conquers” the subject field during the work process. In this lies also the possibility to discover connections across subjects and to develop a meta perspective on their own learning and knowledge (Dysthe, 2001). Portfolio assessment is a method fit to present the process that leads to the finished product. It is in this process the constructions of knowledge develop. If it is possible to get pupils/students to reflect on connections during the work process, it will lead to a more conscious learning process.

To see that you have produced something can be satisfying in its self. The portfolio assessment shows steps in the work process, and especially for pupils/students that need to see “quick results” the method can be strongly motivating. To many pupils/students who experienced defeats in school, the method can be an alternative of less risk of “loosing” because the process involves steps of trying and failing before the final result. Corrections can be made during the process, and the responses from teachers and co-workers assure the quality of the work. This reduces uncertainty and opens for new initiatives in the learning process.

Portfolio assessment are based upon the learners previous constructions of knowledge, and will always be possible to use for adapted and customized education which is a strong principle in all education in Norway. In the process of collecting products for the final assessment or exam, valuable reflections take place concerning curricular questions, what’s important to show, how to present an overall picture of
the portfolio, a.s.o. This represent an important part of the scientific reflections and give room for reflections on one’s learning strategies and ways of socializing into a working cooperative (Dysthe, 2001).

In educational processes there are close connections between working methods and systems of assessment. This concerns both students/pupils and teachers. The teachers need to see the choice of objectives, methods and sources of knowledge in connection with the question of assessment. The pupil/student will also look to the final assessment during the work process and make choices according to that. If the grades depend on the ability to remember the textbook, the learner will probably work on remembering text. In the portfolio assessment method the learning process will be attached great importance as a part of the final assessment. This will make the students/pupils more conscious on their own learning strategies. (Limstrand and Rønningsbakk, 2003).

**Digital portfolios**

There are many expectations related to working with digital portfolios. Even if it is the same methodology as physical portfolios, the digital format will have several benefits. The portfolios can contain different file formats that make it possible to document the learning processes and final products in presentations of various expressions. We have a strong tradition of using the text media as the common expression in school, but are more and more aware that some learners express themselves better in other formats than written text and that school therefore should open for more use of other medias (images, films, animations, multi-media presentations).

Another and just as important aspect to digital portfolios is that they easily can be distributed. The traditional form of assessment usually takes place in one-to-one relations between teacher and student with limited insight from others. This gives room for dialogues and reflections, but only within a certain frame. The digital media makes it possible to share thoughts and understandings with anyone, and can give room for learning processes supported by many different dialogues and evaluations. It might be this aspect about ICT-supported learning that will show to be the most interesting in the future.

The communicative side of learning is important in the portfolio pedagogy. Through communication we have access to other people’s thoughts and ideas that “nourishes” our own understandings. The expression of learning consists of elements from the culture and the working community that during time appropriate in the individual (Säljö, 2001). Using ICT, the acquiring of knowledge gets a new dimension. We earlier had a limited access to information, but with the internet this access is enormous. Through available applications pupils and students get new tools that can compensate problems with handwriting, orthography, gramatics o.a, and the ICT offers great possibilities to use other presentation forms than texts.

### 4.2. BrainBank Learning

BrainBank Learning (BBL) (Lavik and Nordeng, 2004b) was developed as a web application for learning of concepts (their content) and associations (how concepts relate to each other). It works with standard Internet browsers, which means that educational institutions are not dependent on any other installation to use the application. Users enter the application through individual accounts. Topics (concepts) that the learner meets during education activities are entered and described (Fig. 3).
The topics can then be connected by linking phrases to form propositions or associations: The learner creates his own associated network of topics that represents his knowledge. This way of documenting in the learning process is good for the learner’s understanding of the area of study (placing knowledge in a context), as well as navigating and overview of the acquired knowledge later on. To further describe topics and associations, digital resources such as documents, pictures, movie clips and sound clips can be attached to the topics. These resources can be either linked to or uploaded to and stored in BrainBank. BBL is based on the TM standard, including the XML format supporting the TM ISO standard (XTM) (The Topic Maps.org Authoring Group, 2001) and it was implemented using the Ontopia Knowledge Suite (http://ontopia.net). As the Topic Map standard defines an effective way of representing information, through topics and associations etc. (Biezunski et al., 1999), BBL now uses this TM technology to represent the data in the application. A case study has been done to evaluate practical use of BBL and to find out if it helps improve learning to become more effective. The project has been a cooperative effort between Kristin Bjørndal at PLP (Program for learning and practical pedagogy at the University of Tromsø), Cerpus AS and Alsvåg primary and secondary school. The project has been reported (Bjørndal and Knudsen, 2003) and thoroughly discussed (Lavik and Nordeng, 2004b) elsewhere and the main focus here is rather to catch on with unleashed potential and prospects for improvement. Based on the replies from the pupils (in interviews), three separate aspects were identifiable: BBL as an e-Portfolio, as a learning strategy and as a medium and method for assessment.

**Figure 3 Main entry window screen of BrainBank Learning**

The figure shows a BrainBank Learning screenshot where a teacher is looking at a Norwegian primary school pupil’s production, in the subject “Natural Science and Environment”. The pupil has entered the topic “Etanol” (ethanol), given it a brief description, and associated the topic to 9 other topics. In this case, two different types of relations have been used (to the far left), and the associated topics are listed.
4.3. ePortfolio

The pupils expressed that they would prefer to structure and store their knowledge in BrainBank rather than in paper notebooks. Pupils often think of repetition of learnt material as boring, but it is widely acknowledged that repetition is one of the best ways of storing knowledge. Seven out of the group of sixteen pupils stated that BBL helped in remembering what they had learned.

According to these pupils, BBL mainly helped because they could easily go back and take a look at what they did earlier, what they had written down of keywords and associations (e.g.: “We can save things, so we won’t forget it. It’s simply to enter BrainBank, and there we have it. It’s easy to save and easy to retrieve. We learn more and more through the years.”) The same pupils said that they regularly used BrainBank to repeat for themselves what they had learned (e.g.: “You kind of get a repetition of what is learned when typing it into BrainBank. When I’m in 9th grade, I can look back on what I learned in 8th grade.”). The pupils also expressed that they were motivated to document their knowledge thoroughly by the fact that it is properly stored: “I’m so proud when I see how many keywords I’ve got in BrainBank!” one pupil said.

Both pupils and teachers have raised some criticism on the way hierarchical structures are built in BBL. Although BBL is related to the central ideas of concept mapping (a pedagogic method) as defined by Joseph Novak (Novak, 1990, Novak, 1991, Novak and Wandersee, 1991), it differs by the fact that it does not demand knowledge to be expressed hierarchical. On the contrary, with BBL a user can build and browse complex multi-directional associative structures, across context and disciplines. It is however quite possible to build hierarchical structures using the TM standard. Even within the standard itself, there is support for typing in a hierarchical manner. In the learning process, hierarchy and (not least) typing can be quite useful to understand structures and trees of concepts. For example, it is valuable knowledge in itself to know that ‘cat’ is a mammal. And as long as it is also known that mammal is an animal, ‘cat’ will have to be an animal, which represents even more knowledge. We will include ways to build hierarchic structures in upcoming versions of BBL by implementing topic types. Class-Subclass and topic typing are efficient ways to express simple propositions like ‘cat is a (type of) mammal’ and “Charlie is a cat (and therefore also a mammal)”.

In concept mapping, the idea of focus is essential (Novak, 1991). There is always some kind of focus point where the mapping starts. Defining a context will always increase the value of information and knowledge. By somehow telling that a particular view of a piece of knowledge belongs to a particular context, it is easier to relate new chunks of knowledge to pre-acquired knowledge, and it is also easier to see the purpose of the knowledge in its current location. In addition, especially with young learners, it is important to be able to divide the knowledge into manageable chunks during the learning process. We will include a feature in BBL that makes it possible to create themes, and to use a theme to build a small knowledge map within the boundaries of the perspective. BBL is all the way centered on topics, and a theme can consist of one or more topics. As the learner acquires new knowledge and relates it to the theme, it makes sense right away, at least where it is put. Later on, as deeper understanding develops, the knowledge map belonging to the theme can be
merged into the learner’s main (complete) knowledge map. However, the theme is still kept as an identity to allow focused navigation, searching, etc.

Some pupils did complain that BBL is suffering from the lack of a powerful visualization of concepts and their relations. Numerous reports have documented the power of the concept mapping. It is therefore crucial to support, direct and/or indirect, import and export from front end software for mind mapping and concept mapping. Interestingly, CmapTools (Cañas et al., 2004) already supports XTM 1.0. Moreover, Rovira (2005) has concluded that TM allows expressing conceptual relationships in an adequate way for the web environment, and we believe that the concept mapping community should strive to decide on a common standard, preferentially XTM, for digital concept maps (Lavik and Nordeng, 2004a).

Implementation of graphical edition of concept map-like structures in BBL has substantially increased the value of the tool as a pedagogical method for meaningful learning. Since the project ended, BBL has now implemented Ontopia’s Vizigator™, a generic TM visualization tool, and we also intend to enable editing of such graphically visualized maps. Ontopia’s Vizigator™ is based on TouchGraph’s (http://touchgraph.sourceforge.net/) technology for visualizing map structures using Java Swing components. As shown in Fig. 4, such maps provide a good overview of the topics and association that has been established during the learning process. It is easy to resize and rotate the maps, and the amount of information can be adjusted by changing the association radius from the root topic. In addition, the maps could be restricted by other criteria that are already stored in the BrainBank data structure, for instance date, subject and course. Methods to limit the amount of information in the maps will be crucial as the students produce more content into BrainBank.

Figure 4 Visualization of topics associations in BrainBank Learning
The figure shows a screenshot of BrainBank Learning: The topics and association shown in Figure 3 is here visualized as a graphical map. The topic “Etanol” (yellow) is the root of the map. The radius of the map was set to 3 (upper left). Different colors on the branches indicate different association types.

The project class has continued to use BrainBank Learning after the project ended. Interestingly, we now observe that the pupils have started to connect new topics with previously entered topics. For instance, as shown in Figure 5, the 10th grade topic ‘Metan’ (methane) has been connected to the 9th grade topic ‘Elektroner’ (electrons) through the hydrocarbone-to-molecule association. ‘Electron’ is then connected to the 8th grade topic ‘Ampere’ through the topic ‘Atom’. This shows that the pupil has used BrainBank Learning to connect the new information about hydrocarbons to previous knowledge about molecules and atoms, and this has possibly helped in the process of transforming new information into knowledge; meaningful learning (Ausubel, 1963).
Figure 5 Visualization of associations between previous and new topics

The figure shows a screenshot of BrainBank Learning: ‘metan’, the topic in focus, is a new topic (10th grade) that has been connected to the previous topics cluster from the 8th and 9th grades on the top left containing ‘Elektroner’ and ‘Ampere’ amongst others. The small red squares on some topics indicate that these topics have more associations that are not visible in the current view.

Successful learning often takes place within a socio-cultural context where an interaction between humans is essential (Vygotsky, 1978). Interaction between the learner and the teacher is supported in BBL. However, cooperation between peers is widely accepted as a useful way of learning and some pupils did ask for such features. The ability to work in projects, where peers have equal access to all project resources is one attractive way of doing this. The project members should be able to share resources from their personal brainbanks with the project, as well as accept the project resources and import them into their brainbanks. Moreover, learners should be able to share knowledge maps and resources with the world by publishing them on public searchable web pages, free for anyone to browse. It is expected that this may help exchange of knowledge between peers. It is also important for the interaction between learner and teacher to have the ability to share resources. The teacher needs to be able to transmit resources to the learners. This could be possible in several ways, but as a principle, the learner should have to actively accept new resources. This is to ensure that the learner always is actively aware that he has received something new that can be used in his own knowledge structure. Furthermore, teachers should be able to share learning resources, from complete ontologies to simple learning objects, so that developed learning resources could be reused not only by the developer, but also colleagues and other teachers.
Research data indicates that the learners need curriculum and ontological support to responsibly record and manage their e-portfolios (Treuer and Jenson, 2003). With TM-based digital course libraries coming up (Dicheva et al., 2004), it will be very interesting to study how successful students can construct individual knowledge maps with predefined ontologies as a knowledge backbone. However, as helpful as it is to have good tools for individual learning, the world of information we live in is more and more based on networking and interaction with many instances and sources. The Internet is no doubt an important source for information, but the amount of information out there is so vast and overwhelming that new and better methods are needed to search and navigate. A useful point when trying to retrieve information from digital sources would be: What exactly is the learner’s current knowledge in the area in question? Could we in some way analyze the learner’s already acquired knowledge to help him locate new information that is relevant to him in his current position?

If representing the knowledge using a map like structure one could try to build some sort of mechanism that could analyze the documented knowledge and search the digital sources with the outcome of that analysis to determine what information that really is relevant. Leake et al (Leake et al., 2004) have developed a model for this using concept maps. They used the locations and relations of the nodes in the concept map to automatically create queries for the Google Internet search robot. As the hierarchical structure of a concept map supplies means to weigh concepts used in a semantic web search the new Theme feature in BBL can do a similar job. It gives a main topic (the perspective) that gives the boundaries for the scope. It is possible in the TM structure in BrainBank to start with one main topic and then count the radius: The distance from the main topic to other topics. This can also indicate a topic’s level of relevance and it can help balancing the search and make it more accurate. However, because Google is not able to analyze what any retrieved page is actually about it is likely that such queries still would result in a lot of false positives. We are currently building a search function that automatically uses associations in BBL to focus the queries, and linguistic characterization and indexing to match the retrieved document content to the queries. Hopefully, this function will allow the users to spend less time on browsing and more time on learning.

Learning Strategies

BBL was designed to be a tool for meaningful learning (Ausubel et al., 1978) within a constructivist learning environment (Wilson, 1996, Jonassen and Rohrer-Murphy, 1999). The tool was inspired by the ideas of knowledge building developed by Joseph Novak and colleagues (Novak, 1977): It stimulates the learning process as the learner continuously reflects through and updates his own knowledge and stores it in BrainBank. This is because he has to discriminate received information to extract the essence of the information to document it in BBL, and also by relating new information to already existing knowledge by associating new topics to existing ones and describing the relation between them (Novak, 1990, Novak, 1991). Some of the pupils said that they now pay more attention to how they are learning and made explicit statements that indicates that they have started a process of reflecting on their own learning process as such (e.g.: “You become more aware of what you read when writing keywords: You pay more attention. When I do my homework more in-depth, because I’m going to find keywords.”). One of the main conclusion drawn by (Bjørndal and Knudsen, 2003) is that BBL is a good learning strategy.
Assessment

Another important issue that came up during the project is how detailed and how often the teachers should evaluate the pupils. BBL opens for both formative and summative methods for evaluating students, which makes it a promising instrument for modern forms for education. Teachers and supervisors can at any time take a look at what their students and pupils has documented in BrainBank. This way, they both evaluate progress and the knowledge documented. By examining the associations the students have made between topics, the teacher gets an impression on how much the students really understand of the area of study as well. However, for the teacher this kind of detailed evaluation of many pupils is time consuming. Even if this challenge is not related directly to BBL (a teacher can simply choose not to use it for evaluation) the new options of assessment bring this issue out into the light. A possible answer to this could be to automate the analysis of the end product (summative assessment) by using techniques like latent semantic analysis (Landauer et al., 1998) or by comparing TM: Several tools for comparing concept maps have been described (Chang et al., 2001, Biswas et al., 2001), but such systems are often restricted to particular subject domains, vocabularies and even map building environments. The Reasonable Fallible Analyzer (Conlon and Bird, 2004) strives to be flexible in this respect: When comparing a map with any other map (for instance an expert map) it is honest and says it is likely to be wrong. The point is that the learner becomes aware of similarities and differences between different maps, and by arguing with the program, deeper understanding will be achieved. Results from a practical case (Conlon, 2004) suggest that the Reasonable Fallible Analyzer is a promising tool for formative self-assessment, and at least with respect to time consumption a good alternative to diagnostic assessment done by the teachers with shortage of time.

5. Conclusion

As e-learning strives to honor its promises in today’s rapidly inter-networking world it is facing increasingly complex problems. E-learning is clearly in a transition phase, where the online information is reaching critical amounts, the learners are demanding for more personalized system interaction and the courseware developers and learning resource providers are requesting adaptive support for effective management and maintenance of knowledge and information. In this context, the emerging Semantic Web technologies that aim at providing more intelligent access to and management of Web information can play a central role in the ongoing efforts for improving the efficiency and effectiveness of e-learning.

In this paper we discuss the employment of the novel Semantic Web technology - Topic Maps - for the development of efficient e-learning environments. We describe two alternative approaches for using the Topic Maps paradigm to improve learning: a top-down and a bottom-up approach. The first approach is present in a framework for top-down ontology-centered curriculum development. The framework is based on utilization of distributed digital course libraries opening up new possibilities for authors and learners. A pragmatic perspective in this aspect is addressed in terms of TM4L (Topic Maps for eLearning) environment.

The second approach is illustrated by the BrainBank model. Educators have long recognized that students learn best when they internalize new information along a continuum of perceiving, processing and communication. The BrainBank model was designed to address these learning strategies. It utilizes the constructivist and e-portfolio model of learning, which allows students to move through the learning
experiences at their own pace while recognizing and incorporating different learning styles.

The discussed TM-based eCurriculum, digital course libraries, and BrainBank Learning unleash powerful support for constructivist learning. In addition, by supporting standards-based knowledge representation and management, they promote reusability, shareability, and interoperability of the created learning content, which is crucial for the effectiveness of e-learning. Our future plans include thorough evaluation and improvements of the developed environments, as well as further research related to using context, peer cooperation, etc.

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ePortfolios in ActiveMath

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Abstract

Existing ePortfolios record the work of a learner and his assessments. The standalone application “workbook” of the web-based and user-adaptive learning environment ActiveMath tries to go beyond that. It aims at supporting explicit learning by providing interaction, construction and reflection opportunities.

1. Introduction

Existing ePortfolios record the work of a learner and his assessments. Prior to the selection of evidences to be included into a portfolio, a reflection process takes place: "What kind of evidence do I want to include into my portfolio and why? Why do I prefer some evidences over others?" These reflections are usually not stored together with the evidence itself. Instead, the information is stored in the learner's memory. This implicit information if not used regularly is transient and vanishes after a while. A learning log is a mean of storing and transferring implicit information into explicit one.

Implicit memory is closely related to implicit learning which is defined as “learning complex information without complete verifiable knowledge of what is learned” (Seger, 1994). In other words, learners acquire knowledge, e.g. by reading, or they learn a sequence of steps to perform a task, but most of them are unable to report the principles underlying their performance. Hence, there is a need for cognitive tools supporting explicit learning.

The standalone application “workbook” of the learning environment ActiveMath tries to go beyond pure collection of work and acquisition of knowledge. It aims at supporting explicit learning by providing interaction, construction and reflection opportunities. We show how this is realized currently: the learner can interactively assemble his own learning material, reflect on his learning process and learning results in a (adaptively) structured environment and he can recall knowledge in a situation-related way. When “workbook” is run together with ActiveMath, it can take advantage of the systems various functionalities such as knowledge base and learner model.

2. ActiveMath

ActiveMath (Melis et al., 2001) is a web-based, multi-lingual, user-adaptive, interactive learning system for mathematics. It employs technology for enhancing learning with scaffolding and instruction as well as with constructivist elements, among them cognitive tools such as an interactive concept mapper, a semantic lexicon and those described below.

ActiveMath bases on semantically OMDoc-encoded (Kohlhase 2000) learning objects that are annotated with pedagogical and other metadata. The system provides a modular and open architecture to use various components and external services such as a learner model, a knowledge base, a course generator and several
service systems. The course generator automatically assembles individual books according to learner's goals, preferences and knowledge.

Domain knowledge is represented by a collection of learning objects encoded in OMDoc. The metadata annotations define mathematical and educational properties of knowledge items and relate these to each other. This establishes ontologies of mathematical and educational knowledge. The domain knowledge contains concept and satellite items. Concept items (e.g. definition, theorem) are the main items of content ontology, whereas satellites (e.g. example, exercise) are additional content items grouped around the concepts. Each item is stored in ActiveMath's knowledge base and is accessible via a unique identifier.

3. Workbook

The “workbook” is ActiveMath’s first version of an ePortfolio which enables students to collect and reflect on their work. It includes two tools: learning log and assembly tool.

3.1. Learning log tool

A learning log provides a model for self-managed documentation of learning objectives and processes and supports the awareness and reflection of learning activities. ActiveMath’s learning log offers two types of log entries: one for reflecting on lectures and one for stating hypotheses. In the following, we discuss the pedagogical motivation for learning logs, introduce both types of log entries, and describe how to capture the semantics of learning logs.

Pedagogical motivation

Gallin and Ruf (1990) emphasize the importance of documentation and presentation of core ideas by the learner in his own words. They empirically validated paper learning logs with students in primary school as well as in secondary school (Gallin/Ruf 1993). Further pedagogy researchers (e.g. Mayr 1997) tested paper learning logs with students of different educational levels. Their results show that learning logs help to strengthen the learner's autonomy and support his meta-cognitive reasoning such as planning, reflecting, correcting, looking back, memorizing, and exploring different viewpoints in a situated way. This observation motivates electronic learning logs in any eLearning environment.

Reflecting on lectures

Reflection on lectures by creating own learning logs is a simple process of taking several reflection steps: on the content, on the process, and on meta-cognition. Table 1 lists the questions used in ActiveMath’s learning log. A picture of the learning log application is shown in figure 1.

Each learning log entry contains basic information such as label, date, and privacy. The label is the entry’s subject. Storing the date enables to review log entries chronologically and to retrieve log entries for a specific period. By setting the privacy option, the learner indicates whether his entry is accessible for the public.

Reflection on the content comprises recapitulation of learned content in the learner’s own words. He is encouraged to write a summary of the last lesson, to explicitly refer to learning objects he has understood as well to those he has not understood, and to formulate questions he might ask his tutor in order to fill a learning gap.
Reflection on the (production) process includes information on resources in general and persons in particular that were involved in the problem solving task. Storing this information creates links between content and problems on the one side and resources on the other side. In watching his learning logs the learner can deduce which resources are useful in which context, or which resources are most helpful.

Reflection on meta-cognition implies self-assessment (where you are now), checking and setting objectives (where you want to get to), action planning (how you will get there), and charting progress (how you are doing). The intention is to increase the learner’s awareness of his cognitive skills. To do so, the learner has to reflect about his difficulties and about his goals. He has to argue if he has achieved his goals. If not, he should try to identify the problems. Moreover, he is asked to refer to learning objects that are most helpful to understand the learning content. Finally, he can rate his performance which expresses satisfaction on learning progress.

In ActiveMath, the learner introduces a log entry in a dialogue window which contains a tabbed panel. Each panel represents one of the reflection fields described above. The introduced questions expect different types of answers, for example yes/no, text, or single/multiple selections of a given set. To answer these questions, we use a palette of diverse widgets such as text fields, text areas, list boxes, or check and radio buttons. Referring to learning objects is a simple drag and drop gesture: point the mouse cursor to the learning object’s title in the browser ActiveMath is currently running in and drag it to the learning log entry.

<table>
<thead>
<tr>
<th>General data:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label, privacy, date</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Questions related to content:</th>
</tr>
</thead>
<tbody>
<tr>
<td>What was the lesson about? Write a summary.</td>
</tr>
<tr>
<td>What did you (not) understand?</td>
</tr>
<tr>
<td>Formulate questions to issues you did not understand.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Questions related to the (production) process:</th>
</tr>
</thead>
<tbody>
<tr>
<td>What kind of tools or resources did you use for solving?</td>
</tr>
<tr>
<td>Who helped you?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Questions related to meta-cognition:</th>
</tr>
</thead>
<tbody>
<tr>
<td>What difficulties arose during problem solving?</td>
</tr>
<tr>
<td>Which learning objects were most helpful to you?</td>
</tr>
<tr>
<td>How would you rate your performance?</td>
</tr>
<tr>
<td>Did you achieve your goals? If not, why?</td>
</tr>
<tr>
<td>Who can help you?</td>
</tr>
</tbody>
</table>
Table 3: Learning log questions

Writing Hypothesis
A hypothesis is a proposed explanation for a phenomenon. A phenomenon can have several hypotheses and each can be annotated by different beliefs. Formulating hypotheses is a meta-cognitive strategy that supports the acquisition of reasoning and problem solving skills. Further, hypotheses are basic building blocks of argumentations, and thus, knowing how to formulate and justify hypotheses, improves argumentation skills which are in particular important in scientific disciplines.

ActiveMath’s learning log supports formulation of hypotheses and their justification with evidences which are, in this context, learning objects (see figure 1). The learner introduces a hypothesis in a dialogue window, where he first inputs the label of the hypothesis. Then, in the description field, he can elaborate on his line of argumentation. To justify a hypothesis, the learner can drag any learning object from ActiveMath’s learning environment to the dialogue. Finally, he can rate a hypothesis, i.e., he can state how much he believes the hypothesis is true.

Capturing semantics
Learning logs carry structure and semantics. Plain text input without structure is accessible to human mind, but not to machines. Thus, our learning log tool stores and processes information as partially machine-readable entities. This enables semantic evaluation and reuse of learning logs.

Learning logs’ structure can address different aspects of learning such as motivation, content, process, and meta-cognition. They depend on the target group and therefore differ in aspects, questions and ordering of questions. Our structure of learning logs is adopted from pedagogical experience for university students.

Learning log structure provides first information on semantics. That is, we know what the questions are about, but we do not understand the learners’ input. To capture even more semantics from input our learning log tool applies drag&drop interactions, single/multiple choice questions and template answers.
Drag & drop. In ActiveMath, learning objects are identified by unique identifiers. They are presented to the learner within a book or a lexicon. Each presented learning object displays the object’s title as a link that encapsulates the object’s identifier. This way, the identifier is accessible by various actions: clicking on the title of an object in a book opens the lexicon with a detailed description of the item; dragging the link out of the browser’s window and dropping it on learning log’s widgets stores the identifier and establishes an association. This way, drag & drop actions allow the user to refer to learning objects. Hence, the system “knows” what learning object the learner describes and what evidences he uses for justifying hypotheses.

Single/Multiple choice questions. Some questions provide a restricted set of answers. These are modeled either as single or as multiple choice questions. Single choice questions accept only one answer (e.g. “How would you rate your performance?”), multiple choice questions accept several answers (e.g. “What kind of tools and resources did you use for solving?”). Here, the system is able to “distinguish” between different answers.

Depending on the question, it can happen that none of the provided answers applies. Then the learner can input an additional answer, which will be stored and which will be available in further learning logs. For instance, he might have used a tool that has not been listed beforehand. Then he inputs the name of the tool. If he uses the tool more often the learning log offers the tool’s name as an answer in this question again.

Template answers. A combination of single choice questions and a user’s plain text input are template answers. Each template encodes a specific beginning of a sentence. Examples are: “I am confident that...”, “I doubt that...”, “I know that...” etc. On the one hand this approach supports the learner in articulation and on the other hand the learning log is able to “classify” answers.
**Views and Queries**

ActiveMath learning logs are stored in a database and can be retrieved at any time. Database queries profit from the learning logs’ structure and semantics, as this data is stored explicitly. That is, we can provide views or search for entries according to a specific criteria. Views are predefined queries to the database, while search statements are custom queries defined by the learner. Some interesting example queries are: the learner can ask the database for a list of all entries; for entries of a specific type; for entries of a specified period; for entries related to a specified learning object; for entries related to learning objects he does not understand; or for entries related to learning objects he did not understand in first place, but has learned meanwhile.

ActiveMath’s learning log lists the result of a query in a table ordered by date. The table ordering can be changed by clicking a table header. You can order by date, label, or privacy in respect of ascending or descending order. Clicking on a row opens a window, displays the complete entry, and allows for editing.

3.2. Assembly tool

**Pedagogical motivation**

Bredo (1993) points out that learners are never integrated into the constructive process of assembling learning objects. Instead, they are given learning material and a task that puts them in a passive role with respect to finding their own problems and developing their own expertise. Learners become “book smart and practically stupid”. This observation motivates the assembly tool.

The goals of an assembly tool are to support the learner’s meta-cognitive reasoning such as planning, reflecting, structuring and presentation as well as to help memorizing knowledge and to work with content actively.

**Interactive actions**

On the one hand, ActiveMath provides students with authored books or adaptively generated books by the course generator. On the other hand, ActiveMath offers a learner to manually create or edit his own book with the assembly tool and to upload it into ActiveMath. If the learner sets access rights for the public this book becomes publicly available to other students who are free to browse it, to work it through and to comment on it.

Currently, the assembly tool offers learners to newly assemble content (learning objects) in the sense of creating and ordering new chapters and sections as well as dragging learning objects from ActiveMath learning environment into the book the learner is currently assembling.

4. **Architecture**

The learning log as well as the assembly tool runs standalone. Both can be invoked either locally or as modules within the Java Web Start framework (jnlp) from ActiveMath’s learning environment. Data is stored locally, and since they are connected to ActiveMath’s services, data exchange is possible. Figure 1 illustrates ActiveMath’s architecture and embedding of jnlp-based applications. The knowledge base and the user model operate as services and can be accessed by secured XML-
RPC interfaces which restrict read and write actions to data. The session manager is the key control instance that manages all system properties and threads. It is connected to the knowledge base and user model services. It is in charge of assembling content according to the user’s model and of passing it to the presentation generator which in turn transforms the content into a web-presentable format. Finally, the web server presents the learning objects in a web browser to the user. Moreover, the web server watches user actions which are passed to and interpreted by the session manager again.

ActiveMath provides access to the learning log and assembly tool via a web link which upon activation triggers a request to ActiveMath’s servlets. The latter generates a jnlp file and includes the user’s id, name, language, as well as urls to ActiveMath’s host, to the user model and to the knowledge base services. Further, it contains the application’s arguments and resource path. The manager sends the created jnlp file back to the client browser which recognizes it as such and processes it, i.e., it downloads the application’s resources if not already present on the client side and starts it.

**Figure 7: ActiveMath architecture**

Communication between the learning log as well as the assembly tool and ActiveMath is two-folded: via drag&drop and via services. Drag&drop is a one-way communication. Links (w.r.t. unique identifiers) can be dragged from ActiveMath learning environment and dropped onto the learning log or assembly tool. Both tools exchange data with the knowledge base service upon request with respect to the unique identifier.

The learning log contains a backend for storing entries in a relational database. The database is organized in tables for the learning log structure and entries. Figure 3 illustrates briefly the database scheme. In particular, it highlights how learning log objects are linked. Log entries and hypotheses share a common structure that contains basic information. Identifiers of learning objects are stored as strings in the
“MbaseID” table. The tables “Understood”, “NotUnderstood”, “MostHelpful”, and “Evidence” link MBase identifiers to log entries as well as to hypotheses.

The MBase identifier does not say anything about the ActiveMath session or MBase service it has been used in. Instead, it is an information relative to any MBase instance. This enables the learner to maintain learning logs in different ActiveMath environments. For instance, the learner can work with several ActiveMath environments in parallel. Information on the learning object referred by the identifier will be accessed by the MBase service that belongs to the same environment as the learning log. Moreover, the learning log is still able to retrieve information related to any identifier if the user aborts a session and restarts it later on as well as if he changes to a different ActiveMath environment.

The assembly tool stores books in OMDoc format locally in a file. The assembly tool applies the same drag&drop mechanism as learning logs. That is, you drag an identifier and you store an identifier. You never store the information itself. The information is retrieved from an MBase service by need.

If an assembled book is intended to become publicly accessible, the assembly tool contacts ActiveMath via the shipped url and transmits the book in OMDoc format. The session manager integrates the book and creates a new link to the book on the main page and another link for writing public comments by other users.

5. Related work

Weblogs (bloggs) are text-based publishing systems that can be used among others for learning logs. There is a huge amount of weblog products and services (free and commercial). Usually, they offer a convenient web front-end for text input and a one-click upload to a web-server. They also offer privacy and collaboration facilities (e.g. comments). More complex systems, such as the learning environment Moodle (www.moodle.org), provide a journaling application that is tightly integrated into the environment. eHelp (Nückles et al. 2004) is a tutored system whose learning log structure bases on pedagogical research. It supports the writing of learning diaries through a modelling and scaffolding of the phases of planning, production, and revision.
Related systems that support argumentation and hypothesis formulation are BioWorld (Lajoie et al. 1995), Propa (Linton 1995) and Belvedere (Suthers et al., 1995). BioWorld provides cognitive tools for the acquisition of scientific reasoning skills in biology for high school students. In an argumentation environment the learner is engaged explicitly in justifying hypotheses with evidences. Propa provides an environment for training satellite tracking analysts in which learners explicitly link evidence to explanations (hypotheses) on an argument palette. Belvedere provides a graphical environment in which students construct diagrammatic representations of arguments in the areas of science and public policy. Their arguments are analysed for consistency, comprehensiveness and coherence and online advice is available to assist in argument completion and reconstruction.

6. Conclusion

This paper presents the “workbook”, the first ActiveMath version of an ePortfolio. It reviews the basis and benefits of the workbook’s integrated applications, learning log and assembly tool, and describes their models and architecture. Both tools strengthen the learner’s autonomy and support his meta-cognitive reasoning, in particular explicit learning and reflection in a situation-related way.

Further work will examine the integration of more reflection-supporting tools (e.g. notes), the enhancement of collaboration, and the interaction of the workbook with ActiveMath’s services. We will test the workbook tool and conduct an evaluation in our next lecture “Hands-on mathematics for computer scientists” which is scheduled for the period from October 2005 till February 2006.

7. References


Personal and Community Knowledge Management for New Enterprise KM paradigm

Session: PS2D
Type: Work in Progress

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concepts cartography, Human Resource, Knowledge Management, text-mining, semantic web, community e-portfolio, interoperability

Abstract
The aim of this paper is to explain how Knowledge Management techniques, especially data-mining and text-mining processes, can be helpful in e-portfolio systems, for e-portfolio users and reviewers. This paper will focus on a work in progress project, explaining the aims and benefits for e-portfolio community, the used scenarios, the status of the work already done and the expected achievements.

1. Introduction
Learning involves developing and capitalising knowledge, but beside these very personal issues, sharing and more generally explicating knowledge are crucial modalities of learning. If we keep this terminology, and from an enterprise point of view, Knowledge Management (KM) can be seen as a learning process, as the aim is to improve knowledge extraction, capitalising and retrieval within a company. Secondly, considering KM as an impersonal information system would lead to failure; it is a collective process and employees remain at the heart of the process. They develop and share their own knowledge and dedicate part of it to the enterprise. For both reasons, we think (e)Learning and KM are complementary domains and close enough to explore new paradigms. We will develop here an example of e-portfolio enriched with KM techniques.

Current e-portfolio platforms (OSPI [12], Elgg [2], etc.) make it possible to manage personal data such as personal profile, documents and publications using communication or collaborative tools (blog, wiki, personal web pages...) by having an access rights policy for various users types (viewer, reviewer, contributor..) or users communities (community of practice [15] or interest). E-portfolio systems integrate functionalities from other domain platforms like Web Publication, Database Management, and recently Social Networking (Flickr, Friendster, Orkut, etc.), Network Visualisation (general graph visualisation toolkit [6][3], many studies on small-world graph visualization [1][16], more specific area as eLearning environment [9]) etc. Any content management and personal or collaborative work-space tools are potentially of benefit. France Telecom Research & Development works on a research project dedicated to Knowledge Management in which one of the main issues is the generation of concepts cartography using text-mining and data-mining tools to automatically classify and visualise knowledge related to documents or users.
A concepts map will help e-portfolio users:

- To visualise their documents (and others') in a thematic manner,
- To find the best documents that fit their needs, in their own space of knowledge or other people documents,
- To facilitate the search of other users (e.g. experts of a field...) for their own training requirements or for working group construction, expertise and career management for both KM and e-HR approaches ([10]),
- To see their positioning inside a community of practice, of interest, a working group or an organisation,
- To share their work, their knowledge, their interests with other people (colleagues, friends, employers, teachers…) or communities (classroom, project team, community of interest, community of practice…) inside or outside the e-portfolio system,
- To fill forms (such as proficiency form) by suggesting keywords.

More technically, the KM processes automate meta-data generation, given associated knowledge referential (more or less technical dictionary or competency ontology). Each document is tagged with the concepts the most representative; users who declare documents can then be characterised by their documents concepts.

Our KM project is a work in progress, many of the text-mining, data mining, clustering and visualisation tools being already functional. We are integrating them in an open-source e-portfolio platform like Elgg and planning to experiment this inside pilots' projects.

2. **Scenarios**

Even if our work has a KM service in view, we propose here some basic use-case scenarios especially related to e-portfolio users. In the electronic sphere, sharing is one of the main interesting aspect for e-portfolio community. The scenarios described in this paper answer the "how to find the best person?" question.

2.1. **Contacts and peers searching:**

Tom who works on a project on network supervision seeks other users in the company having knowledge on this domain in order to require their assistance and to submit them his reflexions.

His documents set and his profile has already been analysed using the KM suite tools.

Tom opens his portfolio, and consults the knowledge graph automatically built (cf. figure1). He clicks on the concepts "DHCP" et "identification" and chooses to see only the people (not documents) corresponding. A new map is generated and shows the cartography of his peers and their own environment (concepts close to them, but it could be other peers and/or documents). He can thus consult their profiles and their public e-portfolio space (profile, documents, blogs…) and the tags declared by the user for cross-checking.
Having found the good interlocutor, he looks among the communication medium that this one declared public and which is most appropriate to him (telephone, chat, instant messaging, e-mail, voice over internet protocol...) and establish the communication.

The contacted peer can also check the "profile" of the requesting user (declared and built by KM system from the list of concepts) in order to answer as well as possible while being based on (supposed) knowledge of the applicant.

2.2. Building Project e-portfolio

The process as described above in the previous scenario could be used for the construction of a project e-portfolio.

The project leader integrates the documents related to the project (description, reports, experts profiles, etc.) and after analysis by the KM system he can seek within the company the matching profiles to the project concepts cartography. He can submit them a link to the project community space (which include the key-documents to the concepts map) to ask for their participation; the contacted people would have then quickly an idea of the "profile" of this project by its cartography and find information on the portfolios of the other participants to see if they're interested to participate or not.

This scenario could also be used in case of community portfolio by seeking participants according to the degree of "relationship" of their portfolio (friends, friends of a friend...).

2.3. Competencies evaluation, profile evaluation:

The same principle would allow peer competencies evaluation (assessment) of the applicant for human resources needs like training policy, recruiting proposal, career evolution, experts' management, etc.

We imagine here that the e-portfolio owner send a CV e-portfolio to a company:

- The user establishes his portfolio (profile) and associates documents to him. This portfolio is received by a member of the human resource staff (HR reviewer) which sends it to KM system for analysis and cartography according to the current skills and competencies cartography used in the company (the profile of the applicant does not affect in this case the cartography).
- Once analysed and the applicant's profile positioned, the HR reviewer chooses for the key concepts corresponding to a job position or a need for the company, the "experts" or "evaluators" for the candidate by seeking the corresponding peers (peer reviewers).

- Each one of these peer reviewers can consult the portfolio of the applicant, while concentrating on the elements corresponding to the concepts of which they are evaluators and subject and send back their reflexions and evaluations to the HR reviewer for recruitment or not.

- This candidate portfolio can also be stored in a dedicated portfolio space so that they do not deteriorate the concepts cartography but that their profile and their resources are referred there for later needs (task force management, new job position...).

In the first scenario, KM tools are used to produce a graphical knowledge view of e-portfolios; in the second one, KM tools help to build a community e-portfolio in (partly) automatically filling its profile fields; and the last scenario shows e-portfolio as a source of knowledge in an information retrieval task.

3. Methodology

In order to produce our knowledge maps with unsupervised learning techniques, we need a textual corpus from which words will be extracted and linked together if they lay frequently close in the documents (co-occurrences). For example, if "IP" and "DHCP" words are found quite frequently in the same paragraphs, they will be connected and considered as "close concepts". Concept is not the proper denomination of those common key words (protocol would be a concept and IP and DHCP instances of it), but are called so for better understanding in this paper.

The underlying process breaks up into 4 main parts:

- The analysis of corpus (documents set) by determining co-occurrence relations between words allowing defining clusters of words. Each of these clusters is then regarded as "concept". A graph is built, allowing establishing distance relations between each one of these concepts (a word or set of words can belong to several clusters).

- Then the process takes again the documents to associate them the corresponding concepts thus making it possible to link these documents in the concepts cartography (graph).

- It is possible also to associate these concepts to the users by analyzing their uses of the documents (creation, modification, consultation). Let's note it is easily possible in case of e-portfolio platforms by analysing users roles on the documents (Owner, Reviewer, Community Contributor); more generally, any web-based platform provides server logs (logs based on authenticated WebDav protocol for example allow to associate document usage to users).

- It is also possible to use this same process of analysis and mapping of concepts not only on the documents but also on elements of profiles, or usage of communication/collaboration tools (e-mail, forum, wiki, blog).

Erreur ! Des objets ne peuvent pas être créés à partir des codes de champs de mise en forme.

*Figure2: Graph presenting the KM process building a cartography of users/documents/concepts*
Remarks regarding access right management: It is necessary to take into account within such a framework the problems of information access right management. They are in general already managed by the e-portfolios platforms themselves. If we want our system to respect the information access rights defined by each owner of information (documents, profile parts, data produced by communication and collaboration tools...), a first level of privacy can be achieved if the data-mining system is seen as another reviewer user and if the owner made his/her information public or accessible to this reviewer.

4. **Architecture, standards, interoperability**

The demonstrator will use specific tools developed by France Telecom R&D labs for all the data-mining process and several open-source existing tools for e-Portfolio community:

- Elgg as e-portfolio platform (e-portfolio platform including weblogging and social networking [14])
- Prefuse for graph visualization integrated on Elgg platform ([8][13])
- eXist XML database ([5]).

To avoid licence conflicts between open-source tools (using GPL licence) and the tools provided by France Telecom, it is planned to use several standards and open specifications to build a simple interoperability framework for e-Portfolio data-mining processing:

- Using web-service protocols to allow weak "coupling" between the tools (Soap or XML-RPC)
- Using XML based data to ease reuse and interoperability of data (IMS LIP, included in IMS e-portfolio standards [11], and GraphML data)

This e-Portfolio data-mining service framework is then open to e-portfolio community; these allowing e-portfolio implementers to choose the data-mining tools which best fit their needs and easier implement it in their architecture. Such an architecture would be compliant with EPICC interoperability framework [4].

5. **Conclusion**

The project described in this paper shows the interest of using Knowledge Management data-mining process (data- and text-mining, unsupervised learning techniques) in conjunction with e-portfolio platforms. It opens the perspectives of using e-portfolio in a wider interest area (i.e. KM, e-HR etc.). A pilot process is needed to test viability of this proof of concept in a wider community of users.

This work also points out that it will be possible to use automatic and dynamic process in order to build a referential and search capabilities. This referential is simpler than an ontology and thus doesn’t need any experts to create/manage it. In the future, we may introduce more complex referentials, such as ontologies ([7] shows an example of an ontology driven e-portfolio template that would allow more flexible interoperability and re-use of e-portfolio contents) when Semantic Web and especially ontology automatic generation will be more mature.
At present, the created concepts maps show concepts and clusters of concepts but the clusters are not tagged in a human-readable manner. It would be interesting if users are able to annotate the clusters, to describe the concepts and to share them within their communities. That would make it possible to benefit from a collective enrichment, and thus reach an intermediate stage between basic referentials and experts-driven ontologies.

6. References


Abstract
ePortfolios can be used for a diverse range of purposes (formative, summative, presentational etc) and pedagogic requirements vary with each context. It is therefore important that the software is flexible and easy to customise if ePortfolios are to be embedded in a way that is meaningful for both learners and other stakeholders. This paper, draws on the experience of implementing and embedding a component-based ePortfolio (http://www.eportfolios.ac.uk) in a range of different institutions and subject areas. It has been used for a range of purposes including personal development planning (PDP), formative and summative assessment. It is also being used as part of the ‘EPICS’ regional project in the North East of England.

The ePortfolio (described in Cotterill et al., ePortfolios 2004) was initially developed at Newcastle University as part of a collaborative FDTL-4 project (http://www.eportfolios.ac.uk/FDTL4). The ePortfolio architecture has been designed to be highly adaptable and offers the opportunity for developers to create new components using Open Source software. These can draw on ‘built-in’ features to support content sharing, commenting, attaching objects (files etc), and integrated action planning. Administrators can also create structured tools, without the need for any programming skills, using simple Web forms. They can also select from a bank of ‘generic’ components including a learning diary, CV, log of meetings with tutors, learning outcomes / skills log and tools to support PDP. Different sets of components can be selected for specific courses and year-groups, outcomes/skill sets, nomenclature and ‘look-and feel’ can also be customised. Access can be controlled by the learner, but access policies can also be defined for each component if the ePortfolio is being used to support assessment. Interoperability features, developed as part of the ePortfolio Extension Toolkit (ePET) project (http://www.epet.ac.uk), gives further flexibility for integration with other systems.

In addition to the structure determined by the course/programme, learners can create their own folders in which they can add a range of objects (files, links, notes etc), structure their task lists, and keep unstructured blogs.
The ePortfolio has so far been adapted for a range of contexts; undergraduate students (Medicine, Bioscience & Dentistry), postgraduate research students, and CPD (contract research staff & vocational dental practitioners) across 6 institutions. These ePortfolios include a mixture of existing ‘generic’ components and new of context-specific components. Two were modelled on existing paper-based portfolios which have been applied in the ePortfolio framework. Evaluation findings are summarised and we present 6 cases of how the flexibility to adapt the ePortfolios has helped with the implementation of these systems, in a way to best serve specific pedagogic requirements. The ePortfolio can be used as a ‘generic’ PDP system, however, the adaptability of the system provides the opportunity to deeply embed PDP and other ePortfolio processes within the curriculum. This has the benefit of making them more meaningful to learners and other stakeholders.

We also discuss the non-technical challenges to ePortfolio implementation, including those related to ‘people processes’ (eg. training, motivation of learners etc.). Implementation will be a learning process and will involve difficult decisions (eg. whether assessment is necessary to motivate PDP in your context, and getting the right balance between support for subject-specific and transferable skills).

Embedding an ePortfolio requires a continuous process of evaluation and refinement of both technical and people processes - in order to ‘fine-tune’ the role of ePortfolio in the curriculum and wider teaching and learning strategies.

Here, we have proposed that ePortfolio software with high levels of flexibility give the benefit of being more able to match pedagogic and curricula requirements. Many ePortfolio solutions have some degree of flexibility, those developed in Open Source software are particularly adaptable to the local context. Of course, input from skilled technical staff need to be considered as part of the ‘total cost of ownership’ when considering solutions based on Open Source platforms. The potential benefits of flexible ePortfolios are however very high, particularly in organisations with diverse and changing requirements. They allow PDP and other ePortfolio processes to be better integrated with the pedagogic requirements of the curriculum.
A Pilot e-Portfolio for Postgraduate Medical Trainees. (Work in progress; paper and presentation)

Session: PS3C

Type: Abstract

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1. Aim

NHS Education for Scotland is currently piloting and evaluating an electronic portfolio for two groups of trainee doctors. The aim of the pilot is to determine the efficacy of an e-portfolio intended to facilitate a culture of life-long learning, incorporate and manage assessment procedures and aid both the revalidation process and patient care by promoting reflective practice.

2. Context

Whilst portfolios have been used successfully in medical training for a number of years, it is only in the last few that they have been implemented electronically in undergraduate medical education and they have not yet appeared in postgraduate medical education.

Modernising Medical Careers (MMC) is a UK-wide initiative which begins in August 2005. It involves a major reform of postgraduate medical education, delivering doctors attuned to the requirements of the service and the needs of the patient. The programme will do so through the creation of efficient, high-quality, independently assured training programmes and initiatives.

MMC will be launched in August with the introduction of two-year Foundation Programmes for all medical graduates. This programme will, for the first time, require doctors to demonstrate their abilities and competence against set standards. They will offer doctors the chance to gain insight into possible career options or to build a wider appreciation of medicine before embarking on specialist training. Most importantly, MMC will deliver a modern training scheme and career structure that will allow clinical professionals to support real patient choice.

NHS Education for Scotland (NES) is a special health board that exists to advance knowledge and to develop skills for the entire NHS workforce in Scotland - some 135,000 employees. Coinciding with the launch of MMC, NES is piloting an electronic portfolio that builds upon the assessment and reflective practice work successfully delivered by previous paper portfolios. The pilot e-portfolio is a NES and Scotland-wide initiative, though the core team is based in the South East (Edinburgh).

The University of Edinburgh’s medical undergraduates have benefited from a successful e-portfolio for several years and it was reasonable for their graduates to expect the service to continue to support their education. A pilot examining the efficacy of e-portfolios limited to South East Scotland/Edinburgh’s catchments area would suffer two problems: the sample would be biased as Edinburgh’s students would already largely use e-portfolios and students can migrate during their training.
The pilot was therefore decided to take in as many medical trainees as was logistically possible across Scotland. Scotland’s medical training has traditionally been arranged regionally according to the four medical schools: Edinburgh, Dundee, Glasgow and Aberdeen. This pilot’s population totals half of all Foundation One trainees (n=370) including 176 (100%) in the South East/Edinburgh, 15 (16%) in the East/Dundee, 44 (11%) in the West/Glasgow and 135 (100%) in the North/Aberdeen.

South East Scotland’s GPSTs (General Practice Specialist Training trainees) are providing a second distinct population (n=44), trialling an e-portfolio that is broadly similar, which uses more formative assessment tools and is only partially hospital based, with the rest in general practice.

Both groups’ e-portfolios will be centrally managed with support given to all users (trainee, postgraduate tutor, administrative and education supervisor).

3. Objectives

The pilot’s core objectives are:

- To evaluate the feasibility of using an enhanced electronic environment for trainee doctors’ portfolios
- To ensure that the e-portfolio has potential for transferability to other healthcare professions
- To support corporate objectives, such as promoting life-long learning, providing educational infrastructure, e-learning and improving patient care.

4. Advantages

The potential benefits to moving to an electronic format are considerable for both users and the NHS.

e-Portfolios can assist revalidation by checking, tracking, assessing, recording and identifying trainees’ progress. They provide an environment for potential creative development with e-learning initiatives and create opportunity for interdisciplinary and inter-professional collaboration.

Current paper portfolios are unwieldy and problematic over time – the electronic format overcomes these problems and creates numerous advantages:

Information will be quality assured, standardised and managed nationally on behalf of the learner and will enable:

- Audit/tracking of groups or individuals
- Easy identification of poor performance
- Immediate access to revalidation information
- Access to relevant information for educational supervisors
- Creation and consolidation of training opportunities, and links with other NHS initiatives
- Support for Foundation programmes’ objectives
- Personal element of recording educational history and CV production
- Link content with supervision, better supporting education

The e-portfolio will also be an advantageous innovation for remote and rural practitioners, providing them with an equitable and localised educational platform. It
will gather invaluable systematic data about the education, training and lifelong learning needs of remote and rural (as well as urban) staff. It will act as an enabling infrastructure supporting a number of current and future business areas, not least of which is e-learning.

Research and development will be underpinned by evidence gathered and analysed by the e-portfolio, ensuring that it is grounded in the most recent and objective data. Several research development aims (including, determining the educational needs of NHS staff; identifying valid and reliable methods of assessment; supporting and developing effective learning environments) will be considerably strengthened by the e-portfolio, as will effective needs assessment.

The e-portfolio would form a core part of the responsive and effective education and training infrastructure that the NHS requires to support the workforce and patient care. The products and research gained by the e-portfolio pilot could easily be extended and shared across the professions and beyond NHS Scotland.

The development of the e-portfolio will be iterative, with continual feedback informing each stage.

5. Evaluation

The first evaluation conducted on the pilot will be on the training that will coincide with its launch. The training itself will be across several mediums including publications, lectures and personal and online tutorials.

The formal evaluation of the e-portfolio will analyse the pilot in three segments of four months (the length of each Foundation placement). This evaluation will be multi-faceted, incorporating an evaluating usage statistics, the results of online surveys and qualitative methods such as focus groups and semi-structured interviews.

6. Conclusions

This pilot is limited to medical trainees – a small group within one profession of many delivering patient care across the NHS. The experience and evaluation of this pilot are however being actively considered by a far larger population. This will provide the basis for the establishment of a permanent e-Portfolio for medical trainees, create the opportunity to extend e-portfolio usage throughout a medic’s career and be shared with the other professions seeking to implement e-portfolios themselves (notably dentistry and allied health).

Health care professions are increasingly working on an inter-disciplinary basis. If an ultimate result of this pilot was the creation of interoperable e-portfolios across the NHS professions, the benefits to assessment, reflective practice and life-long learning would be considerable.
ePortfolios for Professional Development

Using an ePortfolio to change an appraisal culture to performance management.
Session: PS3D
Type: Work in Progress

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Abstract
This paper looks at an exploratory piece of work in which an ePortfolio has been used by staff as a tool to reflect on their progress against annual objectives. The staff used the ePortfolio to present their self-appraisal as a webfolio. The paper reports the reactions, issues and concerns of the staff, which the paper reflects, is typical of larger groups. It evaluates progress at four months. Views are mixed with only half the staff having continued to use it and the reasons for this are discussed.

Key words

1. Background

1.1. Appraisal Schemes in Higher Education Institutes in UK.

All Higher Education Institutions in the UK have well documented schemes for appraising staff and identifying training needs. Managers input considerable time and effort, completing forms, recording objectives, outputs and training needs. Central systems collate information and numerous courses are put on for groups and individuals and thousands of pounds are spent on training but does it make a difference?

This type of systems, as many others, works where annual appraisal is followed up by regular meetings, on going support, discussion about courses and outcomes on an individual basis. Nevertheless, in many intuitions these luxurious discussions often fall down the priorities. In some institutions, appraisal is an annual job that falls to a member of staff who only sits down once a year with the appraisee to discuss targets, progress and improvements. The problems with this type of formal appraisal system are well documented as bureaucratic or management controlled (Townley 1993), as aiming at voluntary compliance (Newton et al 1996) but the major one is that the manager owns it and little is gained by the individual who is subjected to a review on an annual basis. In fact many staff in Higher Education would side with a view that Management indulge in rhetoric about development but often do not put their espoused views into practice (Stiles et al 1997).

In contrast performance management is based round a continuous and forward-looking process in which managers work with their staff in order to facilitate personal and professional useful development. Research shows that performance appraisal can be highly effective in generating positive attitudes (Fletcher et al 1996), increasing motivation (Patterson et al 1998), raising commitment and as a result...
ePortfolios for Professional Development

enhancing the overall performance of the department or organisation (King et al 2002).

1.2. Appraisal at the University of Wolverhampton

All members of staff are appraised annually by their line manager using a common framework in which the appraisee carries out a self appraisal on the previous year. The manager comments on this and they agree objectives for the next year. They identify any development needs and discuss concerns, both parties must sign in agreement to the workload for the next year. Some managers hold a six month review but many only meet once a year and sometimes neither appraiser or appraisee reflects on the objectives! Being valued by an organisation/manager is critical to an individual’s motivation and success and regular reflection by the individual and an opportunity to share success and failure with a manger or colleague lies at the centre of performance management. The University is currently exploring ways to make the appraisal system more developmental. As reflection and sharing are two of the key aspects of the recently developed Pebble Pad (2005) ePortfolio it seemed an ideal opportunity to explore the potential of using Pebble Pad as a performance management tool.

1.3. ePortfolio opportunities

The system developed at the University of Wolverhampton by Pebble Learning (2005) has been designed to be generic – an institutional necessity with 10 schools, 200 subjects and a diverse student body of 22,000. The system provides 6 structured entry forms designed to accommodate the recording of a range of challenges, development needs, skills, experiences and reflections, typical of most professional development activities. Additionally staff can store a wide range of external file types in the ePortfolio system. Records and files stored in the system can be easily shared with others using user-defined permissions. This allows a member of staff to get immediate feedback. In addition the information built up in the ePortfolio can be aggregated into a WebFolios (personalised websites) to demonstrate the development growth and outcomes from their work. This can be used annually as a self-appraisal and shared with the line manager. Feedback can be stored as a permanent record.

The ePortfolio enables staff to plan, record and reflect upon all formal and informal forms of both personal and professional development. The advantages of motivating staff to use the tool regularly will also encourage them to use it with their students.

1.4. Aims of the Evaluation

1.5. The specific purpose of this pilot scheme was to

- develop templates within the ePortfolio to enable the University appraisal system to be conducted with members of staff within a single department.
- assess the benefits of using the tool to enhance the individuals professional and personal development within an appraisal context.
- explore and evaluate the experience of the staff.
- reflect on the appropriateness of the tool to enhance staff performance and development.
2. **The Scheme**

This section briefly sets out the stages of the scheme from introducing staff to the ePortfolio, through their submission of the self-appraisal, interviews with the staff about the experience at the time and a group session four months after the appraisal to examine their subsequent use and discuss the potential for the tool on an ongoing basis.

2.1. **Development of performance review templates and testing**

Pebble Learning worked closely with the line manager to develop templates for the objectives, the review, the proposals for the next year and development needs. These mirrored the University self-appraisal forms. One of the staff team who had been closely involved in the development and piloting of the ePortfolio produced a performance review webfolio trialling the forms. The manager had the opportunity to comment and feedback on this before the final templates were produced for the staff development session.

2.2. **Introduction to the ePortfolio for self-appraisal and professional development.**

An introductory session was arranged for the staff and the manager to familiarise themselves with the new system. Staff were asked to prepare for the session by reflecting on their objectives and completing the usual documentation but by bringing word documents of the content with them. Staff came to the session in various states of readiness and one or two were concerned about the benefits of the activity.

2.3. **Submission of staff self-appraisal.**

Eight senior staff were invited to take part in the development of a webfolio self-appraisal. Seven out of the eight shared their webfolio directly with the line manager ahead of their appraisal whilst one presented a summary table of objectives, progress and issues in a traditional paper form. The manager was able to provide feedback to the shared asset before the appraisal.

2.4. **Feedback from the participants**

Initial group feedback was collected during and after the first training day. Individual views were collected during the appraisal meeting and a few months later. Staff were asked about their initial perceptions of the task, the reality, the benefits, shortcomings and their motivation for continuing to use the portfolio. A group focus session was held four months after the initial training.

3. **Results**

An overall summary of the staff that participated in the ePortfolio pilot appraisal is provided in Table 3.1. The table shows that equal numbers of men and women took part, with a range of good computer competences. All but one member of staff submitted their appraisal as a webfolio and all staff would have done so except for a problem uploading a table into the ePortfolio. The level of creativity in the final product was a direct reflection of familiarity with the tool and not prior technical competence.
Table 3.1 Summary of the gender, technical competency, motivation and use of the ePortfolio by staff.

Four months after the appraisal staff use is directly related to their prior experience with the ePortfolio, reflecting the need for readily available and frequent support through the early introduction of new technology for any application. Staff comfortable with the use of the ePortfolio have uploaded their new objectives and are reflecting on activities and sessions that they run and attend, two have shared outcomes with the manager.
3.1. Staff views

Advantages
All staff found the ePortfolio attractive and easy to use. They liked the potential for collaborative sharing and learning and for getting quick feedback from the manager. It was agreed that it was useful to keep everything together and it allowed a CV to be kept up to date. From a management point of view the webfolio provided a range of detail that could be interrogated as much as time and interest allowed. Professional development sessions could be reflected on and lessons learnt noted for current or future discussions with colleagues.

Disadvantages
The training and pilot revealed the extent to which individual take up is time dependent and there is clearly a significant commitment needed by staff to up-skill. There was a lot of guidance at the first session but further sessions could have given a higher level of competence. There was early concern that staff had received no notification when the manager had submitted feedback prior to the appraisal meeting. This was rectified for appraisals later in the cycle.

3.2. Staff views on implementation
Staff could see the advantages of using an eportfolio to record and reflect on their personal and professional development as well as sharing this with colleagues. Sharing progress and development with the line manager was also considered useful. Most concern was about the management decision to ask staff to produce the webfolio for their self-appraisal. Staff had felt that the time scale was short and that it would have been more useful to input the objectives for the year into the ePortfolio as a starting point and to develop the use through the year. Some staff felt it had been a major challenge to produce a webfolio in the short time period. There were strong feelings that it should not be imposed but that staff should be left to chose how they could use the ePortfolio.

4. Discussion
Using the ePortfolio for staff appraisal has identified a potential benefit for staff to reflect and plan their own development. All staff commented on the benefits of being able to keep ongoing and updated records of activity, plans and outcomes. They also liked the share facility. Starting from the next years objectives all expressed an interest in continuing to use the e-portfolio, however only three out of the eight staff have currently continued to use it. Time is the main reason provided for lack of use within a group that are very positive about the product. In this short evaluation it has not been possible to full determine the potential for the tool. Using such a system regularly and sharing the outcomes with management should allow a greater level of performance management into a previously formal appraisal structure.

5. Conclusions
- Templates have been developed to enable the University appraisal system to be conducted via the ePortfolio. Using the system allows progress and outcomes to be shared and discussed on an ongoing basis through the year.
The tool has the potential to enhance the individuals’ professional and personal development by providing regular opportunities to share outcomes and thoughts with colleagues and line management.

Staff involved in the pilot found the tool easy to use but felt that three months was too short a timescale to evaluate the experience.

A full assessment of the benefits can only be derived over a full year’s application through the development and delivery of objectives and regular feedback.

6. References


Pebble Learning (2005): http://www.pebblelearning.co.uk


ePortfolios for Professional Development

Portfolio as a tool for academic education and professional development: problems and challenges

Session: PS3D

Type: Full Research paper

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Abstract

This paper provides an overview of problems and challenges at Utrecht University, related to the implementation of an electronic portfolio as an instrument of students’ academic and professional development. Firstly the concept of portfolio in higher education is introduced. After covering the research method and the results of an empirical study, the results of a literature study of problems in the use of (electronic) portfolios in higher education are described. At last the results of the research will be related to the outcomes of the literature study.

Key words
portfolio, academic development, problems, research, implementation

1. Introduction

1.1. Portfolio in higher education

About two decades ago portfolios appeared on the scene in higher education. Ever since different definitions of a portfolio have been presented. These differences reflect probably the authors’ paradigm of teaching and learning. Whereas some definitions exclude assessment, others include it as an important function of portfolios (cf. Barrett 2005). Some authors estimate on collaborative analysis and define a portfolio as a “flexible, evidence-based tool that engages students in a process of continuous reflection and collaborative analysis of learning. (…) the portfolio captures the scope, richness, and relevance of students' learning. The portfolio focuses on purposefully and collaboratively selected reflections and evidence for both improvement and assessment of students’ learning" (Zubizaretta 2004). While other authors (like Van Tartwijk et al 2004) avoid a “definition discourse” and focus on the different purposes of an electronic portfolio, resulting in various types of portfolios:

Assessment portfolios

When a portfolio is used for assessment purposes only, portfolios are usually organised around items such as the students’ own products, evaluations, photographs and video-recordings. To guarantee that the students provide assessors with all the necessary information, sometimes a list may be supplied containing items required for inclusion in the portfolio. Students use the portfolio to prove their competence. To be convincing they must include information such as their coaches’ evaluations or certain key products.

Showcase portfolios

Where students are free to determine the content of their portfolios, they most often tend to display examples of their best work or evaluations of that work. These are
usually referred to as showcase portfolios and resemble those compiled by artists and architects. Students may use showcase portfolios for a number of purposes, such as introducing themselves to potential employers.

**Development portfolios**

A portfolio may also be designed as an instrument to keep track of and plan a student’s development. In such a case it is referred to as a development portfolio. The point of departure here could be a summary of what the student should master in order to obtain a degree. The student can then use the portfolio to note work done on competences or roles, the results of such work, and the planned nature and direction of further development. Obviously the use of development portfolios only makes sense where there is room for individual development. If all students take the same courses, try to achieve the same goals and are tested in the same way, more efficient systems than a development portfolio are available for tracking and planning the development of students.

**Reflective portfolios**

When portfolios are used for the purposes of monitoring student development, it is important to know how students themselves evaluate and analyse it. Therefore it is crucial that portfolios used in this way contain written reflections by the students. These reflections are usually organised around the competences the student should master. Students are asked to reflect on how their accomplishments relate to their goals.

**Combinations**

Portfolios are usually used for a number of different purposes and in that case possess characteristics of each of the typical portfolios described above.

Although (electronic) portfolios have been used in higher education for several years, there are still problems occurring in daily practice.

### 1.2. Context

In 2002 Utrecht University decided to implement a digital portfolio system. The university aimed to provide flexible, demand driven education. Within the set requirements of cohesion and standards, students should have considerable freedom to put together their own study programmes, transcending disciplinary boundaries if they wish. Utrecht University also attaches great importance to its students’ academic development. In line with various university educational traditions (i.e. teaching to think, investigate and put into practice), students are required during their studies to develop in intellectual, academic and professional regard, attaining the level required of a bachelors or masters degree.

Students do not acquire the requisite intellectual, academic and professional expertise according to fixed patterns. We know that interdisciplinary education stimulates intellectual development, single-discipline education the development of knowledge and understanding of a particular subject area, and dual education professional development. We also know that under certain conditions students are able to learn a great deal through active forms of work, authentic experiences and social interaction, that development is a Know-Can-Do process, that expertise does not come from studying a subject and having a shot at it in practice but rather from a rationally planned curriculum, and that a curriculum can only be effective if the
institution in question and the climate of the study programme are in tune with it. Moreover, students do not develop purely within the context of their studies but also outside them (i.e. informal learning) and therefore have their own learning aims.

Against this background Utrecht University decided to implement a digital portfolio system designed to perform three functions in any particular curriculum. The first function deals with testing students’ intellectual, academic and professional development. At the end of a bachelors degree programme, students’ portfolios should contain the kind of material demonstrating that during their studies they have evolved into an intellectual and a professional worthy of the designation ‘academic’. The second function is designed to monitor students’ intellectual and academic development. Portfolios should include the possibility of critically tracking students’ academic development during their studies and, where necessary, tweaking it in good time. Finally, the third function is designed to stimulate students’ intellectual and academic development. Their portfolios should be integrated into their studies and used in such a way that they are coaxed into reflecting on their own academic development, at the same time enabling teachers, supervisors and fellow students to give them individual, effective feedback on their development. The fact that Utrecht University decided on digital rather than paper portfolios was primarily due to the logistic and practical advantages involved.

By now practically all degree course programmes at Utrecht University have worked with digital portfolios. The reports vary: there is some enthusiasm but this is certainly not unqualified. Educational advisers at the IVLOS Institute of Education, also involved in the implementation of electronic portfolios, have analysed the situation to gain a clearer view of the extent of the problems and challenges at issue.

1.3. Objectives

An exploratory enquiry sought answers to two principal questions:

- What problems involving Utrecht University’s portfolios need to be addressed?
- How are these problems related to difficulties and constraints associated with the use of portfolios in higher education described in literature?

Not only did the researchers try to gain an idea of the problems encountered during spring 2005, they also attempted to place them in a policy perspective by defining their extent and gravity.

After covering the research method (section 2) and the results of an empirical study (section 3), the results of a literature study of problems in the use of (electronic) portfolios in higher education are described. Finally the empirical results are related to the outcomes of the literature study (section 5).

2. Method

This study aims at a comparison of the results of an empirical study with the results of a literature study.

2.1. Empirical study

In an exploratory enquiry problems related to the implementation of the electronic portfolio at Utrecht University were investigated. For this purpose a bottom up procedure was used. The researchers drew up a questionnaire for the enquiry,
simply entitled *Inventory of Portfolio Problems* (‘IPP’), which itemized fourteen problem areas affecting the university’s digital portfolios and their use. For each problem (or cluster of problems) respondents were able to indicate the degree of their recognition of it by ticking one of three words: ‘fully’, ‘partly’ or ‘not’. They could also indicate that they had no experience of it, or that it was not applicable to the programme(s) about which they were being surveyed.

The list was based on experiences of IVLOS educational advisers who are and were involved with the implementation and fine-tuning of digital portfolios across a wide range of degree course programmes. Informal discussions were also held with representatives of various study programmes who were in a position to speak with authority about the portfolio situation in their own environments. Problems that these sources presented as connected issues have been included as clusters of problems in the questionnaire.

Through a member check the problems were then submitted to about 25 degree course programmes in the form of separate statements. This included a written discussion placing the problem clusters in an educational context and listing a number of recommendations. In addition to the answers indicated above, the questionnaire allowed respondents to explain every one of their answers, which they did extensively. The questionnaire concluded with two open questions. The first was a request to add any problems that did not appear on the list and the second was an appeal for additions and improvements to the suggested recommendations.

From the answers of the respondents (policy assistants, portfolio coordinators, study programme directors) data was thus assembled about the following programmes:

- Combined arts and letters programmes
- Liberal Arts & Sciences
- Pharmacy (masters phase)
- Information management
- Physics
- Geo-sciences
- Psychology
- Administrative and policy studies
- Physiotherapy studies
- Medicine
- Medical internships
- Nursing studies

In analysing the data the researchers concentrated on the frequency of the problems that occurred. Their paper lists the results in order of frequency, i.e. most frequently recognised problems (at least in part) appearing first. Although it must be noted that the number of respondents was too small to permit statistical assessment, they also looked at possible differences between academic fields. For this paper these differences are not relevant and therefore not mentioned. Accompanying the results are respondents’ written explanations to their scores, intended as qualitative data.

### 2.2. Literature study

Two databases were used for searching relevant information about problems in using (electronic) portfolios in higher education:
ePortfolios for Professional Development

- Educational Resources Information Centre (ERIC)
- Omega database Utrecht University. This database contains about ten million articles, published in scientific magazines (e.g. Assessment in education, Education for Information and Innovative Higher Education).

The following search preferences were used in both databases:

- Portfolio in Title
- challeng* or obstacle* or constrain* or problem* in Abstract

Furthermore, in the ERIC-database ‘Higher-Education’ was used as a descriptor. In the Omega-database the discipline “social sciences” was used to make a selection. In addition, the Omega search concerned the period 1998-2005.

Seventy articles on portfolio problems were collected and examined by abstract analysis. If an article focused on only one problem, like rater reliability (Van der Schaaf et al 2005) or detailed time-consuming technical problems (Pecheone et al 2005), it was put aside. In the end ten articles were selected for the comparison (cf. Table 5.1). Some of these also comprise conditions for success with portfolios. Since problems are the opposite of conditions for success, the success conditions have been translated into obstacles and challenges.

3. Results empirical study

Firstly the recognised problems are described briefly and presented in order of frequency. Secondly, the problems are weighted.

3.1. Problems in order of frequency

Respondents recognised – at least in part – an average of six out of fourteen clusters of problems presented to them, ranging from two problems to twelve. Half of the respondents recognised four to six problems.

Table 3.1: problems in order of frequency

<table>
<thead>
<tr>
<th>Problem area</th>
<th>Total</th>
<th>Complete*</th>
<th>Partly**</th>
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<td>1. Criteria for assessment</td>
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<td>11. Technical aspects</td>
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ePortfolios for Professional Development

12. Ownership and demands faculty  3  3  -
13. Rater reliability  3  3  -
14. Value academic development  2  0  2

* Complete = number of respondents which recognise a problem completely
** Partly = number of respondents which recognise a problem partly

The researchers defined a problem as a common problem if at least five respondents have recognised it partly.

Criteria for assessment

The first and most recognised problem is the lack of clear and transparent criteria for assessing portfolios. In the research this problem was defined as follows:

Tutors do not have transparent and clear criteria for assessing a portfolio. Not having a certain standard, they find it difficult to assess very different portfolios. Tutors want standardisation. This might contradict the principle of a student being the owner of his or her portfolio (and subsequently the autonomous constructor and designer of this portfolio – see ‘Ownership and demands faculty’).

Seven respondents recognise this problem (about 60%), six completely and one partly. Three respondents do not recognise the problem (25%). Two respondents withhold a judgement.

Stimulating reflection

The second problem is stimulating reflection. In the research this problem was defined as follows:

In some programs the portfolio is (a. o.) a reflection tool. Tutors have difficulty in facilitating reflection. It is not a self-evident part of their image of teaching; as little as it is a self-evident part of their students’ image of learning. Students look at reflection as something difficult and complex and see no point in doing it.

Seven respondents recognise this problem (about 60%), five completely, two partly. Two respondents do not recognise the problem (15%). Three respondents withhold a judgement.

Tutoring development

The third problem has to do with tutoring academic development. In the research this problem was defined as follows:

The portfolio is used to provide insight in the development of students’ competences. At the same time there is not much tutoring available (or even absent). Furthermore, tutors are not enough equipped to guide students in a proper way.

Seven respondents recognise this problem (about 60%), three completely, four partly. Four respondents do not recognise the problem (about 35%). One respondent withholds a judgement.
Providing credits
The fourth problem concerns the provision of credits. In the research this problem was defined as follows:

*Constructing and keeping a portfolio is compulsory. Students do not always receive credits for it, although credits are very important for bachelor students at a university. Constructing and keeping a portfolio, without getting credits for it, hinders the adoption of the portfolio.*

Six respondents recognise this problem (50%). Three respondents do not recognise the problem (25%). The other three respondents withhold a judgement (25%).

Status in program
The fifth problem is related to the status of the portfolio in the program. In the research this problem was defined as follows:

*Students and tutors do not have the impression that the portfolio is taken seriously as an instrument for education.*

Six respondents recognise this problem (50%). Five respondents do not recognise the problem (about 40%). One respondent withholds a judgement.

Embedded in curriculum
The sixth problem concerns the way the portfolio is embedded in the curriculum of the program. In the research this problem was defined as follows:

*In fact, the portfolio is no part of the curriculum. It is a foreign body within the curriculum.*

Six respondents recognise this problem at least partly (50%). The other respondents do not recognise the problem (50%).

Change Management
Problem seven concerns change management that is needed to implement and use a portfolio. In the research this problem was defined as follows:

*The educational management related to the implementation of the portfolio has been insufficient; for example, there are difficulties in developing, tutoring and assessing the portfolio (in terms of credits, tutoring time, double rating or assessment appeal). Furthermore, the quality of supervision by the tutor is not monitored adequately, no more than the quality of the portfolio construction and maintenance by the student.*

Six respondents recognise this problem at least partly (50%). Four respondents do not recognise the problem (about 35%). Two respondents withhold a judgement (about 15%).

Development and skills
The eighth problem has to do with the reduction of academic development to academic skills. In the research this problem was defined as follows:

*Academic development is reduced to academic skills with a strong emphasis on communication skills (writing and speaking). There is not much attention for*
development aims. The focus is on teaching aims, especially teaching aims that point at general professional competences.

Six respondents recognise this problem at least partly (50%). The other respondents do not recognise the problem (50%).

Facilitating skills development

The ninth problem concerns the way skills development is facilitated. In the research this problem was defined as follows:

Well-developed skills curricula are lacking. While detailed skills lists have been used (like the famous Osiris*-table, which was unrightfully regarded as standard for finishing levels), students are in want of facilities to practice skills. Furthermore, passing a module implies the acquisition of knowledge and skills, assessed separately or otherwise, at the risk of not having developed the skills sufficiently. Besides, since the assessment is registered in Osiris*, the portfolio does not have added value.

* Osiris is the study registration system of Utrecht University.

Five respondents recognise this problem at least partly (about 40%). Six respondents do not recognise the problem (50%). One respondent judges the problem as not applicable for her program (medical internships).

Value of adding assessed products

The tenth problem is the value of adding products, which are already assessed to the portfolio. In the research this problem was defined as follows:

It has been made obligatory to insert certain already assessed student products in the portfolio (e.g. reports). There is no added value in doing this.

Four respondents recognise this problem (about 35%). The other eight respondents do not recognise the problem (about 65%).

Technical aspects

The eleventh problem concerns technical aspects of the electronic portfolio. In the research this problem was defined as follows:

Though strongly improved in the mean time, the electronic portfolio still does not work faultless (accessibility portal, authorization of students to publish their portfolio).

Four respondents recognise this problem (about 35%). Five respondents do not recognise the problem (about 40%). The other three respondents withhold a judgement (25%).

Ownership and demands faculty

The twelfth problem is the relationship between ownership and the demands, formulated by the faculty. In the research this problem was defined as follows:

On the one hand the portfolio has been passed into the ownership of the student, on the other hand the faculty makes strict demands upon the structure and content of the portfolio. Both principles are at daggers drawn.
Three respondents recognise this problem (25%). The other nine respondents do not recognise the problem (75%).

**Rater reliability**

The thirteen's problem is the reliability of the portfolio assessment. In the research this problem was defined as follows:

*Only one assessor assesses the portfolio. With that the reliability of portfolio assessment incur risks.*

Three respondents recognise this problem (25%). Seven respondents do not recognise the problem (about 60%). The other two respondents withhold a judgement (about 15%).

**Value academic development**

The fourteenth and therefore least recognised problem is the value and need of academic development. In the research this problem was defined as follows:

*In daily practice of higher education the value and need of explicit attention for academic development is often not acknowledged sufficiently (by tutors and students). Furthermore, tutors do experience the increased freedom to choose as quality loss (less compulsory content-related modules). This indirectly effects the portfolio negatively.*

Two respondents recognise this problem (about 15%). Eight respondents do not recognise the problem (about 65%). The other two respondents withhold a judgement (about 15%).

**3.2. Extent and gravity**

Section 3.1 provides an overview of the problems in order of frequency (table 3.1). This overview makes clear that most of the respondents recognise the lack of clear and transparent criteria for assessing portfolios as a problem. The value and need of explicit attention for academic development is least recognised as a problem.

Nevertheless, for a thorough understanding of the results, problems’ frequency is not sufficient. The above-mentioned problems do not have the same impact on portfolio acceptance. Therefore it is suggested to grade the problems. In distinguishing problems, the researchers graded them as follows:

- **Grade 1:** Problems of substance
- **Grade 2:** Professional problems
- **Grade 3:** Practical problems

A problem of substance is a grade one problem because it affects the elected educational concept itself, i.e. it implicitly or explicitly involves a debate about academic education and portfolio use. A professional problem is classified in another, lower grade than one of substance because not the underlying idea is at issue but rather the competences (and their application) of students, teachers and educational managers. A practical problem is one that can be regarded as being of the lowest grade, not because the solution to it is simple but because it involves tools or the organisation. Seen thus, the problems appear in a different perspective.
Table 3.2 provides an overview of the problems in order of their weight. Within every group the order is determined by frequency.

Table 3.2: problems in order of weight
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<th>Partly**</th>
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<tr>
<td>Ownership and demands faculty</td>
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<td>3</td>
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</tbody>
</table>

* Complete = number of respondents which recognise a problem completely
** Partly = number of respondents which recognise a problem partly

The new classification—if accepted—provides a new perspective on the collection of problems. This classification clarifies that the most recognised problem (lack of clear and transparent criteria for assessing portfolios) is in fact a practical problem, while the least recognised problem (value and need of explicit attention for academic development), is a substantial one. This is a positive outcome.

Less positive is the outcome that—according to the respondents—eleven of twelve programs faced one or more substantial problems. Each program is dealing with one or more professional problems. And nine of the twelve involved programs have to deal with one or more practical problems.
4. **Results literature study**

Ten articles were selected to lay the foundation for a comparison with the empirical results described above. Firstly general problems are described (4.1); secondly, the attention is focused on the ‘electronic’ perspective (4.2).

4.1. **General problems**

Based on Woodward (1998) the following problems can be distinguished:

- Whether or not to give a grade for portfolios. This could change both the content and the purpose of the reflection.
- Recognition of ownership of the process.
- Continuity throughout the process (working on a portfolio during a three years program).
- Conflict between beliefs and reality and organisation of actual assessments.
- The need that teachers understand the value of a portfolio.

Anderson and Bachor (1998) provide a summary of concerns in the educational measurement literature about portfolio use:

- Standardisation of portfolio contents.
- Level of agreement between judges.
- Stability of estimates of student achievement
- Rigour of standards used in evaluating the contents of portfolios.
- Costs and feasibility of portfolio use.

Based on a literature study Wright et al (1999) see the following problems with learning portfolios:

- Lack of good research evidence about their impact and costs.
- Confusion about purpose.
- Uncertainty about best practice – what to include, how often to review portfolios, relationship with other forms of assessment, who assesses portfolios, etc.
- Insufficient teacher planning and preparation.
- Reliability – insufficient evidence presented to be reliable (summative portfolios).
- Reliability – lack of articulation of standards to be applied (summative portfolios).
- Reliability – inter-rater consistency (summative portfolios).
- Program portfolios seen as marginal by students.
- Intellectually demanding (for students [and faculty]).
- Student indifference and resistance.
- Possible lack of skills by students in compiling a portfolio.
- Portfolio development not seriously taken by faculty and/or lack the time to do so.
- Direct financial costs (faculty training, program redesign, materials).
- Lack of institutional commitment and support.
- Incompatible with higher education systems facing intensification and overload.
- Special issues with electronic portfolios.
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- Not used by employers and universities selecting students for postgraduate study.

They also formulate conditions for success. Transformed into difficulties and problems, the next overview can be created:

- Poor connection with the goals and structures of a course or program, and with the used pedagogy. Students do not know clearly what the 'rules of the game' are; they do not see how portfolios are integrated to their undergraduate experience.
- Small value because portfolios “appear as an afterthought to the 'real' business of mastering knowledge”.
- Little advice or guidance for students in constructing portfolios.
- Extra workload in a busy academic schedule.
- No proportion between academic credit and the effort in creating the portfolio.
- Prospective employers are not interested student portfolios.

Fournie and Van Niekerk (1999) evaluated the use of portfolio assessment for a module in Research Information Skills offered at the University of South Africa (Unisa), and they conclude that it was found very valuable. Although they mention several general problems, experienced by students and lecturers (e.g. based on literature study):

- Some of the activities not clearly explained to students.
- Students’ need for a workshop organised earlier in the year to support the completion of the portfolio activities.
- Increased workload for lecturers if the study material and portfolio activities are not clearly and unambiguously written.
- Not providing comments and/or continuous feedback on students' strengths and growth.
- Not providing enough lecturer direction.
- Possible controversies in grading.
- Possible misunderstanding that a portfolio and portfolio assessment fits all purposes.
- No absolute reliability of portfolio assessment. Portfolios may lead to controversy over issues such as the reliability and validity of the data collected as well as the standardisation of portfolio content.

In his research Klenovski (2000) found that lecturers and pre-service teachers identified “numerous difficulties and constraints associated with the use of portfolios for assessment purposes in a teacher education context”. According to Klenovski many of these problems were related to the assessment procedures and the grading system:

- Lack of opportunity for lecturers to meet often to improve their understanding and adopt a more consistent approach to the grading of portfolios. Lack of time to meet with colleagues and learn from each other.
- Insufficient clear framework and specified guidelines, so especially pre-service teachers would understand what was required of them. These guidelines include learning outcomes and suggestions of evidence suitable to address these outcomes, criteria to be used in the assessment of the portfolio, grade descriptors and exemplars that illustrate standards.
Zeichner and Wray (2001) see the following problems in the use of portfolios in teacher education:

- Frequent conflict in purposes among teacher educators and their students. While students focus on the "showcase" aspects of portfolios to present a favourable image to prospective employers, teachers use the portfolio for professional development and/or assessment.
- Ownership of the portfolio. "Leaving the construction of portfolios mainly to students has sometimes caused problems in both assessment and professional development (e.g., superficial reflection about teaching, limited evidence on which to base an assessment of teaching), but too tightly prescribing what goes into the portfolios has sometimes caused negative reactions by student teachers who, lacking ownership of their portfolios, are more likely to see them as something that diverts their attention away from their teaching and their students."
- Deficit perspectives about low-income students or colour brought in by teacher education students to their education programs. This prevents them from successfully teaching these students. This issue can be also a constraint for the development of a portfolio (especially reflection). Some amount of structure provided by teacher educators in teaching portfolios and other vehicles for promoting reflection are needed to confront student teachers with some of the difficult issues that have to do with race, social class and inequality. Providing this structure conflicts with the ownership. Furthermore, it implies the possibility "to go too far in this direction which raises the issue of indoctrination".
- Difficulty to stimulate students to work on their portfolios over time (e.g., a course, a field experience) rather than producing it just before the exam. A portfolio is the result of a long process, not a product that has been developed in a short period.
- Not much evidence on the nature and quality of reflections that emerges under different conditions of portfolio use.

Van Tartwijk et al (2004) formulate three conditions for success in implementing (electronic) portfolios. These conditions imply the following problems:

- No match with the goals of the curriculum.
- Insufficient managerial support of the educational change which using portfolios implies. There are no authentic learning situations used, there is no opportunity for individual development, there are no investments in coaching and alternative assessment.
- No added value of working with portfolio in the perspective of teachers and students. They are not willing to invest the relatively large amount of time and energy in working with portfolios.

Driessen et al (in press) have researched the conditions for successful reflective portfolio use in undergraduate medical education. Based on their findings it can be concluded that obstacles for successful reflection through portfolios are:

- No adequate coaching available to stimulate reflection, to motivate students and to help them formulate learning needs and learning plans.
ePortfolios for Professional Development

- No suitable structure and guidelines for students. Driessen et al (in press) conclude: “Although weaker students needed structure and guidelines, too much structure may become an obstacle for students with good reflective skills. These students should have more freedom in compiling their portfolios.”
- No opportunity for students to have a sufficient variety and quantity of interesting experiences as subjects for reflection.
- Reflection not seriously taken by students and teachers if there is no summative assessment.

4.2. ‘E’-problems

In four sources problems on ICT aspects (‘e’-problems) were found. Fournie and Van Niekerk (1999) mention technological problems that impede completing some of the activities of students and lecturers. According to Van Tartwijk et al (2004) an inappropriate IT-infrastructure can become an excuse to postpone or avoid investing in working with portfolios.

Two authors focus on the ‘E’-problems of portfolios.

DiBiase (2002) describes the following potential costs, obstacles and challenges:

- Time consuming to create, maintain, and evaluate ePortfolios (especially when ICT-skills of students and teachers need some improvement).
- Difficulty of evaluating ePortfolios in a reliable way. DiBiase quotes Lin and Gronlund (2000) who conclude that in respect with a reliable evaluation sufficient planning, specification of portfolio guidelines, refinement of scoring procedures, and rater training are needed. (By the way: this is also applicable for portfolios in general).
- Unequal access to technology and skills by students and teachers.
- Cyber-plagiarism. The availability of students’ assignments in ePortfolios will increase the number of sources of on-line material from which students may be tempted to copy illicitly.
- Privacy. There is a risk that personal information will be improperly revealed, when this information is available online. Even in a secured environment there is the risk of hacking.
- Free speech. The question is if students are allowed to express controversial viewpoints in a portfolio.

Acker (2005) describes three obstacles to institutional uptake of ePortfolio:

- Lack of easy ways to protect the intellectual property rights of students. If someone has access to an ePortfolio, he or she can download and misappropriate the work of a student. Maintaining ownership of the original work cannot be accomplished in a technical way, only through social norms and policy expectations.
- Time consuming to provide explicit feedback on an ePortfolio of students and grading these portfolios. Furthermore if teachers have to learn new skills to use ePortfolio, this leads to an increased workload.
- Inverted value of the work and commitment of students as they move from freshman status toward graduation. “Most students are outcome, rather than process, oriented. They want to graduate, rather than track their academic growth between early and late educational experiences. (...) As important as final outcomes are, students’ insights into their own unique learning and work
processes are ultimately more valuable. At the beginning of the journey, however, students typically are concerned only with meeting a requirement, perhaps unrelated to their ultimate career goals. Without seeing the value at the beginning of the process, many students only superficially contribute to their ePortfolios. Lacking baseline data, the ultimate learning process improvements are invisible and the potential of ePortfolio is diminished."

Not all the problems, mentioned in 2.1 and 2.2, are real obstacles. The lack of good research evidence (Wright et al 1999) is not a problem as such, but it may influence the acceptance of a portfolio in academic institutes. Furthermore some of the problems, which are described previously, are very specific (e.g. privacy; DiBiase 2002) or may depend on a certain (cultural) context. The obstacle “free speech” (DiBiase 2002) does probably not occur in liberal countries, while an inadequate IT-infrastructure (Van Tartwijk et al 2004) will not be an issue in high-developed countries.

5. Discussion

5.1. Conclusions

Based on the empirical study the researchers drew six conclusions:

1. In terms of substance the portfolio’s status and position and the reduction of academic education to a situation whereby skills are trained require a good deal of attention. Facilitating the development of skills is another recognised problem.
2. The benefits and necessity of explicit attention to academic education in practice are broadly subscribed to.
3. In professional terms, teachers should pay more attention to stimulating reflection on the part of students and guiding their academic development. “Educational management” also needs improvement.
4. The reliability of portfolio assessments is (still?) not regarded as a problem by many.
5. In practical terms, the lack of clear assessment criteria and assignment (or non-assignment) of credits appear to be undeniable problems.
6. Problems such as the usefulness of previously assessed products, technical aspects and the field of tension between ownership and educational requirements are viewed by most as less significant problems.

5.2. Comparison

In this section the outcomes of the empirical study have been compared with problems, described in the literature (section 4). Table 5.1 provides an overview of the problems that were subject of the empirical study, related to the conclusions of different authors.
ePortfolios for Professional Development

Table 5.1: comparison problems Rubens & Oost (2005) with outcomes literature

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<td>+</td>
</tr>
<tr>
<td>Ownership and demands faculty</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

6. 

+: similarity found

Problems in bold have been investigated but not been recognised in the empirical study.

Some authors use different terms compared with the problems in the empirical study. Woodward, for example, has mentioned “continuity throughout the process” as a problem. This problem has a close relationship with the way a portfolio is embedded in the curriculum. Driessen et al. (in press) conclude that students do not have the
ePortfolios for Professional Development

opportunity to have a sufficient variety and quantity of interesting experiences as subjects of reflection. This obstacle is related to concerns the way skills development is facilitated.

Several authors have mentioned problems that were not covered in the empirical study. Some of them are very specific (e.g. cyber-plagiarism and free speech, DiBiase 2002; activities not clearly explained, Fournie & Van Niekerk 1999; potential employers not interested in portfolios, Wright et al. 1999). The match between the conclusions of the different authors according to problems in using portfolios and the problems described in section 3 differs very much, as table 5.2 illustrates:

Table 5.2: match number of problems literature and Rubens & Oost (2005)

<table>
<thead>
<tr>
<th></th>
<th>Number of problems</th>
<th>Match with Rubens &amp; Oost (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodward (1998)</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>Anderson &amp; Bachor (1998)</td>
<td>5</td>
<td>60</td>
</tr>
<tr>
<td>Wright et al. (1999)</td>
<td>21</td>
<td>38</td>
</tr>
<tr>
<td>Fournie &amp; Van Niekerk (1999)</td>
<td>9</td>
<td>33</td>
</tr>
<tr>
<td>Klenovski (2000)</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Zeichner &amp; Wray (2001)</td>
<td>5</td>
<td>40</td>
</tr>
<tr>
<td>Van Tartwijk et al. (2004)</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Driessen et al. (in press)</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>DiBiase (2002)</td>
<td>6</td>
<td>33</td>
</tr>
<tr>
<td>Acker (2005)</td>
<td>3</td>
<td>33</td>
</tr>
</tbody>
</table>

To sum up, it can be concluded:

1. The problems “status in program” and “criteria for assessment” match at least five other articles.

2. It is obvious that several authors mention “rater reliability” as a serious issue, while the respondents in the empirical study did not perceive this as a problem.

3. Different authors often mentioned the time-consuming impact and workload of working with a portfolio. In the empirical study this was only a small aspect of change management.

4. Some other problems described in literature (like the lack of skills by students to compile a portfolio, Wright et.al 1999), were not mentioned at all by the respondents of the empirical study, although these respondents had the opportunity to do this. Possibly, it requires too much imagination to picture a new problem (cluster) after digesting fourteen clusters of problems .

5. A final striking difference between the articles in the literature study and the results of the empirical study is the (absence of a) weighing-factor. Weighing the problems provides a new perspective on the results, as table 5.1 suggests.
Several authors hardly mention substantial problems while other authors more or less focus on substantial and professional problems. A more systematic large-scale research on problems in using (electronic) portfolios is needed. The used questionnaire “Inventory of Portfolio Problems” (IPP) can be adapted by using problems and constraints found by other authors. It is recommended to use a classification of grades of problems, since problems have different weights: not every problem has the same impact on the adoption of the (electronic) portfolio within an organisation. In fact, set in a wider context of university policy grading portfolio problems is a prerequisite.

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Potential of using e-Portfolio for Evaluation of Educator’s ICT Competence
Session: PS3D
Type: Work in Progress
Palmira Juceviciene, Kaunas University of Technology, ei@smf.ktu.lt
Vaino Brazdeikis, Kaunas University of Technology, vainas@ipc.lt

Abstract
Educator’s ICT competence is an important factor for ICT implementation in education. The dynamic model of educator’s ICT competence is applied for the evaluation of this competence. On the other hand, it is very important to choose the adequate method for evaluation of Educator’s ICT competence. In this article authors analyze the possibilities and limitations of using e-portfolio for evaluation of Educator’s ICT competence. The Educator’s ICT competence is described by employing the analysis of scientific literature. Two case studies of the Educator’s ICT competence evaluation using e-portfolio at Kaunas University of Technology are presented. The possibilities of using e-portfolio are highlighted and the questions for the further investigations are submitted.

Key words
competence, ICT educator’s competence, portfolio, e-portfolio, evaluation of competence

1. Introduction
Modern education is related to the contemporary ICT. It is commonly agreed that ICT make a positive impact on education. The impact depends on teaching material, the subject, the age of student, teachers’ capacity to work effectively and on others factors (Schacter, 1999; Andresen, 2002; Coughlin, 1999; BECTA, 2002, IEA, 2002). Teachers’ capacity to work effectively means the necessity for an educator to develop competence of using and applying information and communication technologies (hereafter – Educator's ICT competence). A number of scholars have presented the different conceptions and structure of competence (Knierzinger and other, 2002; Resta and other, 2002; Jucevičienė, Brazdeikis, 2003). The international and local organizations also present their attitudes towards the issues of teacher competence, for example International Society for Technology in Education (ISTE) (2000), Educational Testing Service (ETS) (2002), the Ministry of Lithuania Education and Science (2001). However, it is not enough to outline educators' ICT competence or to developing programs for teacher training. It becomes important to evaluate and to present the Educator’s ICT competence. Although, the amount of research works is devoted to this topic (Andresen and Brink, 2002; ETS,2002), in most cases, however, Educator's ICT competence is treated as a static structure. We suppose that Educator’s ICT competence should be considered as dynamic structure that is dependent on the technological and organizational level the educator works in.

Doolittle (1994) proposed to use teacher portfolio method for assessing teacher performance. As Doolittle claims, a teacher portfolio is a collection of work produced by a teacher and could be used in two ways: first, for authentic assessment in evaluating the teacher’s effectiveness for licensure and/or employment decisions; second, for feedback of teachers, which helps to improve the quality of teaching
activity. However, the researcher notes that teacher portfolios are not universally endorsed, because of the possible subjectivity in evaluating portfolio, the great variety of portfolios and the inadequate agreement on what teachers should know and be able to do.

Another important question worth for researchers’ considering is the possible ways of using e-portfolio which at the first glance is more advanced in a virtual sense than a particular paper document. The application of e-portfolio may cause some problems, for example, the authenticity of documents presented in e-portfolio. While discussing about e-portfolio, it is difficult to detach the evaluation from competence portfolio building, because the structure of competence portfolio depends on the specificity of this building process.

The aim of this article is to reveal the potential of e-portfolio for evaluation of educator’s ICT competence.

In the first chapter of article the structure of Educator’s ICT Competence is analyzed. The second part of the article deals with the portfolio types and strategies as well as the evaluation actions that depend on these strategies. An exceptional attention is devoted to e-portfolio. Two case studies that highlight the possibilities and problems of using e-portfolio for evaluation of Educator’s ICT are presented in the third part.

2. Educator’s ICT Competence

Competence may be defined as the complex of individual’s knowledge, abilities, skills, understanding, values, personal qualities (Juceviciene, 2002), that influence the effective positive result of the individual’s concrete activity.

According to Jucevičienė and Lepaitė (2001), the different level of competence is necessary for performing the different level of activity. Applying the four competence levels distinguished by Bowden (1997), the latter authors relate them to the activity levels and the educational concepts suitable for training a person to perform this activity (see table 1).

Table 1 :Competence levels corresponding to activity levels and educational concepts
(Jucevičienė, Lepaitė, 2001)
### Competence levels

<table>
<thead>
<tr>
<th>Competence levels</th>
<th>Characteristics</th>
<th>Activity level</th>
<th>Educational concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Behavioral level of competence</td>
<td>Primary skills required in a work place</td>
<td>1. Operational work performance</td>
<td>Mastery learning/competencies development</td>
</tr>
<tr>
<td>2. Additive level of competence</td>
<td>Primary skills plus understanding and knowledge</td>
<td>2. Improvement of work</td>
<td>Mastery learning/competencies development</td>
</tr>
<tr>
<td>3. Integrative level of competence</td>
<td>Integration of understanding, knowledge, and skills</td>
<td>3. Change of internal</td>
<td>Balance of mastery learning and cognitive constructivism.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. and change of external work</td>
<td></td>
</tr>
<tr>
<td>4. Holistic competence</td>
<td>Transfer and integration of cognitive structures</td>
<td>5 Development of new work</td>
<td>Cognitive constructivism/ holisitic approach to a concept of competence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Qualification transfer into a new situation of action</td>
<td></td>
</tr>
</tbody>
</table>

The process of ICT implementation into pedagogical system is closely related to Educator’s ICT Competence level. Notably, every next stage of ICT implementation requests for more advanced ICT competence. ICT implementation is a process of four stages (Anderson, Weurt, 2002; Jucevičienė, 2002), in which teachers' performance have some differences:

1. Introduction stage. In this stage a new subject (computer literacy) is introduced, possibilities for accessing computer facilities are created. A teacher here acts as a simple person who has acquired computer literacy. On this stage teacher’s performance relies on ICT literacy (ICT basic competence), which covers the characteristics of:
   - Technological literacy: ability to use and manage IT
   - Information literacy: possession of information skills and usage them in right way
   - Social literacy: knowledge of social, ethic and legal norms and ability to follow them in using ICT.

This competence, however, not just yet ensure the ICT application in pedagogical process.

2. Application stage. On this stage the application of ICT creates the possibility to enrich the educational process. A big significance herein is attributed to teacher’s ICT pedagogical competency, defined by knowledge how to apply ICT in the subject and ability to select the appropriate education concept for the organising of the pedagogical process, knowledge and skills necessary to develop students' ICT literacy through subject.

3. Integration stage. On this stage the development of teaching and learning possibilities by using the Internet is taking part. Teachers’ activity is related to
managing the students’ activities, i.e. teachers should be able to create the tasks that stimulate for students’ communicating in Internet network, to monitor the existing communication processes, to evaluate them, etc.

4. Transformation stage. This stage is characterized by the conceptual changes in pedagogical process. The educational paradigm is transforming from teaching to learning. This means that ICT create such possibilities that students to great extent are able to study with databases and without teachers’ direct instructing. A teacher works more as a consultant than a manager of teaching process. On this stage of ICT implementation the content of some subjects changes considerably. Transformation stage of ICT implementation demands for the holistic Educator’s ICT competence, enabling him/her to analyze situation, to choose relevant methods and ICT tools for creating the learning environment for students.

We would like to note that the competence in the Introduction stage of ICT implementation should be considered as basic ICT that is necessary for all professions. The next stages demand for the ICT competence that is specific for Educator’s profession. Dynamic model of the Educator’s ICT Competency (Table 2) reveals that the necessary ICT competence for teacher depends on the ICT stage the school operates in and the pedagogical system a teacher works in. Therefore, ICT competence that is represented by teachers may have different structure. This should be taken into account while building and evaluating teacher’s competence portfolio.

Table 2: Dynamic model of the Educator’s ICT Competency (by Juceviciene, Brazdeikis, 2003)

<table>
<thead>
<tr>
<th>General level of competence</th>
<th>Behavioural</th>
<th>Added</th>
<th>Integrated</th>
<th>Holistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content of Educator’s ICT competence</td>
<td>ICT literacy (ICT basic competence) which covers characteristics of:</td>
<td>ICT integral educational competence which covers characteristics of:</td>
<td>ICT integral educational competence which covers characteristics of:</td>
<td>Holistic approach of Educator’s ICT competency</td>
</tr>
<tr>
<td></td>
<td>• Technologic al literacy.</td>
<td>• Pedagogic competence.</td>
<td>• Manageme nt competenc e.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Information literacy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Social literacy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage of ICT implementation</td>
<td>Introduction</td>
<td>Application</td>
<td>Integration</td>
<td>Transformatio n</td>
</tr>
</tbody>
</table>

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3. **Portfolio building and evaluation**

There is no one opinion that competence has to be presented by means of portfolio. For instance, Doolittle (1994) assumes that teacher portfolio is only a collection of his/her works. So, how does the evaluator work while evaluating this portfolio? The first step of this process is the qualitative evaluation of the works performed. The second step embraces the acknowledgement of one or more competencies necessary for this particular work.

Other authors, for example Jan van Tartwijk and Erik Driessen (2004), distinguish between several types of competence e-portfolios: not only as a showcase, but also as presenting evidences based on reflection. In this respect the evidence is considered to be the successful fact of the activity that is objectively approved and allows disclosing person’s competence. Obviously, this fact of activity could be a prepared methodical paper. However, the successful practical activity (well organized conference, the effectively applied method, etc) may be treated as a fact of activity as well. It is extremely important that a person would be able to prove this evidence. The proof is considered in three aspects: first, to prove the fact as really accomplished; second, to prove as result generated; third, to prove the person’s authorship in respect to this evidence. In terms of evaluation, the showcase of works and the showcase of activities have a few differences. The main difference is that the works presented in a portfolio should be examined by the expert. Meanwhile, the proved successful activity in a portfolio approved by the documents does not demand for the additional expert examination, the expert’s approval is enough. The truth is that in both cases the successful fact of activity and not a competence is acknowledged. In order to record the competence necessary for this successful activity, the evaluator should make one more additional step in defining what competence a person had to possess for achieving the results presented. In case of dynamic structure of competence this is not so easily achievable task for it may appear that the concrete successful activity demands for competence quite complicated in structure.

According to Jucevičiene (2002), the best practice is when a teacher not only presents the evidence in his/her portfolio, but also clearly defines what competence he needed. Obviously, this requires extra efforts from the teacher, but for evaluator the only assessment function is left.

When evidence is difficult to prove, the tasks are recommended that a teacher should accomplish and in that way prove his/her competence. Educational Testing Service (2002) have proposed to collect evidences by using the simulation method. This is in line with the methods of assessing facts. However, this way is similar to testing and makes us consider that qualification instead competence is being evaluated. The similar doubts are about the various testing systems, for example European Computer Driving Licence programme, that is run by Council of European Professional Informatics Societies

Jucevičienė (2003) distinguishes between two strategies of competence portfolio. The first strategy: a teacher receives a list of competences in advance, according to this he/she has to prove his/her own competence structure. In this instance, the evaluated is limited to the acceptance or rejection of the presented evidences that are displayed and proved by the portfolio owner. The second strategy is based on the extraction of successful activity facts and later the defining of particular competences. In case of this strategy teachers often are successful in presenting the evidences, but they fail in attributing these evidences to appropriate competences. Therefore, the
ePortfolios for Professional Development

evaluator has to go through two stages: first, he examines the evidence, and second, he checks out if a teacher defined a proper competence based on this evidence.

The second strategy is more open for displaying the whole structure of teacher’s competence. However, this strategy often becomes an obstacle in evaluating teacher’s competence because after having successfully presented an activity fact, a teacher is not able to properly discern competence. E-portfolio evaluation is also problematic: an evaluator cannot always easily communicate with a teacher and explain the mistakes in his/her portfolio.

The e-portfolio problem mentioned above is not a single one. There are problems with information storage, information protection, etc, despite the strategy applied. However, e-portfolio has much attractiveness. For instance, teachers have a possibility to widely display their competence on Internet space and in that way to present themselves in the educational market. The competence portfolio becomes more easily accessible for educational and human resource institutions that are able to evaluate it.

A big number of countries use competence portfolio for teachers’ evaluation. Lithuania is not an exception: the Ministry of Lithuania Education and Science made this decision as far back as 1998. the truth is that the bigger experience is accumulated in evaluating the paper document, but we have analysed some cases of e-portfolio application that let us taking some notice.

4. Two cases of the Educator’s ICT competence evaluation using e-portfolio


This case deals with the research results presented by researchers from the Kaunas University of Technology who investigated in what ways the dynamic structure of competence is reflected in the competence portfolios. The first strategy of competence portfolio building was chosen (the whole structure of dynamic competence was presented) and the teachers of different subjects divided into different groups were asked to display their ICT competence in their competence portfolio.

62 teachers in total participated in this research, 11 of them have worked in Comenius projects for the first year; 24 of them have been involved in these projects for some years; 28 have not participated in Comenius projects.

The following actions were carried out:

- Teachers had been instructed how to prepare competence portfolios before they began to collect the evidence.
- Teachers received the characteristics of dynamic Educator’s ICT competence structure (defined in four levels) and had to find the evidences for these activity levels they supposed themselves they were working in.
- The researcher evaluated the teachers’ portfolios.

In this case the e-portfolio was built; therefore, the evidences could be generated only in e-format. This particular reason caused some difficulties in preparing the competence portfolio, because some of the documents were accessible only in paper format. The evaluation of competence portfolio in three selected groups clearly
revealed the three different forms of dynamic competence structures. The teachers who did not participate in Comenius projects were able to prove only ICT literacy (ICT basic competence level). The teachers with one year of experience in Comenius projects demonstrated ICT literacy and some characteristics of ICT pedagogical competence (partial competence of the second level). Meanwhile, the teachers working in Comenius projects for some years proved that they have not only ICT literacy, but also a big number of the characteristics of ICT integral educational competence (the third level).

4.2. Case 2

In 2005 the researchers from Kaunas University of Technology carried out the research which aimed to find out if there are teachers who achieve the highest, the fourth level of holistic competence. 200 teachers participated in the research. 172 of participants were selected by means of expert evaluation (Troter, Ellison (2001). The research was restricted to showcase type competence portfolios: the teachers had to present the ICT application works they had implemented. The selected teachers were introduced to the characteristics of Educator’s competence structure in a dispersed way for they could not perceive what competence level evidences they were aiming to prove. So, the second strategy of competence building was employed, obviously, restricted to the showcase. The teachers were asked to attribute their competence to one or another level according to their works. No one teacher achieved the highest level. It was observed that part of the teachers used to overestimate the competence level while attributing their evidence. Moreover, it was noticed that e-portfolio requires a lot resources, more specifically, human resources in evaluating competence portfolios prepared in this way, and also in motivating teachers to build these portfolios. Another problem encountered in the evaluation process was that the part of showcases was done in team, so a teacher was not able to prove his/her personal participation and input. Because of the remote contacts between the researcher and the teachers, the evaluation of competence portfolios was rather difficult.

5. Conclusions

Educator’s ICT competence can be defined through the hierarchical levels of competence, the specific features of ICT implementation stages and the requirements for teacher’s activity. For this purpose the dynamic model of Educator’s ICT competence could be applied.

Portfolio and e-portfolio as a variation can be treated as an appropriate tool of evaluation. The collection of portfolio data could be carried out according to different strategies. The discussed cases showed that while applying the dynamic model of Educator’s ICT competence and discussing the evaluation together with a person who is being evaluated, the objective evaluation of competence portfolio could be attained.

Competence portfolio building is a complicated process by itself; therefore, e-portfolio should be simple and clear enough for the person to fill in. The evaluation of e-portfolio is partly problematic in a sense it is sometimes impossible to present evidence in e-format, and the unprovided face to face communication also bears some problems for evaluators.

The following questions call for the further research:
What technological decisions should be made to make a portfolio building and its evaluation simple at the maximum?

Still, open for debates is the question: Does the proposed dynamic model of competence enables to detect the fourth level competence – the holistic competence). This particular question has not been answered since no one of all 172 teachers according to their evidences displayed received the acknowledgment on the fourth level competence.

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ePortfolios for Professional Development


ePortfolios for Work

Retail Detail: a tailored e-portfolio solution for a complete industry sector
Session: PS4A
Type: Abstract

Arntsen, Rob and Holland, Tom: The Retail Academy

1. **Background**

The retail sector raises particular problems for learning and skills provision. Smaller retailers are usually those with the least available resources (financial and human) to spare, yet, in an increasingly competitive high street, they are most in need of new knowledge and skills to adapt and survive. It is estimated that 20% of people in the retail sector have no qualifications; this is associated with low levels of employer engagement with formal training.

Led by a wide consortium of retail industry representatives, experts from Higher Education, FE colleges and private providers of training to the industry, the Retail Academy aims to help retailers engage with skills training by exploiting new learning technologies. In the retail industry, the lack of time between serving customers and attending to shop management has proved a significant barrier to the take up of less flexible, traditional training. In these circumstances, e-portfolios—technologies to record achievements that can be accessed by a learner at work or at home and shared easily with employers, and that enable learners to build and document a flexible and relevant personal learning plan—can be invaluable to both staff and employers, allowing them to fit training more easily around their business.

The Retail Academy’s online subscription portal, Retail Detail, implements an e-portfolio designed to address the needs of retailers. This study explores its implementation, and reports on how users responded to a pilot for the system.

2. **Summary**

This case study looks at the Retail Detail system’s implementation of online personal learning spaces, encompassing personal portfolios. The portfolios were specifically tailored for the retail sector and intended to address the needs and demands of an entire industry. The system had to be implemented in a way that would be easy to use, so as not to place an unnecessary time-burden on an industry sector where time constraints present the greatest barrier to investment in training.

Drawing on the feedback obtained in the Retail Detail pilot, this study evaluates how learners and shop owners have used the personal learning spaces and their component e-portfolios. It then goes on to show how successfully the learning space and e-portfolio fulfilled their objectives from the various stakeholders different perspectives: how learners and employers benefited, and what the value of the system might be to training providers and to wider bodies representing the industry as a whole.

Retail Detail’s e-portfolio is linked and integrated within a total end-to-end framework which covers initial skills diagnostics, personal development planning, delivery of e-learning and traditional qualifications, and organisational monitoring and tracking.
This integration gives learners opportunities to build all of these elements into a coherent learning plan over which they and their employers have complete control—we’ll look at the ways that learners could do this, and how users actually responded to the system. Finally, this study looks at how the Retail Detail e-portfolio has been implemented on a national scale, and at the future implications of this scaling to the value and portability of the system.
**Abstract**

The Australian Science and Mathematics School is a newly established specialist high school for students in years 10 to 12. It is a government high school, co-located with the Flinders University of South Australia. The ASMS has a mission to transform the teaching of science and mathematics. Each student has a Personalised Learning Plan which guides their progress through the school. In 2005 we began the journey of learning how to produce the PLP as an ePortfolio. This paper describes the journey so far.

**1. The Purpose of the Research**

This research by the Australian Science and Mathematics School on the development of student ePortfolios is intended to generate discussion at a school and system level about the uses of ePortfolios. We believe that ePortfolios increase the possibilities for students to personalize, to document, to reflect on and to present their learning to a variety of audiences. We are encouraging students to develop web based ePortfolios as they can be personalized and customized and are highly transportable. Data collection from an ePortfolio by central agencies is also possible. Students may use the ePortfolio for multiple purposes including: as an archive, as a reflective tool, as a showcase and as an aid to gaining access to further study or employment.

**The Scope of the Investigation**

This is a report on the implementation of ePortfolios over a three year period in a senior school with 270 students. While this investigation is based in a senior secondary science and mathematics school which operates with an interdisciplinary curriculum, the principles of student engagement can be translated to a variety of contexts.

**2. The Learning Context of the ASMS**

The ASMS operates with pedagogies which reflect our beliefs that:

- Education is most effective when the needs and interests of students shapes their curriculum and learning experiences and supports their development as independent, life-long learners.
ePortfolios in Schools

- Learning is enhanced when students possess deep understanding of their preferred approaches to learning and are able to self-direct and individually plan their learning
- An experiential and inquiry-based, interdisciplinary learning environment deepens understanding
- A thorough understanding of science and mathematics, their interrelationships and applications through innovations within the wider community is essential
- The development of learners is enhanced through rigorous intellectual challenge and the opportunity to explore issues in depth
- Student learning is supported through interaction with and guidance from significant adults and significant peers working as a community of learners. At the ASMS every student is a member of a Tutor Group of about 14 students from years 10 to 12 who work with their Tutor in a 40 minute pastoral care session each day.

The school is housed in an environment that was created from an architectural response to desired pedagogy.

- Multi-functional learning commons and studios
- Flexible and ubiquitous ICT where learning in physical space merges with learning in electronic space
- Transfers the power of adolescent social interaction into the learning environment
- Fosters interaction through integrating the physical, cultural and organisational environment
- Social space merges with learning space
- Moves away from the architectural-pedagogical paradigm that reinforces teacher-centred pedagogical practice. The teacher’s predominant role becomes learning coach, mentor and “guide on the side”

An Interdisciplinary Curriculum

Phenomena in the real world are not confined to disciplines. Life is interdisciplinary and the way we think is naturally interdisciplinary. At the ASMS students in year 10 and 11 take part in a two year sequence of nine interdisciplinary Central Studies.

We believe students need skills to:

- become knowledgeable in the traditional subject disciplines and be explicitly taught to make connections
- see multiple perspectives on knowledge and appreciate diversity
- problem solve and be able to hold a viewpoint on various issues
- work effectively and efficiently in collaborative groups
- repackage knowledge to create new understandings to meet the complexities of the modern world

In the Central Studies students are exposed to different subjects where the unique characteristics and distinctions between the subjects are retained but connections between the subjects are emphasised. Each Central Study has a fertile question as the focus for learning and enquiry. The fertile questions require knowledge, skills and dispositions to be synthesised from all the disciplines to transform or generate new knowledge.
3. Why ePortfolios?

There is a growing realisation that lifelong learning requires learners to take an active role in constructing their learning and that multiple assessment measures are necessary to interpret the complex demonstrations of learning produced by independent learners. ePortfolios, by their digital nature, are an appropriate way of archiving complex demonstrations of the multi-literacies expected from today’s students. Students can select, reflect on and interpret their own learning. Students are able to demonstrate their learning to teachers, parent, employers and communities through their ePortfolios.

There is an international movement toward ePortfolios, as seen by the European Institute for eLearning’s slogan “In 2010 every citizen will have an ePortfolio.” The Australian Government is supporting the development of ePortfolios through its Employability Skills Portfolio project. The South Australian Government expects all High School students to develop a Transition Plan including a Learning Pathways Plan, a Transition Portfolio and a Transition Pathways Plan, and will soon release an electronic student folio for this purpose. Within the ASMS we want our students to collect and showcase evidence of their Graduate Capabilities, to earn the Australian Science and Mathematics School Graduate Certificate.

Helen Barrett (2005) describes ePortfolios as a student’s story about themselves. We believe that it is imperative for our students to tell the story of their own learning and plan their story, in digital form, to show their achievements and future goals. Students today are part of the information age and technology is part of everyday life. ASMS students report that they spend an average of 29 hours per week using computers (Treilibs 2005). Their familiarity with the technology, the development of new media production methods and the distribution capacity of everyday technology gives easy access to ePortfolios for our students.

Personalised Learning Plans and ePortfolios

From its inception in 2003, every student at the Australian Science and Mathematics School has developed a Personalised learning Plan. The PLP is a portfolio of the student’s past achievements, information about and reflection on their learning preferences, plans and hopes for the future. The PLP guides the student to map their pathway through the school’s curriculum, giving multiple entry points and pathways into lifelong learning. The PLP also becomes the basis for regular Learning Conversations between students and their teachers and parents about educational pathway through the school’s learning experiences.

ePortfolios as a learning tool

We believe that the ePortfolio is an appropriate vehicle to develop PLPs because students are tuned to learning using electronic media. The internet and digital media are more engaging than standard text on paper. Blogging, texting on phones and sending images are popular forms of communication. We want to harness the interest in new media in the construction of ePortfolios.

The ePortfolio is (From Barrett 2004):

- A dynamic and flexible document, capable of embedding multiple media forms
- Accessible at any time for students to build their PLP within all learning programs
ePortfolios in Schools

- a digital CV or a digital Resume. Multiple ePortfolios for multiple goals and purposes can be drawn from the archive
- a metacognitive tool
  "The Power of Portfolios to support deep learning is personal"
  "The heart and soul of the ePortfolio is reflection" Helen Barrett (2004)
- a tool for building self esteem
  - a collection of evidence / demonstrations of a student’s learning and achievements
- a celebratory tool, to showcase achievement
- a sharable object, written for a variety of audiences
- a tool to develop critical multi-literacies
  - Students develop their own criteria for selecting materials
  - Students develop the meaning of the portfolio for themselves
- an assessment tool
  - Authentic assessment
  - A collection of demonstrations of learning
  - Students prove what they know by selecting from what they have done

The ePortfolio can be understood using metaphors. (From Ravet and Barrett 2004)

- Digital clone – your e-self
- Butler – providing a personal service
- Dashboard – providing feedback on the state of learning
- Planner – a tool to plan learning
- Management assistant – a tool to exploit personal assets
- Work companion – blending learning and the work environment
- Mirror – to look at yourself
- Map – where you have been and where you are going
- Sonnet – a personal poem or song
- Storyboard – a digital story of oneself

Students use a wide range of traditional and technological skills to build the ePortfolio:
-
collecting, selecting, reflecting, directing, celebrating, archiving, linking, thinking, planning, composing, story telling, collaborating, publishing, hyperlinking.

4. The Methods of Investigation

The ePortfolio implementation at the ASMS has been researched using the Action Research model. This model has been well described elsewhere. For purposes of this paper Action Research involves cycles of planning, implementation, information gathering and reflection. This project has involved a number of cycles through these stages:

1. a) Initial plans for Personalised Learning Plans 2003
   b) Implementation of student PLPs
   c) Evaluation of the use of PLPs at the ASMS

2. a) Development of a web based template for ePortfolios 2004
   b) Trialling of the template
   c) Reflection on the trial via individual portfolios
ePortfolios in Schools

3. a) Plans for all students to develop an ePortfolio 2005
   b) Work with all students to implement ePortfolios
   c) Data gathered term 1, 2005 re student engagement and staff reflection

4. a) Plans made to embed ePortfolios within curriculum
   b) Curriculum activities to embed ePortfolios
   c) Data gathering via individual students surveys

5. **Implementing ePortfolios at the ASMS**

The process of implementing ePortfolios at the ASMS has been complex and developmental.

In the school’s first year, 2003, while the school was housed in temporary accommodation within Flinders University, students worked with a paper based Personalised Learning Plan. Students were provided with a series of stages for the development of their Personalised Learning Plan and set of question to guide their work. In 2004 Thom Burns successfully trialled web based ePortfolios with interested students. The trial was based on a template created using Fireworks and Dreamweaver. Students were attracted to the use of the template because it gave the ePortfolio a sophisticated look without the need for students to know much about web page design. Other students had their interest raised in the ePortfolio because they had a ‘real example’ to look at and develop their own style. On the other hand some students took on the task of designing web pages to express their ideas but were unable to go beyond the graphics. The substance of an ePortfolio, the reflection on learning, the connection of their learning experience was not developed. Because of the early successes with some students the decision was taken that all students in 2005 would develop their Personalised Learning Plan as an ePortfolio.

**ePortfolios and the Curriculum**

We believe that the ePortfolio should be a management assistant, a tool to exploit personal assets, and a work companion, for blending learning and the work environment (from Ravet 2004). For students to successfully work with ePortfolios, the portfolio must become an everyday part of student learning and reflection. It must be an easy to use, personalized tool that can be called on seamlessly in the student’s day.

To support this notion we have linked the ePortfolio to significant activities in the school curriculum:

- Integrating the ePortfolio into learning within the Central Studies by linking ePortfolio development to assessable learning tasks
- building reflection on learning in Central Studies within the ePortfolio
- building Central Studies learning tasks around reflections on learning made by students in their ePortfolio
- linking the ePortfolio to other transition tools, including the online Futures Connect Transition Plan and the Education Australia’s online Employability Skills portfolio
- offering students significant accreditation within the South Australian Certificate of Education for working with an ePortfolio

**ePortfolio and Learning Management Systems**
In addition to ePortfolios we have been developing a Learning Management System which delivers curriculum materials in an organized and timely manner. In late 2005 we will be trialling a Student Management System which tracks student attendance, records assessment items and reports to parents electronically. The system under trial has an automatic portfolio builder, which may contribute to simplifying the process of students building a portfolio as a story of their learning. Part of the challenge is to ensure that students have input into the portfolio creation and not leave it to an automatic process.

**ePortfolios for assessment**

- The ASMS Graduate Capabilities: When students graduate from the ASMS they receive a certificate which verifies that students have achieved a significant level of capability in working scientifically, mathematically, communicating effectively, working collaboratively and independently, demonstrating personal and social enterprise and demonstrating critical literacy.
- The new Student Management System has a portfolio builder which will automatically create a portfolio from demonstrations of learning so that student work can be matched against one or more curriculum frameworks including the ASMS Graduate Capabilities, South Australian Certificate of Education, Key Competencies and Essential Learnings.
- A development in term 3, 2005 was the Graduate Capabilities proforma. Year 12 students were required to gather evidence about their learning in the areas described in the first dot point above. The capabilities statement was adapted as a hyperlinked word document. This document made it very easy for students to collect artefacts from their learning. This Graduate Capabilities work should be part of an ePortfolio.

**ePortfolios for reporting**

At the end of 10 week’s work in the Central Studies students use the ePortfolio to guide Learning Conversations - discussions between the student, their parent and the Tutor about the students learning successes, areas for growth and learning pathways.

**ePortfolios for planning**

- When a student wishes to negotiate more time on an aspect of learning they are expected to be able to refer to the ePortfolio for evidence of their interest in a special project. The PLP should also provide evidence of having substantially addressed the learning outcomes of tasks which the student wants to negotiate less time.
- Incidental opportunities arise when students express an interest in special program. Students who participated in an international science fair in Japan were asked to present their ePortfolio as a demonstration of their reflections on learning at the ASMS.

**Staff ePortfolios**

We are developing modelling by staff through building their ePortfolios. We began with staff posting contact details on the school’s web page. This has lead staff to reflect on the types of thinking students need to do to build their ePortfolio, including
selecting parts of their learning journey to include, making statements about achievement which are open to public scrutiny, decisions about how the information will be kept current and privacy issues. The aim is for staff to extend the school web pages into their own ePortfolios, see the power of such portfolios and lead students by example.

6. The Main Findings from the Investigation

Statistics
At the end of term one in May 2005, after 10 weeks of school and at the first Learning Conversation, a survey of Tutors indicated that while approximately 65% of students had some form of ePortfolio the Tutors felt that only about 17% of students were using portfolios effectively. There was a much higher rate of effective ePortfolio use by year 10 students (29%) when compared with year 12 students (10%).

There is a great deal of anecdotal evidence that student engagement with ePortfolios has increased markedly throughout 2005. At the end of term 3 with the second Learning Conversation, we will conduct a similar survey to quantify the increasing engagement with ePortfolios.

Staff and Student Qualitative Data
At the end of term two, Tutors were surveyed regarding their impressions about student use of ePortfolios for supporting and enhancing their learning. Some comments from the staff were positive about the possibilities of ePortfolios and about the way that some students were using them.

- “[Students are] learning to collect things together. In the old days we all had books to show our grandchildren. Electronic pages seem to collect in the cosmos and disappear. This gives students the chance to see how wonderful they really are.”
- “[Students are] taking pride in creating their own ePortfolio, adding SACE results, describing their learning in Central Studies.”
- “An attempt to collect polished work builds self esteem and organisation skills”.

Other comments indicated frustrations and disappointments encountered when students showed disinterest in creating or using the ePortfolio.

- “Some students are unenthusiastic and do not see any relevance in ePortfolios. Some have few HTML, web page skills.”
- “Time pressures on students. Difficulties of not knowing the applications necessary for web page creation.”
- “There is a general resistance in my group to the use of these. They are unwilling to put in time that some think that they could use better else where.”

In response to these comments a range of strategies was developed to embed the use of ePortfolios with the Central Studies curriculum, as previously described.

Students were surveyed during term 3 on the ways they were using ePortfolios to support and enhance their learning. As in the staff survey, student gave a range of very positive comments:
“In the school holidays I use my ePortfolio to reflect on my work. I write down what I have done, what I like and what I have found out about me as a learner.”

“I had a full page dedicated to my sporting and educational achievements.”

“I have links in my ePortfolio to some good work I have completed which suits each section in my ePortfolio”.

“In my ePortfolio all my subjects have a section which has examples of work I have done to demonstrate what I have learnt.”

Other students stated that they didn’t have one or they were unable to outline any positive uses of their ePortfolio. Two task remain to be take up. One is for us to understand the issues that exist for those are resistive to using and ePortfolio. The second is to quantify the most common uses of ePortfolio and those uses that are idiosyncratic for individual students.

Stories of Success

One useful part of the research has been the use of video to capture individual stories of the way students are successfully using ePortfolios, and stories of those who are choosing not to engage.

The issues which have emerged

Students have responded to ePortfolios in a number of ways, from great enthusiasm and engagement through to disinterest. Our challenge has been to engage the school community in the process of developing ePortfolios for all students, examining the most useful programs and formats for constructing ePortfolios and discovering uses for the ePortfolio that most support student learning.

Some staff members are not yet convinced that there is a real benefit for students from creating and using ePortfolios. This lack of belief in the use of ePortfolios means that there is a varying level of support for students. Anecdotal evidence suggest that students who received the higher levels of teacher support have been able to develop ePortfolios that support and enhance their learning.

Another emerging problem this year was that year 12 students deleted work from last year which was stored in their school drive because the drive was full. It is possible to increase the drive from 80mb up to 300mb. It was an issue particularly for students who worked with a large number of graphics.

7. The Main Conclusions

The ASMS mission states, in part, that the ASMS will “focuses on research, development and innovation of the pedagogy of science, mathematics and related technologies and on being a state, national and international focal point for enhancing science and mathematics in secondary schools.”

Traditionally schools have valued student learning. While the ASMS will continue to value learning, the school is undertaking a cultural shift to also value metacognitive thinking to enhance learning. Our work is demonstrating that student ePortfolios are a valuable contributor to metacognitive thinking and learning about learning. Our challenge is to continue the work to find strategies that assist all of our students to engage with ePortfolios. From here we will examine at the micro level the changes to the way curriculum, thinking skills and ePortfolios can be better connected.
8. References


Abstract
The initial work on digital portfolios began with a project at the Coalition of Essential Schools in 1993.* The work began with a simple question: how could technology support exhibitions of student work? At the center of conversations around assessment, we have to keep to looking at two key purposes: allowing students to show that they are meeting high standards of achievement, yet having students show who they are as individual learners. During the last dozen years, technology has progressed at a rapid pace, and schools are facing many new challenges. Still, in our collective work across many different projects, we (the three authors) have learned a number of lessons that are consistent across learning environments and hold up over time. Here, we present a dozen lessons that are most resonant across all of our work.

1. **Schools need to address a set of "essential questions."**

From the first research on digital portfolios, we learned that schools have to consider a number of issues, including:

- **Vision:** What should a student know and be able to do?
- **Purpose:** Why are we collecting the student work?
- **Audience:** Who will be reading the portfolios?
- **Assessment:** What tasks should students perform? How will we know what’s good?
- **Technology:** What systems will we need? How is it supported?
- **Logistics:** What resources do we need?
- **Culture:** How do we make the portfolios valued and valuable to a school?

There isn’t one “right” answer to these questions; what is important is that the school engage in the conversation. To work out these questions, teachers need to work collaboratively, yet each teacher needs to contribute his or her own thoughts. If you are a teacher, you need to recognize that you can’t do it alone; at the same time, there is much that you can do alone.

2. **Teachers must support the project.**

While support may come in varying degrees is fine but some support is necessary. A top down initiative gets the ball rolling; however, unless the stakeholders are involved in the design and have a say in the decision-making they will not feel as vested in the

project. Like students, teachers can feel disenfranchised and not completely buy in to the project.

Leadership, however, can help build that support through consensus. Each portfolio endeavor requires someone to explain the purposes of the project as often as necessary.

3. **Portfolios are fundamentally for the students.**

A good portfolio sounds like the student, is created around his or her own learning goals, and shows growth over time in areas important to the student. Student and school goals are integrated as the student collects and reflects on progress over time.

The portfolio is for both formative and summative evaluation. With the contribution of each new sample, the student reviews the previous work and reflects on progress. This often leads to the student having insight into how he or she can improve. With new goals in mind, the student returns to learning, until the next portfolio entry. The portfolio is also a summative evaluation tool; gauging how a student measures up against standards. For this, the best entries are rated against the criteria for standards.

As the demonstration of what students know and can do, portfolios include reflections by the students on how they did the work, what they think of the pieces in the portfolio, what they think they demonstrate and why they included the piece in the portfolio. These reflections provide the context for the work. They are also evidence that the student has in fact operationalized the assignment; understands the concepts or skills, and can articulate, the purpose of the assignment or learning activity that resulted in the artifact that appears in the portfolio.

4. **The portfolio has to fit into how students and teachers work.**

They must be integrated into instruction to be sustainable. If they are an add-on that teachers or students do not see as important to their learning, they become impatient with the time it takes to collect, select, reflect and present. Consider having students think or talk about what they know about a topic before you begin instruction. Capture these for the portfolio. Then as students learn, have them collect and reflect. At the end of the unit, have students review their initial understanding, reflect on what they have learning, and choose artifacts that reflect their learning.

Portfolios gain acceptance quickly when they track high value and high growth (e.g. primary reading). Think about what you can collect using video, audio and pictures that will show the heart of student growth. In pre-schools, jumping, skipping and drawing show dramatic change. In primary, reading and handwriting improve dramatically. In upper elementary, students get much better at comprehension and retelling. In middle school students become narrators of their own stories, often reveling in autobiographies and using technology to capture where and how they live. In high school, students make great advancements in skill in areas such as sports and music, as well as writing and speaking. They often want to use the portfolio as evidence of proficiency for jobs or higher education. College portfolios often demonstrate competency against standards for entry into a profession.
5. **It's not about the technology.**

A portfolio doesn’t have to be digital but pictures and video change the whole experience. Students love creating the video. They can often talk about what and how they are learning much better than they can write it, so recording their reflections creates a rich picture of their learning. Audiences love seeing the growth over time that video and pictures capture so well.

People often ask, “Do we need to have digital portfolios?” The answer is no, but you will probably want to. Schools that use portfolios intensively year after year find they have trouble managing the paper. Digital portfolios eliminates this problem. The problem of what to keep, what students take home and what gets stored from year to year is also eliminated. With digital portfolios, the digital copy is available to different people at different times, and copies can also be made.

To launch digital portfolios, you will need to have an infrastructure in place prior to support implementation. At the very least, you will need cameras, server or web storage, and ready computer access. You will want to develop routines for students to collect, select and reflect using the equipment and systems you have available.

6. **“Collect, select, reflect and present” is the process of portfolio development and use.**

Cycling through these activities makes the portfolio part of the learning process rather than a chore at the end.

Portfolios should include decision-making by students. A portfolio holds the byproducts of their learning so you want them to ask the question, “What shows what I know and can do?” This deepens their understanding of what constitutes evidence of learning. They soon realize, for example, that showing the difference between their initial understanding and a final performance of understanding is more powerful than showing only the final performance. Students contend that they learned more when they had to make the decision of what work was appropriate to use as a demonstration of proficiency for a particular practice.

Reflexion makes a portfolio different than a collection of work. When students reflect on what, and how they are learning, they add meaning to the work they have produced. They are demonstrating that they know “how they know” rather than just “what they know.” These reflections often become the most cherished part of the portfolio since they are such a personal representation of the “thinker” behind the work.

You don't need as much in the portfolio as you think you do. A few well-chosen pieces with reflections can show a lot of growth. You will probably always want to include examples of writing three or four times a year. If you are including video, speaking samples in September, January and May can show huge growth. Consider including different kinds of work; lab reports, expository writing, handwriting samples for primary, career aspirations for older students.

7. **All portfolio tools are not created equal.**

You need to find the tool that will work best in your setting. Some schools, such as High Tech High, ask students to build their own portfolios from scratch as part of the
technology curriculum; other schools may find it more useful to use tools that are more "ready-built."

In almost all cases, though, customization is critical. The technology needs to fit the way you do things in your school – not the other way around.

8. **Implementation takes time.**

Change does not happen overnight and the implementation of a portfolio project is no exception. Be prepared to nurture the initiative and be flexible to change.

It is important to recognize that any portfolio initiative is dynamic and not only should change but must change based on what you learned during implementation and as a result of reflection on the project. However, in order to have the necessary credibility and participant buy in there must be a solid infrastructure in place to support and facilitate project success.

9. **The portfolio has to stretch how students and teachers work.**

The portfolio system takes the assessment of student work and elevates its importance. A portfolio isn't about maintaining a reasonable average; it's about actual performance of standards. Therefore, students need to have opportunities to meet standards, and teachers need to respond to the work that students do. Like a good coach, teachers should look at performances in the portfolio, and determine where more emphasis is needed to reach higher levels of achievement.

Portfolios shift instruction toward diagnostic, data-driven teaching and learning. While the data in a portfolio is qualitative rather than quantitative, portfolios can provide a balance to standardized testing. Schools often find it helpful to work with common rubrics so that there is a common language for discussing the work in the portfolios. On a larger scale, portfolio implementation can affect the program. For example, when a set of portfolios is reviewed by reading specialists, the group may recognize patterns where students need help – and can then establish the appropriate professional development to address that need. Various education decisions, from curriculum to how time is allocated, can and should be reevaluated based on information gained from the portfolios.

10. **Feedback is the most important aspect.**

Students agree that feedback/coaching is a necessary element of developing their portfolios, yet, in a discussion of portfolio systems, students in a number of settings felt the feedback was missing from their courses.

One strategy is to create a formal structure for feedback, such as one-on-one conversations, advisory periods, student-led conferences, panel presentations – even science fair type events where students put their portfolios on display. Students are more likely to put effort into a portfolio if they feel the school is taking the portfolio seriously.

11. **Portfolio development is DEFINITELY worth the work.**

The actual effort involved in assembling a portfolio is often minimal; students can create entries quickly, and schools can focus on projects, activities and assessments that are already in place. By taking a few minutes and adding work to the portfolio, students and teachers can start to create a more complete view of what the student
has accomplished, and what the teacher can do to help the student get to the next level. Parents, students, teachers, and administrators can see growth over time and patterns of performance in new ways. In the end, the portfolios are about getting a "richer picture" of each of us – and of all of us.

12. **The audience matters.**

Unlike a typical assignment, students recognize that work in a portfolio can be viewed by more than just the teacher. Knowing that the portfolio can be shown to various audiences makes students more conscious of what they want to display, and in turn, students put more effort into the work they put in the portfolio.

Because portfolios make student - and teacher - work more public, students will include projects that require more effort or creativity. Teachers then have to make the adjustment to provide students with the opportunities to generate that kind of work.

13. **Conclusions**

These 12 lessons represent our collective experience and that of the thousands of students and teachers with whom we have collaborated over the last 12 years. We share them in the hope that you will find them to be touchstones in your implementation as we have. As we all continue in this work, we hope you will add to these 12 with what you learn along the way.

Let us know how you all doing and add your story at [www.techstory.org](http://www.techstory.org).
BrainBank Learning – a Topic Maps E-portfolio system for Meaningful Learning

Session: PS4B

Type: Good practice case study

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Abstract

In this article we present BrainBank Learning, a web based learning tool for building of individual topic maps. The application is developed inspired by constructivist learning strategies, and has as a purpose to support so called meaningful learning and good learning strategies. We also want to present experiences from research and practice when it comes to use of BrainBank Learning. The learning tool is described as a way to build the user’s e-portfolio by linking external and produced learning resources to the learner’s knowledge map. The application is also discussed in relation to modern evaluation methods like evaluation of the learner’s e-portfolio. Finally, version 3.0 of BrainBank Learning is presented, included some new features, taking the application even further in the direction of being a modern toll for e-portfolio.

1. BrainBank: - a strategy for meaningful learning

BrainBank Learning (BBL) is a pedagogical tool for learning of terms and development of learning strategies, in a lifelong and life wide perspective. The tool is developed by Cerpus AS, over a three-year period with empirical testing. (Lavik and Nordeng, 2004, Nordeng et al., 2004, Lavik et al., 2004, Nordeng et al., 2005). The learners work in BBL via the Internet by using a standard web browser. Every learner has his own individual account in the application. Topics the learner meets in the teaching is entered and described in BBL. The topics are then connected, where the learner is invited to describe the associations between the topics. In this way, the learner constructs his own personal network of topics and associations, a topic map that represents the learner’s documented knowledge.

The purpose of documenting the learning process in this way is to stimulate a deeper understanding of the knowledge as well as the ability to use the knowledge map for navigation, and finally to reuse the knowledge structure later. By attaching images, text, video clips and sound clips to the topics in BBL, the learners can construct their own digital e-portfolios in a topic map structure. BBL was originally built in a constructivist pedagogical tradition (Wilson, 1996, Jonassen and Rohrer-Murphy, 1999) where David Ausubel’s theory about so called ‘meaningful learning’ has been one of the sources for inspiration (Mintzes et al., 2000, Ausubel, 1963). Furthermore, the tool is inspired by Joseph D. Novak and his colleagues’ ideas about knowledge building (Novak, 1990, Novak, 1991, Novak and Wandersee, 1991, Novak, 1977).
ePortfolios in Schools

Even if the application has some similarities with Novak’s “concept mapping” there are some clear differences. BBL is not merely hierarchical in its structure, but it can handle large and complex knowledge structures, again connected to digital contents. This gives the tool a future potential as a powerful e-portfolio tool.

BrainBank Learning is the first application that uses the Topic Maps (TM) standard (Biezunski et al., 1999) in a pedagogical context and focus on the following TM elements: topics, associations, occurrences.

2. The BrainBank project

Phase one of the BrainBank project was carried out at Alsvåg Primary and Secondary School, in March 2001 – June 2003. The research report from the project, written by Kristin Bjørndal (PLP, University of Tromsø) (Bjørndal and Knudsen, 2003), shows that BBL works as a motivator for the learners that enjoy building the knowledge. From a pedagogical point of view, BBL seems particularly promising when it comes to learning strategies and adapted learning.

Pupil 1: “You become more aware of what you read when writing keywords. You pay more attention.”

Pupil 2: “I have to read more concentrated to be able to make keywords and see associations.”

2.1. BBL as an evaluation tool, experiences from practice

BrainBank Learning is currently being tested in three projects:

In a project partly financed by Høykom (government funding program for building of broadband and development of digital content, http://www.hoykom.no) BBL is tested in primary schools in the three Norwegian municipalities of Bø, Sortland and Øksnes.

In the project “Transparent Learning”, financed by Cerpus AS, Nordland Fylkeskommune (County of Nordland) and Innovation Norway BBL is tested in three high schools in the county of Nordland.

In a project partly financed by “Transparent Learning” (http://www.fleksibel-læring.uio.no, Norwegian only) BBL has been tested in three master-preparing courses at the Institute for Molecular Biology at the University of Oslo.

Some follow-up research is now carried out on parts of this activity. While waiting on the results from the research we will now share some of the experiences from the classroom from these projects.

2.2. BBL for teaching

BrainBank Learning has been used with various didactical methods and in various methods of teaching. At most times, the learners (alone or in smaller groups) have created keywords (topics) into their brainbanks after a class, lecture, practical tests and in-group work. The learners have had to reflect on learnt material and hence gotten a repetition of it. The learners have, as a minimum needed fifteen to twenty minutes for this process. The learners have also worked with activities related to the learnt material. Instead of writing the answers on paper, the activities have resulted in topics in BBL.

Group work and project work has been important methods of work for the class, and the results from these processes have been taken into BrainBank Learning. Here, the
pupils also have been able to discuss with other pupils to come up with “good” topics, which they in turn enter into BrainBank Learning. Another variant of this is that pupils have been working with a topic that they are presenting for the others. The pupils did this first, in groups, made some good associations between central topics. The results from the group work are then presented as a visualized topic map. This topic map was then used as a starting point for fruitful reflection and discussion.

The teacher did also publish central topics to the learners as a starting to point for further building of knowledge. The pupils did create their own description and created new associations for new or existing topics. This method has been experienced as some kind of problem solving and is highly motivating. From a teacher’s pedagogical point of view, this has also ensured that central topics have become a part of the learners’ knowledge domain. Sometimes, pupils have had as an extra task to search for and attach useful resources from the Internet to the topics. The teachers have also used the same approach and functionality to publish topics with important resources attached to the learners.

The project school has reorganized the school day, so that the pupils have had times to individual work with BBL through the week. The pupils have then been able to use the school’s computers, and this has given room for homework where the pupils specifically were to use BBL. The school has also reorganized the school day to give the pupils longer continuous periods to work at the time. The change to longer continuous work periods has had a positive effect for the work with BBL. Experience shows that 45 minutes often is too short a time to go through thorough process that BBL requires and stimulates.

2.3. BBL and formative evaluation

The teachers have used BBL to evaluate along the pupils learning process. This is done by regularly “taking a look” into the pupils brainbanks. Lacking or poor work will therefore be revealed quite early. Measures have then been implemented to help the pupils. In the opposite case, pupils with many relevant topics and good work have been given greater challenges and adapted activities to do. Another interesting result is that the teachers experienced BBL and the pupils’ production there as feedback on their own ways of teaching. If there were many misunderstandings, or some important topics and associations have fallen out, the teacher could interpret this as a sign that his teachings didn’t quite hit the target as hoped, and that changes was needed.

The visualization feature in BBL was experienced especially fit to process evaluation. When doing group work, the groups were given a topic to find topics for, from the books lexica or the Internet. This was then used as the starting point for a group discussion where the group often ended up with a common knowledge structure. The group presented this to the rest of the class (by using the visualization functionality in BBL) about the topics and associations they had made. This was also a good starting point for a discussion about the subject in question, between the pupils, between the pupils and the teacher, between the group members, etc. In a more subject-like context, this stimulated to good discussions on the validity of the associations and in other occasions, missing associations. The teacher experienced this as a good learning process for all pupils in the class, and an excellent way of evaluating the pupils learning.
2.4. **BBL and summative evaluation:**

The teachers soon experienced that traditional tests for facts was too simple when the pupils were allowed to use BBL. Instead, there were done tests that were adapted to the use of BBL. In the simplest form, the teacher made tests containing central keywords (topics) and then the pupils had to make good descriptions. More advanced tests was made to encourage the pupils to describe associations as well. The tests were e.g. built around reflecting questions. Yet another method, was to set up central topics, and make the pupils associate between them. The pupils will then also have to make simple descriptions of the associations. Experience showed that these variants of tests and tasks effectively separated pupils understanding the learnt material from those merely able to reproduce pieces of it.

2.5. **BBL at the exams**

The first exams with BBL as a tool are planned in June 2005. The pupils will then be able to use BBL to prepare themselves and in the actual exams, as a practical way of displaying their knowledge. The teacher is planning to make questions from a main theme and six to seven sub themes, where the pupils shall choose three of the sub themes. The pupils will be told that at least one of the themes should be presented by using the visualization feature in BBL.

The pupils will present their topic maps (knowledge maps) with attached resources, and the conversation with the sensor will spring out of this. The pupils’ e-portfolio in a topic maps structure, and the presentation of it, will be the criteria for marking of the exams. In the evaluation and the marking is “Blooms knowledge taxonomy” used as a tool (Steine, 2001). This is because the teachers in the project found the same levels from this taxonomy in the pupils’ BBL production.

3. **Topic maps and portfolio assessment.**

3.1. **Portfolio as a method of assessment.**

http://www.pfi.uio.no/uniped/gpm/mapper.html

Portfolio assessment is a method inspired by Bakhtin, Vygotskij, Mead and Dewey, and is based on the theory that learning is a social activity and that social cooperation, dialogue and learning are closely connected. (Dysthe, 2001).

The method evaluates the learning process and the product of the work. The pupils/students pick out pieces of work that they want to be evaluated by, and collect those in a folder, either physical or digital. The portfolio can content finished work, sketches, reflections, responses from teachers a.s.o. This makes it possible to document both the learning process and the knowledge that’s developed through the work. The dialogue is basic in the method. During the process, dialogues in-between pupils and between pupils and teachers are important. Knowledge develops through
dialogue. Responses from teachers and co-learners give the learner possibilities to question and rethink their own understandings.

The portfolios are basically two different types:

- work portfolios
- presentation and assessment portfolios

Work portfolios are portfolios where everything connected to the specific work/task are collected (concerning a subject, topic, project a.o.). There can be several such portfolios.

Portfolios for assessment, exam or presentation are meant to express something about the process and the results of the work through a choice from the work portfolio. They are evaluated by a teacher or an external examiner and use specific criteria that are known for all parts. The products can be developed and improved until the final time for delivery. Process writing is a method that is closely connected with portfolio assessment. Many Norwegian teachers base the portfolio pedagogy upon the method of process writing.

The products can be of all formats; written text in different genres, pictures, film, sound a.s.o. It is the portfolio’s format that sets the limits of the content, but most, both physical and digital portfolios can actually contain a lot already. With an average PC most formats can be copied to a CD/DVD and kept in a folder of any kind. The portfolio can be used not only for the assessment of education, but also for instance in connection with job interviews, further studies, or as web-presentation.

3.2. What are the benefits from portfolio assessment?

According to Olga Dysthe (Dysthe, 2005) the most common arguments for using portfolio assessment are that the portfolio pedagogy will

- promote quality and continuity in the work of learning
- promote the pupil’s/student’s motivation for learning and knowledge of their own learning processes
- give a better basic of assessment than traditional exams
- emphasize the connection between issues, work effort, guidance, criteria, systems of assessment and knowledge acquirement

Portfolio assessment is a way of seeing different aspects of the knowledge development as a entirety. The portfolio will have possibilities to show how the learner “conquers” the subject field during the work process. In this lies also the possibility to discover connections across subjects and to develop a meta perspective on their own learning and knowledge (Dysthe, 2001).

Portfolio assessment is a method fit to present the process that leads to the finished product. It is in this process the constructions of knowledge develop. If it is possible to get pupils/students to reflect on connections during the work process, it will lead to a more conscious learning process. To see that you have produced something can be satisfying in its self. The portfolio assessment shows steps in the work process, and especially for pupils/students that need to see “quick results” the method can be strongly motivating. To many pupils/students who experienced defeats in school, the method can be an alternative of less risk of “loosing” because the process involves steps of trying and failing before the final result. Corrections can be made during the
process, and the responses from teachers and co-workers assure the quality of the work. This reduces uncertainty and opens for new initiatives in the learning process.

Portfolio assessment are based upon the learners previous constructions of knowledge, and will always be possible to use for adapted and customized education which is a strong principle in all education in Norway. In the process of collecting products for the final assessment or exam, valuable reflections take place concerning curricular questions, what’s important to show, how to present an overall picture of the portfolio, a.s.o. This represent an important part of the scientific reflections and give room for reflections on one’s learning strategies and ways of socializing into a working cooperative (Dysthe, 2001). In educational processes there are close connections between working methods and systems of assessment. This concerns both students/pupils and teachers. The teachers need to see the choice of objectives, methods and sources of knowledge in connection with the question of assessment. The pupil/student will also look to the final assessment during the work process and make choices according to that. If the grades depend on the ability to remember the textbook, the learner will probably work on remembering text. In the portfolio assessment method the learning process will be attached great importance as a part of the final assessment. This will make the students/pupils more conscious on their own learning strategies. (Limstrand and Rønningsbakk, 2003).

3.3. Digital portfolios

There are many expectations related to working with digital portfolios. Even if it is the same methodology as physical portfolios, the digital format will have several benefits. The portfolios can content different file formats that make it possible to document the learning processes and final products in presentations of various expressions. We have a strong tradition of using the text media as the common expression in school, but are more and more aware that some learners express themselves better in other formats than written text and that school therefore should open for more use of other medias. (Pictures, films, animations, multi-media presentations)

Another and just as important aspect to digital portfolios is that they easily can be distributed. The traditional form of assessment usually takes place in one-to-one relations between teacher and student with limited insight from others. This gives room for dialogues and reflections, but only within a certain frame. The digital media makes it possible to share thoughts and understandings with anyone, and can give room for learning processes supported by many different dialogues and evaluations. It might be this aspect about ICT-supported learning that will show to be the most interesting in the future.

The communicative side of learning is important in the portfolio pedagogy. Through communication we have access to other people’s thoughts and ideas that “nourishes” our own understandings. The expression of learning consists of elements from the culture and the working community that during time appropriate in the individual (Säljö, 2001). Using ICT, the acquiring of knowledge gets a new dimension. We earlier had a limited access to information, but with the internet this access is enormous. Through available applications pupils and students get new tools that can compensate problems with handwriting, orthography, gramatics o.a, and the ICT offers great possibilities to use other presentation forms than text.
3.4. **BBL and digital portfolios**

The BBL already has structures that can be used as digital portfolios. The principle of constructing knowledge as topic maps in BBL makes the pupil/student able to present reflected associations all from the beginning. This reflection about associations, which is an important part of the learning process, will be focused especially, and not just expected to appear during the process more or less coincidental. This aspect makes BBL a very promising tool. When pupils/students work with concepts and associations in the BBL, we can say that they also create “digital portfolios” in forms of advanced knowledge indexes. The different concepts can be linked to various sources of documentation of the knowledge and the learning process.

Every concept is connected in a structure of concepts that through associations and together with the resources can form a work portfolio related to a topic or a subject. The structure of the BBL makes it possible to define any concept as center of a concept map, which, including the connected structures can be presented as a digital portfolio. It will be possible to present portfolios for various subjects and topics, and also focus on the relations between subjects and topics.

The comment field is important in the BBL. It opens for the dialogue between student and teacher that the portfolio pedagogy is based upon. In the BBL the dialogue goes on about the topics and tasks during the work process. The dialogues will be stored in the BBL and can document the learning process. The teacher can also introduce a set of basic concepts related to a specific subject to all the students to assure that they get introduced to everyone. All in all, BBL offers a set of functions that generally give good support in the learning work and are fit for portfolio assessment. As the data stores in the open standard of Topic Map, the application secures a defensible storage of the individual’s constructions of knowledge and an access to further usage of data in other situations of study or work.

The BBL ver 2 is promising but could improve as in a portfolio assessment perspective. In general the application need to be more user friendly to structure the associations between the conceptions, also in a more hierarchical structure. Further on one can imagine another complex presentation of a problem with the BBL: The students that have collected larger amounts of data in their BrainBank ask for a filtering mechanism to reduce the complexity in the presentation of a topic map, to bring out the context in focus at the moment. As a long-term question one can wish interactivity between the visualization of the topic map and the conceptions list. The BBL should also develop functionality for cooperation between students/pupils. Concretely it could be very interesting to make the BBL support the collaboration in contracting common topic maps. The most pressing is anyway to develop functionality to pick out resources and pieces of work in a topic map structure for a specific presentation or assessment portfolio.

4. **BBL 3.0. – Topic Maps evaluation and positioning in the learning process**

BrainBank Learning 3.0 was released in August 2005 as an answered to some of the requests mentioned above. In this chapter we will present a selection of relevant improvement and addition of features and functionality.
ePortfolios in Schools

Topic types: The users (teachers and pupils) are able to create and use topic types. This is to improve the possibilities of structuring the topic map.

Perspective: With perspectives the user can model the context for which association and resources are valid for a given topic. The example below shows that the topic Pythagoras has been put up with two different perspectives, philosophy and geometry. The context (perspective) will work as a filter for the associations and resources connected to Pythagoras.

Access control: With the next release of BBL, it will be possible for the users to control what a supervisor should have access to the look at in a users BrainBank.

5. Conclusion

BrainBank Learning is today an innovative and exciting pedagogical tool, supporting constructivist learning strategies through the learners building of personal knowledge maps, in the form of TM. The tool shows a great degree of use in learning situations in classes, and it has been developed in close cooperation with research institutions and practical testing.

The tool also supports digital portfolio (e-portfolio) through the possibility to link the external and internal learning resources to the learner’s knowledge index. The application is therefore also well adapted to modern evaluation methods, as e.g. evaluation of the learners’ e-portfolio. With the improvements in version 3, the learning tool BBL appears to be a modern e-portfolio tool with an international potential.

6. References


Novak, J. D. and Wandersee, J. (Eds.) (1991), "Special Issue on Concept Mapping".


Abstract
The programmatic approaches currently in place at a large institution of higher education in the United States are offered for the purpose of sharing an understanding of these approaches and promoting conversation related to the issues of implementation. These approaches are presented in an order of increasing levels of stakeholder involvement, i.e., from strategies that involve minimal requirements, ('low stakes' inclusions of e-portfolio activity), to those programs of complete inclusion where e-portfolio is a required and integral part throughout the educational program.

Keywords
e-portfolio implementation, curriculum mapping,

1. Context
If all e-Portfolios provide is a repository for storing students’ learning objects then higher education has missed a huge opportunity for affecting significant change in teaching and learning. Reflective practice and lifelong learning are terms that have been associated with portfolio work as an instructional strategy long before computer mediated communication became common. Today individual instructors, champions if you will of new e-Portfolios tools, impact the learners within their own courses, yet maximizing the potential of portfolio as an instructional strategy requires the involvement of an entire program of study. In the same vein, e-portfolio implementations which focus on accountability and accreditation mandate an inclusive approach at all levels of the program if the e-portfolio activity is intended to collect valid program evaluation data.

Embedding advising, feedback and support strategies throughout a program of study for students developing e-portfolios is a significant challenge however. And, as with any innovation in education, having all important stakeholders involved is critical. Yet, while the work of Love and others (2004) characterizes the maturation level of the e-Portfolio work itself, a review examining approaches for supporting this work throughout a program of study to maturation is not found in the literature. What strategies exist as programs begin to implement e-Portfolio activity within their own programs of study? What do these strategies involve?

2. Minimal Inclusion
One of the beauties of using portfolios as an instructional strategy is that can be implemented in stages or at various levels. You don’t need to completely revamp
your current curriculum to accommodate portfolio work but can integrate it as a part of a single course, or a single course as a part of a program.

2.1. General Promotion of e-Portfolio Opportunities

Faculty, advisors, and student organizations can all be spokespersons for advocating the unique importance of this student-centered approach to collecting, selecting, reflecting upon and publishing evidence about what you know, can do and value. Research to date demonstrates that a sustained promotional and educational effort, backed up by a modest support infrastructure, can generate substantial interest and involvement in e-portfolio use, even when students must master basic Web publishing skills to participate. (Johnson, 2004) This promotional effort includes presentations about the opportunities that exist as well as the significant motivational reasons why e-portfolio activity is an empowering networking strategy where student can represent themselves in ways not possible before for the purposes of reaching out for even greater opportunities. Many programs have included this type of introductory promotional event within the required First Year Seminar experience.

2.2. General Guidelines

A few programs have taken the process of including e-portfolio activity a step farther by encouraging students to continue the work they started in First Year Seminar experiences. These programs have begun by articulating general guidelines for e-portfolio work within that program. Handed out along side the program’s required course checklist, these guidelines are intended to encourage student e-portfolio developers to think about the types of experiences they should be getting involved in and the evidence they should be collecting as they progress through their program of study.

These guidelines, (Table 1 below), are intended to complement the checklist of course requirements that each degree program publishes and advises from. Essentially faculty in these programs have been asked to address the following question, “As a result of being enrolled in your program, taking courses and becoming involved in the program, what types of evidence should a student’s e-portfolio contain after having completed their first year? What evidence would you then see in the second year? Third year? What evidence and experiences should graduates of your program be able to point to, describe and reflect upon upon completion of your program?”

**Table 1: Evidence Map for Meteorology e-Portfolios**

<table>
<thead>
<tr>
<th>First Year</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiences</td>
<td>Evidence</td>
</tr>
<tr>
<td>- Introductory Course: Meteo 201</td>
<td>- Basic weather forecasting skills: reading &amp; interpreting maps and weather data</td>
</tr>
<tr>
<td>- Participation in College/Dept. Programs</td>
<td>- Campus Weather Service, PSUBAMS, etc.</td>
</tr>
<tr>
<td>- General Education Foundations</td>
<td>- Communication skills, math &amp; science foundations</td>
</tr>
<tr>
<td>- Science and Math Foundations</td>
<td>- Reflective narrative that articulates interests in meteorology, general educational plans, and personal values.</td>
</tr>
</tbody>
</table>
## Second Year

<table>
<thead>
<tr>
<th>Experiences</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Survey Course: Meteo 300</td>
<td>- Basic weather concepts: scientific and physical principles of weather</td>
</tr>
<tr>
<td>- Exploration of Meteorology Options</td>
<td>- Air-Quality Studies, Climatology, Weather Forecasting and Communications, Atmospheric Sciences, Environmental Meteorology, General</td>
</tr>
<tr>
<td>- Continued participation in College/Dept. Programs</td>
<td>- Math &amp; science foundations</td>
</tr>
<tr>
<td>- Science and Math Foundations</td>
<td>- Campus Weather Service, PSUBAMS, etc.</td>
</tr>
<tr>
<td></td>
<td>- perhaps beginning to assume responsibility or leadership roles</td>
</tr>
<tr>
<td></td>
<td>- Reflective narrative that articulates specific interests in meteorology, how the science and math foundations support learning more in this area, and more detailed educational plans that incorporate academic and co-curricular experiences to date.</td>
</tr>
</tbody>
</table>

## Third Year

<table>
<thead>
<tr>
<th>Experiences</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Specialized Meteo Courses</td>
<td>- Course project work that begins to demonstrate a breadth of knowledge and experience within meteorology.</td>
</tr>
<tr>
<td>- Professional Electives</td>
<td>- Detailed course project that begins to demonstrate deep-rooted involvement and understanding of a specific meteorologic concept.</td>
</tr>
<tr>
<td>- Continued participation in College/Dept. Programs</td>
<td>- Reflective narrative that articulates meteorological understandings as they have developed across academic experiences and how this relates to what happens in the real world. Detailed educational plans that incorporate and extend these understandings. This should include reasons why they have selected the program option they have chosen to pursue and how this choice will help them achieve their career goals.</td>
</tr>
<tr>
<td>- Internship Opportunities</td>
<td></td>
</tr>
</tbody>
</table>

## Final Year

<table>
<thead>
<tr>
<th>Experiences</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Specialized Meteo Courses</td>
<td>- Course project work that clearly demonstrates a breadth of knowledge and experience within the field of meteorology.</td>
</tr>
<tr>
<td>- Professional Electives</td>
<td></td>
</tr>
<tr>
<td>- Research Opportunities</td>
<td></td>
</tr>
</tbody>
</table>
300 Participation in Department Colloquium Topics

- Detailed course projects or research that clearly demonstrates deep-rooted involvement and understanding of specific meteorologic concepts.
- Reflective narrative that articulates meteorological understandings as they have developed across academic experiences and how this relates to what happens in the real world. A specific post-graduation objective should follow from these understandings and include evidence and reflection from specific internship and/or research contexts.

General guidelines are not requirements. Guidelines serve as discussion points for student/advisor or student/faculty conversations. The guidelines are ‘low stakes’ for students as no grades are associated and involvement is optional at this time. Faculty need only determine general guidelines for each stage of participation in the program. Yet this is not always as easy as it sounds. It requires that the faculty authors own a more developmental as opposed to a prescriptive approach to teaching and learning. The author contends that the conversation surrounding the articulation of these guidelines this process is foundational to understanding the instructional integrity and validity of a program of study.

3. Moderate Inclusion

3.1. Support Courses

Some programs begin by identifying specific courses which introduce and/or require students to become involved in e-Portfolio activities. First Year Seminar experiences in the College of Earth and Mineral Science (EMSC 100S), the College of Agriculture (AG 150), the College of Communications (PSU 009), and the School of Visual Arts (ART 110S) have organized to utilize this First Year Seminar experience as a place to begin student involvement in e-Portfolio thinking and development.

The College of Earth and Mineral Sciences follows the First Year Seminar experience by offering a 1 credit course, EMSC 300, which focuses on Professional e-Portfolio Development. EMSC 300 is team-taught by faculty and staff members of the College of Earth and Mineral Sciences and the Office of Career Services. Students may enroll in the course for one credit per year throughout their undergraduate careers, up to a maximum of four credits.

(https://www.e-education.psu.edu/courses/emsc300.html)

4. Complete Inclusion

4.1. Key Courses

Rather than insist that every course and every instructor within a program become intrinsically involved with e-portfolios, some programs have identified key courses where student e-portfolio development is required. Penn State’s Music Education
Program, for instance, has identified 4 courses that are taken in successive years in the program:

Music 040 - First Year Seminar - 1st year students
Music 140 - Introduction to Music Education - 2nd year students
Music 340 - Teaching of Music - 3rd year students
Music 495D - Student Teaching Seminar in Teaching Music - 4th year students

In conjunction with e-portfolio work, this program has mapped out the goals, types of evidence, target audience, necessary technical skills and provide examples of student work for student e-portfolios at each of these stages. The program then uses these courses as yearly ‘checkpoints’ where e-portfolio work is intentional and formalized. Nothing prevents instructors outside of these classes from requiring work from their classes which would also become a part of a student’s e-portfolio product. Also, note that the prominence of technical skills decreases, while the emphasis on evidence, selection and reflection increases as a student progresses through the program (Ferris).

(http://portfolio.psu.edu/faculty/music_curric_map.html)

4.2. Evidence Matrix

A different approach has been implemented in Art Education at Penn State. For students in this program selecting evidence throughout their program of study and articulating personal understandings and the meaningful connections they are making as their knowledge, skills and values are being challenged is a critical aspect of becoming an art educator.

Rather than general categories, the Art Education program provides students with an evidence collection framework, titled the “Tapestry”. This ‘big picture’ lays out the range of conceptual threads, skills and values running through the courses that are offered in the art education program. The object here is not to fill in all of the cells. Instead, as students connect evidence and reflections to their own copy of the the framework, this personal “Tapestry” helps to identify the gaps or strengths of the student as they progress through the program.

(http://www.sva.psu.edu/arted/undergrad/nodes.htm)

4.3. Flat-List of Evidence

The Physical and Health Education Teacher Education program in the Department of Kinesiology has implemented another approach. As a means of having students demonstrate a range of important competencies as they progress through the program, selected existing requirements from courses were identified for inclusion in a student's e-portfolio. This flat-list of evidence can easily be checked at various stages throughout the program.

5. Recommendations

While many of the examples given above are taken from teacher education programs, it can be argued that portfolio work can be integrated into a wide range of educational and professional development programs. Continued study is needed to identify the factors associated with and benefits of the various approaches that have
evolved. The following are factors that appear to have had an impact on program direction, factors that all programs should consider:

- students’ prior experience,
- types of evidence involved,
- curriculum constraints,
- accreditation requirements,
- level of faculty involvement, or
- aspects of the professional community.

Furthermore, programs under accreditation review from organizations, such as ABET or NCATE in the United States, might readily look to e-Portfolio tools as a means of tracking accreditation requirements or competencies within their own programs. These institutions, however, should be wary lest the power of portfolio as an instructional strategy be diluted when uploading artifacts becomes just another ‘academic exercise’ on the way to obtaining a degree. It is important to maintain an educational vision that focuses on the process much more than it does on the products to help ensure that tools are used to help make connections among and between what is learned, what is experienced, what matters and why this is important. Rather than making wholesale changes to curriculum and approaches to teaching and learning the portfolio instructional strategy is flexible enough to allow us to think about incremental ways of integrating portfolio thinking where faculty and students have ownership in understanding.

6. References


Abstract

This chapter describes the important role that the concept of e-portfolio plays in new pedagogical paradigms of the Windesheim University. E-portfolio can be seen both as a consequence of and a stimulus for the movement towards student-centered competence based learning.

1. Introduction

In Dutch institutions of higher education the subject of e-portfolio continues to attract increasing interest. This can be explained partly by the focus on competence-oriented education in universities of professional education, in which the emphasis is placed on student development, but also by academic universities’ attention to fostering academic maturity. In the process of educational innovation, the e-portfolio is frequently used as an aid for guiding the learning process or as an assessment tool. It also offers the ‘Net Generation’ students of today the possibility of presenting themselves to various target groups. E-portfolios have the potential to offer clarity and flexibility, which various stakeholders in education have a particular need for, both in learning, teaching and administrative processes.

2. Windesheim University of Professional Education – Portfolio in the Heart of the Organization

During the past four years Windesheim has worked on an integrated and functional strategy for the development and implementation of a campus wide e-portfolio system. In the developed pedagogical model using an e-portfolio is not to be just some extra activity that stands apart for the teachers and the students. Instead it should be a fundamental cornerstone for the pedagogical process on the one hand and the educational institute’s administrative processes on the other. When implemented in the heart of both, an e-portfolio can make learning and teaching more efficient and effective. It supports and improves students’ acquisition of competencies and it also brings about a more transparent and flexible workflow for the different stakeholders involved. In this picture e-portfolio fulfils vital demands for overview and flexibility.

Windesheim plans to use e-portfolio as a tool for both students and faculty in all of the courses, starting with the cohort of 2006-2007. The results of two intensive rounds of pilots have shown that it can make learning and teaching more efficient and effective, when embedded in the workflow of students and faculty. A important element of e-portfolio development and implementation at Windesheim so far has been that the different stakeholders have been involved from the start of the program.
in 2001. By working this way there is common ground regarding the functional specifications, the key processes and the selected tool.

Windesheim has run pilots in 9 of the total number of 10 departments. It is now preparing for an intensive implementation project in terms of educational and administrative processes.

Parallel educational standards for the application of e-portfolio in student centred competence based education within the major-minor model are being developed at a strategic level in the so-called Windesheim Educational Standards.

At Windesheim e-portfolio’s will eventually cover the following primary functions: career counselling, assessing and planning in both Windesheim’s more classic subject courses and especially in so called integrated professional tasks that students work on over a longer period of time.

Figure 1 shows the central position of the student from plan to progress in Windesheim’s competence-based process model that students go through each half year.

A circular model like this one is common in several student-centred e-portfolio approaches in Dutch higher education, one can see the learning cycle of Kolb (1984) shining through.

![Processes in competency-focussed student-centred education](image)

In the portfolio system that Windesheim develops in co-operation with Concord assessment matrices provide an actual overview of work in progress and work done by the students. In this manner the system supports the student centred approach, Windesheim chooses, with the focus on competency acquisition in flexible curricula. Students assemble their Personal Development Plan (PDP) within the portfolio system, in a co-operative setting with stakeholders in the institute itself (fellow-students, coaches, assessors) and in the working field (coaches, assessors).
All of the plans, all of the tasks, all of the work in progress and all of the work done by each student are accessible through the hyperlinks in the matrices in a structured way.

Justification arguments for competency and skills certification in the portfolio system may be circulated for discussion with peers and other selected parties and be made part of the justification process. Each justification can be held at one of several justification levels (Figure 2): Proposed, Required, Plan, Draft, Feedback, Closed, Withdrawn, Finished and Complete. The communication and feedback involved can also be stored in the system. The assessment matrix is where the primary requirements of both reflection and registration are being met.

Figure 2: The student portfolio is available in the VLE (virtual learning environment)

For the students there is always an answer to be found in the matrices on common but vital questions like “Where do I stand?”, “How did I get here?”, and “Where do I move next?” Answers that can be quite relevant to the other stakeholders in a student’s learning process as well, especially in a setting were collaborative learning is important. Students are invited to propose learning tasks themselves to give them more responsibility for their own learning.

At Windesheim the e-Portfolio project has recently become part of a strategic program “IT for student centred education” consisting of the following projects:

1. The upgrade of the student information system
2. The development of and electronic catalogue for majors, minors and courses
3. The e-portfolio project
4. A qualitative approach to the virtual learning environment
5. Information architecture and personalised “my Windesheim” portal
6. Reorganization of the processes and tools for scheduling, testing and progress registration
7. Integrated training and support for the whole set of new systems, developed per stakeholder and implemented per department

The program of projects creates as much synergy as possible in the development (using internet technology web services for system co-operation and integration) and implementation of the different new IT tools involved that will scaffold all of the administrative and pedagogical processes and stakeholders in an integrated way. As a result the organizational shift at Windesheim University will be supported with information technology in an effective and efficient way, with the e-portfolio as an important key element.

3. Conclusion

From this case study that is presented above, we can learn that developing and implementing an e-portfolio is a challenging job that takes a lot of time and energy. It calls for context dependent Folio Thinking that can only succeed when linked closely with educational change in the specific organization at different levels and from different perspectives.

The lessons learned are: pedagogy comes first; we must work on well defined goals towards planned results; all stakeholders should be involved in a multidisciplinary approach; management support cannot be missed, as is the case for functional and technical support; the different IT-tools have to interoperate in a technical architecture that is user-friendly in a personalised way. We can expect more progress in the field of e-portfolio if we succeed in learning and applying these lessons together.
Asking important questions: Research on the influence of electronic portfolios on student learning

Session: PS4B
Type: Abstract

Barbara Cambridge
National Coalition for Electronic Portfolio Research: USA

Abstract

The National Coalition for Electronic Portfolio Research in the United States comprises twenty colleges and universities investigating campus-based questions about electronic portfolio use. Institutions from small liberal arts colleges to large research universities are examining student and faculty ePortfolios to discover the effects of folio thinking and practice on learning outcomes. Research questions include such focuses as learning in professions and in disciplines, learning over time, and effects on identity and critical thinking. In addition, institutions are investigating a common question about the effect on student learning of reflection in ePortfolios. This session will feature examples of research projects from members of the Coalition and welcomes examples from participants in the session. Participants will also identify emergent questions that warrant systematic inquiry.
Implementation and Evaluation of an e-portfolio across a UK Higher Education Institution.

**Type: Full research paper**

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**Abstract**

This paper presents an evaluation of the ePortfolio developed by Pebble Learning (2005). 150 staff and students from four of the ten Schools of the University participated in the pilot scheme over an eight-month period. The evaluation reports the advantages and disadvantages for users. It looks at scalability for cross-University use and seeks to establish training needs. The outcome of the work is that the University of Wolverhampton adopted the ePortfolio for all staff and students from September 2005.

**Key words**


1. **Background**

1.1. **National**

In 1997 Dearing recommended that progress files should be introduced, and as a minimum that they should consist of a record of the qualifications and preferably an element of reflective and personal development. This was reinforced by the ePortfolio white paper (2003) and Burgess (2004) went a stage further and suggested that progress files could play a role as an alternative to degree certificates. Both the Higher Education Funding Council for England (HEFCE) and the Quality Assurance Agency (QAA) have been promoting progress files to help students "reflect upon their own learning and achievements and to plan for their own personal, educational and career development". A significant aspect of the progress file is Personal Development Planning (PDP) and many institutions are experimenting with different ways of encouraging students to reflect on their learning and action plan as well as a method of delivering PDP. The (QAA) issued Guidelines for HE Progress files (2001), which expected students graduating in 2005/06 to have progress files or Personal Development Plans (PDPs), documenting their achievements. The primary objective of PDP is to improve the capacity of individuals to understand what and how they are learning, and to review, plan and take responsibility for their own learning (QAA 2001). Increasingly the concept of portfolios and e-portfolios are being widely discussed across the whole of the educational sector as well as for continued professional development. A portfolio of any form is simply an organised collection of work. Art students have built portfolios for decades. Three current trends that make e-portfolios particular attractive are that:

- Student work is now mostly in electronic form,
Most students have access to the Web.
Databases are available through Web sites, allowing students to manage large volumes of their work (Batson 2002).

1.2. Personal Development Planning at the University of Wolverhampton
The University has always been engaged in supporting student personal development planning (PDP) and the Schools have a variety of schemes in place, from the use of individual learning profiles, to reflective journals and highly developed personal tutorial systems. Research conducted within the University in 2002 – 2003 on the staff and student experience found common agreement that any institutional PDP system should:

- Be a formative, student-centred process
- Be used developmentally by students with tutor guidance
- Be integrated into the whole of the student experience at the university and include academic, personal, career, professional skills inputs.
- Produce outputs useful for students and their future employers

1.3. ePortfolio opportunities
ePortfolios have been criticised for focusing on just one element of PDP, that is recording and presenting achievements. They are commonly a product rather than a support structure for engaging in the all important processes outlined above. However, used effectively they do present a viable and attractive means of delivering all aspects of Progress Files and PDP by enabling learners to plan, record and reflect upon all formal and informal forms of learning. ePortfolios can be used to support communication and collaboration between staff and students and amongst the student body. They offer something for all kinds of learners whether at the stage of transition between levels of learning, moving to or seeking employment or simply recording achievement. The greater convenience, in terms of portability of an electronic system over paper bulk and the opportunity for increased formative feedback from staff and peers along with an ability to add live performance by video has seen a tremendous surge of interest in ePortfolios, especially amongst the HE community.

Most ePortfolio systems have been developed in North America where the educational ethos is qualitatively different to the UK. American-based ePortfolio systems include those by Chalk and Wire (2005); Nuventive (2005); ePortaro (2005) and the open-source product OSPI (2005).

Those developed in the UK tend to have been produced for specific groups of students undertaking well-defined programmes of study particularly in medicine-related areas (ePET 2005). Recent developments have also seen the entry of learner management system (LMS) vendors (e.g. Blackboard 2005) into the ePortfolio arena offering bolt-on systems. These seem to be finding favour with some institutions if only because they may ease the implementation phase due to staff already being familiar with the common elements of the system. A survey of these commercial systems and e-portfolio products concluded that there was no suitable ‘off the shelf’ software package that could support personal development planning in the reflective and development way desired by the University. The Personal, Academic, Career and Employment (PACE) team, within the Centre of Excellence in Learning and Teaching at the University of Wolverhampton, contracted a small spinout company –
Pebble Learning (2005) – to develop suitable software. Their challenge was to produce a system that demonstrated all the benefits of record keeping and presentation demonstrated by current ePortfolios while also being pedagogically well-informed, user-friendly and process based.

This report presents an evaluation of the use of the Pebble Pad ePortfolio with 150 staff and students within four of the ten Schools of the University in the 2004-5 academic year.

1.4. Aims of the Evaluation
The specific purpose of the evaluation was to

- identify the advantages and disadvantages of using the ePortfolio system from both a staff and student perspective
- explore and report on any issues on scalability for cross-University use.
- make recommendations on staff and student training.
- bring to the attention of the steering committee any other matters arising that may effect a University wide implementation in September 2005.

2. The Evaluation
This section briefly introduces the ePortfolio, identifies the staff and students that have been involved in the evaluation and the methodology used.

2.1. Introduction to Pebble Pad
The system developed at the University of Wolverhampton by Pebble Learning (2005), Pebble Pad, has been designed to be generic – an institutional necessity with 10 schools, 200 subjects and a diverse student body of 22,000. The system provides 6 structured entry forms designed to accommodate the recording of a range of skills, experiences and reflections typical of most learning experiences. Additionally students can store a wide range of external file types in the system. Records and files within the ePortfolio can be easily aggregated into complex WebFolios (personalised websites) and can be shared with others using user-defined permissions to facilitate the gathering of feedback or assessment.

2.2. Staff and student groups involved in the evaluation
Six out of ten Schools initially volunteered to pilot the ePortfolio but were unable to identify a suitable student group. Four Schools participated and the Students Union. Table 2.2 identifies the numbers involved.

<table>
<thead>
<tr>
<th>Group</th>
<th>Use</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEd Staff and Students</td>
<td>PGCE part-time assessed portfolio</td>
<td>15</td>
</tr>
<tr>
<td>HLSS Staff and Students</td>
<td>Religious studies module, personal tutorials and assessment.</td>
<td>25</td>
</tr>
<tr>
<td>UWBS Staff</td>
<td>Introductory session and planning for next year</td>
<td>3</td>
</tr>
</tbody>
</table>
### Table 2.2 Numbers of staff and students by School who participated in the evaluation

<table>
<thead>
<tr>
<th>School</th>
<th>Activity</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>UWBS Students</td>
<td>PG part-time in Human Resources, assessed CPD (no staff involvement)</td>
<td>25</td>
</tr>
<tr>
<td>SAS Staff and Students</td>
<td>Environmental Sciences, one component of laboratory circus and scalability test</td>
<td>100</td>
</tr>
<tr>
<td>Students’ Union officers</td>
<td>Self directed use for career planning</td>
<td>5</td>
</tr>
<tr>
<td>SSPAL staff</td>
<td>Introductory session and planning for next year</td>
<td>3</td>
</tr>
<tr>
<td>SLS staff</td>
<td>Introductory session and planning for next year</td>
<td>5</td>
</tr>
<tr>
<td>Staff and students</td>
<td>Scalability test – simultaneous login</td>
<td>47</td>
</tr>
</tbody>
</table>

#### 2.3. Methodology

The evaluation team used an on-line questionnaire (see Appendix 1) and semi-structured focus groups for staff and student meetings (see Appendix 2). A scalability test was conducted with staff and students simultaneously logging into the system from within and external to the University.

#### 3. Results

##### 3.1. On-line questionnaire

The questionnaire (Appendix 1) was completed by about 25% of the users. There was general agreement that:

- The introduction to ePortfolio was clear; it was easy to input existing achievements; and ePortfolio was straightforward.
- ePortfolio being useful for reflection; identifying strengths and weaknesses; identifying transferable skills; recording achievements; target setting; and supporting professional and personal development.
- The hints facility on ePortfolio was helpful and the different stages of producing an input useful, however, more face-to-face and online support for use of ePortfolio was needed.
- Using ePortfolio will allow students learn better; present themselves better to possible employers; will develop their IT skills and using ePortfolio will make students better at reflection.

The respondents were not sure that:

- ePortfolio was useful for planning their future; supporting learning in their subject(s) and organising discussions with their personal tutor.
- Use of ePortfolio being supported by their personal tutor and by their lecturers.
3.2. Staff focus group

3.2.1 Advantages

Staff currently using the ePortfolio and those considering it all commented that the interface was attractive and inviting to use. Users reported that it was easy to navigate and share information. They found the webfolio gave a good demonstration of how it could be used with students. They liked the potential for encouraging students to organise reflective practice with the added potential for collaborative sharing and learning. It was less bulky than the current paper based version and could be tailored to professional development making the process more relevant.

3.2.2 Disadvantages

Staff currently using ePortfolio shared common views about the time that was needed to up-skill. They felt that more guidance and hints and tips were needed. All commented that the text boxes were too small and that there needed to be a spell check facility. There was concern about giving feedback and keeping copies for external examiners (extensive cutting and pasting). The issue of recording submission was also raised.

Staff on the Walsall campus raised issues about the lack of suitable rooms to run sessions with the ePortfolio.

3.3. Student focus groups

3.3.1 Advantages

All students considered that the interface was attractive, engaging, easy to navigate (even for technophobes), very professional and addictive. One student had used an ePortfolio within Blackboard that had no interaction and had simply not been able to use it, against that experience she reported that it was easy to use, very collaborative and had helped her to become a confident technology user.

The group sharing was seen as a major success, and an activity that could not be achieved with paper. This provided a strong bonding activity for the group, the initial tutor led tutor support changed to student support over the programme.

Over 50% of the student involved with the pilot who responded to the questionnaire said that they would continue to use it to keep up with technology, for self-support and discussion and all said they would continue to use it with tutor support.

3.3.2 Disadvantages

There was widespread agreement that there was a level of frustration in the discovery learning approach used in some of the student groups, overall it was felt that there needed to be more examples, guidance and more tips and hints available on-line e.g.

- Creating a document
- Uploading files
- Creating links
- A brief on-line and paper based guide to getting started
- On-line user guide
Some students expressed a lack of trust of an e-system preferring paper for confidentiality and to protect their work from viruses.

3.4. Staff views on implementation

If the ePortfolio is to be successfully implemented staff felt that it had to be used initially within modules that already had well developed reflective practices and/or work based project modules, professional training and that it must be incorporated within the assessment criteria in modules. There were strong feelings that it should not be imposed but allowed to be used effectively and appropriately as need requires. Where it is to be used, the introduction needs to be provided during induction as professional practice and introduced to WOLF and other School practices. The views of the Students' Union officers differed in that they felt the portfolio should be introduced at the start of the second semester to allow students time to reflect are the importance of skills and their own future direction. All agreed that high aspiration and purpose has to be given to the students with full guidance from academic, support, learning and IT centre staff. Student ambassadors/peer tutors were proposed as a way of ensuring sufficient support for the implementation.

It was universally felt that staff and students required on-going direction and support and that the IT helpdesk, Learning Centre staff, Careers staff, Technology supported learning and Student support co-ordinators need to be trained and available to provide advice and support on demand.

3.5. Access to the system

Students had not experienced any significant problems accessing the system through dial up or broadband, there were comments about the being unable to work offline but no access issues were reported. The only groups to report problems were the Students’ Union officers and the Human Resource students who had problems with Flash 7 (due to either using external networks which were secured, therefore unable to easily download the software or had extremely old computers that ran slowly). Some lost interest in continuing to create assets.

3.6. Technical Issues and Scalability

3.6.1 Software Technology

Pebble Pad is built around a Microsoft SQL 2000 database whilst the user interface uses Macromedia Flash version 7. SQL fitted the University IT environment being the current standard for databases applications. Flash 7 was initially an issue, as this was not used for other University applications. A web browser plug-in for Flash 6 had been deployed solely to allow access to external web sites. Flash has a poor reputation in some quarters from being used to add unnecessary and unwanted animations to otherwise acceptable web sites leading to slow response particularly over dial-up connections. Accessibility is poor for Flash 6 but improved in Flash 7.
This led to three concerns.

- Flash 7 was not standard in the University
- Use over dial-up connections
- Accessibility

It was possible to include Flash 7 on general purpose Windows 2000 student PCs for September 2004 in time for the initial pilot of Pebble Pad. The University had standardised on Flash 6 when the standard staff Windows 2000 environment was built and tested. For staff machines, after initial compatibility tests it was rolled out to all staff early in January 2005.

Users during the pilot reported positively on the appearance and navigation of the software which is a direct result of the use of Flash.

Use over dial-up was tested during Summer 2004 before the pilot went live. There was some additional delay loading Pebble Pad over that seen when using the University network but once the application had loaded, use over dial-up was acceptable. No significant dial problems were reported.

**3.6.2 Server Performance & Scalability**

Current server hardware for the system consists of a Dell server with:

- Dual 2.4Ghz processors
- 2Gb Ram
- 33.8Gb drive c: (OS)
- 33.8Gb drive e: (Application & data)

No problems with performance were identified during the pilot, performance monitoring showed the server had plenty of spare capacity. However it was recognised that the system had never been loaded with significant numbers of concurrent users. The standard scripting tools which IT Services have used in the past to test performance of web based systems could not be used in this case as they do not work with a Flash application.

In order to test scalability a trial session was organised on 21/04/05 with multiple simultaneous logins. Appendix 3 provides the data. A log of system performance was kept before, during and after the session by IT Services for later analysis. Processor usage did not exceed 8% and disc traffic was very low throughout the session. Significant disk traffic was not seen until after the session when the Pebble Pad log file was flushed prior to the start of the automated backup.

Performance should not be an issue whilst usage remains at the level during the test. Processor and disk use are so low that there is no evidence from the above test to indicate at what level of use the server would be saturated.

It was noted that the Pebble Pad log file had grown from 15 Mbytes to 86 Mbytes during the session. Growth of this log file could become an issue with larger scale use and would recommend both moving the log file to it’s own disc partition and fixing a limit to the size to which it can grow, as well as establishing maintenance tasks for logfile housekeeping.

The tests were carried out with the software as it stood at the time of the test. It cannot be automatically assumed that the test results will remain valid when the
software changes. IT Services recommend that a performance-testing tool be used to establish the limits on the number of concurrent users that the server can support. Server performance is unlikely to be an issue in the short term provided that the software is not changed significantly and that usage does not greatly exceed that seen in the test session. Should performance become a problem, IT Services would recommend running SQL and Web server (IIS) on separate servers.

3.7. Legal Issues
As with any system for handling, storage and accessing information, the ePortfolio needs to conform to legislation. A useful JISC workshop was held on 11th April 2005 covering legal issues around e-Portfolio developments. The importance of considering legal issues and documenting decisions was emphasised.

3.8. Storage and processing of information and the Acts that apply

- The information stored in an ePortfolio relates to individuals so is subject to the Data Protection Act 1998 (DPA).
- The Regulation of Investigatory Powers Act 2000 (RIPA) covers the interception of communications so would apply to communication between student and tutor.
- The Freedom of Information Act 2000 (FOIA) covers public access to information held by the University.
- The Copyright, Designs and Patents Act 1998 would apply both to the intellectual property contained in the program code and design of the system and to the data that is held in individual e Portfolios.
- It is important to ensure that Pebble Pad conforms to Special Educational Needs and Disabilities Act 2001 (SENDA).

The National Centre for Recording Achievement (CRA) based in the UK has produced a template to support the assessment of an ePortfolio against the different legal acts. Appendix 4 provides the template and looks at the way in which Pebble Pad covers the various aspects. In terms of this type of product there were no areas of major concern and the software can be seen to adhering to most of these preferred options.

4. Summary
Overall the ePortfolio pilots have been successful in eliciting a clear direction for development and implementation.

All participants found the ePortfolio to be attractive and easy to navigate which justified the commitment to use Flash. If it is to be implemented successfully the benefits of use must be clear to both staff and students and there needs to be a high level of hands on support at the beginning of the training.

From the pilots it is clear that the tool is robust both in terms of scalability and internal and external access. Some of the concerns from staff and students regarding the size of the text boxes and online support have already been addressed. Other concerns such as the colours and the spell check have been noted and are currently being developed.

In terms of the legal and interoperability aspects, the product is ahead of the issues and is recognised as continuing to work towards and meet any arising criteria.
The most important aspect for the University is implementation and this requires staff in Schools and key service departments (IT services, Learning Centres staff, Schools, Careers staff etc) to undergo common training. In pursuing implementation this should be an evolving and development route that ensures both staff and their students are trained, motivated and have high aspirations for the tool.

Although one group of staff discussed a separate personal and professional development module in general, staff and students were united in the need for e-portfolio to be embedded into the core subject modules and required by the professional bodies. Such a route is considerably more demanding on staff in terms of their working knowledge of the tool, their ability to teach use of it in a way that is relevant to their subject, and their ability to engage in innovative curriculum design. This will entail considerable staged staff development beyond initial training and orientation.

Activities focused on the possible ways of embedding use of Pebble pad in the curriculum and the development of exemplar materials will be required. It also means that students need to be convinced of the clear links between use of such a tool and their learning in their chosen subject(s). As such student induction to the tool needs to go well beyond an initial introduction from central staff and discovery learning to include clear staff leadership on this within their subject discipline.

Those who used the tool for communication and sharing were particularly positive about it being crucial in moving from a tutor-led to student-led learning. This element is clearly a pedagogic strength of this tool and should be stressed in its subject-based use. The professional nature of the individual webfolios produced were also of a high quality.

5. **Recommendations**

- That the PebblePAD system is adopted by the University for all staff and students from September 2005. An icon should be created on all University desktops.
- An implementation group of all interested parties i.e. Schools, IT services, Learning Centres, Careers, Human Resources, Centre for Excellence in Learning and Teaching, Students Union, Registry is established chaired by an E-portfolio co-ordinator. This group will co-ordinate the training and implementation of the tool.
- The pilot identified the need for one to one support during initial and early adoption. Consideration should be given to the use of student ambassadors during this period.
- That the important staff development requirements identified by the pilot be addressed. This is of pivotal importance because the pilot has identified that embedding the use of Pebble pad within the curriculum is far more successful than using it outside formal learning situations.
- That Pebble Pad be put through nationally recognised tools to assess the accessibility of the software and interface.
- Consideration needs to be given to student access to records beyond their time at Wolverhampton. If the data and materials are not portable or accessible they lose a lot of their value.
6. References


EPET (2005): [http://www.eportfolios.ac.uk/](http://www.eportfolios.ac.uk/)


Pebble Learning (2005): [http://www.pebblelearning.co.uk](http://www.pebblelearning.co.uk)


QAA (2001) Guidelines to HE progress files

7. Appendix1: Online Survey Questions designed through ‘Surveyor’

Question 1: What is your student Number?

Question 2: Which school do you study at?

Question 3: What subject(s) do you study?

Question 4: What is your year of study?

Question 5: What is your current average mark?

Question 6: Gender:

Question 7: Ethnicity:

Question 8: Age:

Question 9: I have been using ePortfolio

Question 10: I have enough IT skills to use ePortfolio effectively

Question 11: I have previously used a record of achievement or other tool

Question 12: I have found such processes of recording, reflecting and planning, useful in the past

Question 13: ePortfolio is useful for reflection on my learning

Question 14: ePortfolio is useful for identifying my strengths and weaknesses

Question 15: ePortfolio is useful for identifying my transferable skills,

Question 16: ePortfolio is useful for recording my achievements
Question 17: ePortfolio is useful for planning my future
Question 18: ePortfolio is useful for target setting
Question 19: ePortfolio is useful for supporting learning in my subject(s)
Question 20: ePortfolio is useful for supporting my professional development
Question 21: ePortfolio is useful for my personal development
Question 22: ePortfolio is useful for organising discussion with my personal tutor
Question 23: When I first used ePortfolio, it was clear to me what to do.
Question 24: I like the design and ‘look’ of ePortfolio
Question 25: I found the introduction to ePortfolio clear
Question 26: On-line support for ePortfolio is helpful
Question 27: My use of ePortfolio is supported by my personal tutor
Question 28: My use of ePortfolio is supported by my lecturers
Question 29: ePortfolio should be formally assessed
Question 30: Use of ePortfolio should be optional
Question 31: I am making extensive use of ePortfolio
Question 32: ePortfolio is simple and easy to use
Question 33: It is easy to input my existing achievements into ePortfolio
Question 34: My experiences easily fit the ePortfolio format
Question 35: I have appropriate time to use ePortfolio effectively
Question 36: Making use of ePortfolio is not a high priority for me
Question 37: I would prefer a paper-based portfolio system
Question 38: It is easy to attach appropriate documents and files to my ePortfolio
Question 39: I find ePortfolio clear and straightforward
Question 40: I would like more face-to-face support for my use of ePortfolio
Question 41: I would like more on-line support for my use of ePortfolio
Question 42: The hints facility on ePortfolio was helpful
Question 43: The help facility on ePortfolio was clear and effective
Question 44: It is easy to provide feedback on my experience of using ePortfolio
Theme: ePortfolios in Higher Education

Question 45: I have found ePortfolio useful for recording my thoughts
Question 46: I have found ePortfolio useful for recording my experiences
Question 47: I have found ePortfolio useful for recording my abilities
Question 48: I have found ePortfolio useful for recording meetings
Question 49: I have found ePortfolio useful for recording my action plans
Question 50: I have found ePortfolio useful for recording my achievements
Question 51: I found the different stages of producing an input useful
Question 52: I have found the sharing facility on ePortfolio useful
Question 53: I would have liked other input fields
Question 54: I will use ePortfolio to generate my CV
Question 55: I will use ePortfolio to produce a WebLog
Question 56: I will use ePortfolio to produce a WebFolio
Question 57: Using ePortfolio will help me learn better
Question 58: Using ePortfolio will help me present myself better to possible employers
Question 59: Using ePortfolio will make me a better professional
Question 60: Using ePortfolio will develop my IT skills
Question 61: Using ePortfolio is making me better at reflection
Question 62: What is the best thing about using ePortfolio?
Question 63: What is the worst thing about ePortfolio?
Question 64: What one key improvement would you suggest to ePortfolio?
Question 65: I have not used ePortfolio because:
Question 66: Any other comments?
Beneath Still Waters: Mapping a Landscape for Understanding e-Portfolio Implementation in Higher Education

Type: Work in progress

Johnson, Glenn, Penn State University, gfj100@psu.edu

Abstract

This paper offers a framework for organizing not only current work but also hopes to provide the necessary ‘footholds’, areas where knowledge and understandings about e-portfolio implementation have yet to be gathered. However, while this framework might be a helpful mechanism for the accumulation of knowledge that takes place around the globe, each institution needs to consider those findings in terms of their own institutional context and constituencies.

Keywords

e-portfolio implementation, e-portfolio research

1. Context

One of the primary requirements of adopting something new should be that it do a better job than what we are already doing. The problem is that we oftentimes don’t know much about the ‘something new’ so we dip our toes into a new stream of practice, get our feet wet, and eventually start wading around a bit. Random, aimless wanderings at any point in this process sometimes bring with it unfortunate consequences as many find out too late that, “Beneath still waters, there’s a strong undertow…” (Frazier, 1971). Undertows, unforeseen sinkholes, and other hazards are important to know about but whether they are simply obstacles that can be worked around or complete showstoppers can’t be determined in isolation. Rather, a larger picture of what we know needs to be drawn so that we can determine whether or not this is a river we can afford to cross and the costs involved in the crossing. The more we have explored, the more this picture is developed, so to speak.

e-Portfolio implementation today has many of us in the same position, pants rolled up to our knees standing out in a river perhaps a little bit farther than we are comfortable with. Why the trepidation? This is a body of water that we should have good reason to be comfortable with – at least it looks awful familiar on the surface. First, portfolio as an instructional strategy, has been around for a long time. Second, many institutions of higher education have or will soon have crossed the river of Course Management System implementation. One would think that having experience in both realms would set us up for understanding what we are getting into with regards to implementing e-Portfolios. Why not just dive right in? (back to Frazier’s tune…) “…The surface won’t tell you, what the deep water knows…”

2. Overview

It is unlikely that top-down decisions will be issued from administration requiring the use of an e-Portfolio system across a university system. As well, it would be unusual to find or develop powerful grassroots coalitions from a constantly changing student body advocating these requirements either. Instead, a more practical approach involves planning for three phases of implementation. The first phase in the framework focuses on making a case for e-portfolios; putting forward the ideas,
identifying and connecting champions and understanding support. Based on the successes of these initial efforts, once a positive case has been made and e-portfolio activity has begun, understanding this activity is the next goal. This examination of e-portfolio activity, especially when implementation supports both institutional assessment as well as reflective practice, should be positioned in the context of how this implementation advances the mission of the institution. Collecting data to help drive decision-making wherever possible is critical.

**3. Overarching Questions – Administrative and Pedagogical Efficiencies**

Institutions of higher education are driven by both administrative and academic missions, within this context therefore, the overarching goal of any e-Portfolio Initiative should target the administrative and pedagogical efficiencies related to e-Portfolio implementation. The bottom line for administration is being able to justify the return on its investment. Is it worth the costs involved? Can it do a better job, more efficiently than that which we are already doing? In what ways can an e-Portfolio implementation effectively advance the mission of the institution? The academic mission, on the other hand, is focused on the quality of the teaching and learning environment. Are there pedagogical efficiencies which will have new positive impacts on teaching and learning in ways more significant than without e-Portfolio implementation? Both the administrative and academic sectors react to hunches but will make strategic decisions based on data. The framework presented here intends to help organize and give direction to the findings these data reveal.
4. **Making a Case for e-Portfolio**

The first step involves activities related to making a case for considering any new system or process. A basic justification must be developed and stakeholders must be identified and involved in order to proceed. This can begin with simply promoting awareness of the new possibilities. New initiatives can serve this purpose here. The goal is to establish a foundation of interest and need for new activity. At the same time, while new ways of doing things are often enticing, the practical counterpart should also begin investigating the basic required supports necessary to encourage further adoption and sustain implementation. e-Portfolio work can take place using simple web publishing applications and open web space for this purpose. Research to date demonstrates that a sustained promotional and educational effort, backed up by a modest support infrastructure, can generate substantial interest and involvement in e-portfolio use, even when students must master basic Web publishing skills to participate. (Johnson, 2004)

5. **Understanding e-Portfolio**

Making a case for e-Portfolio activity that has garnered moderate institutional support allows for more in depth investigations to occur. It would be difficult to target the understanding of what e-Portfolios are all about without a robust set of users to draw data from further informing decision makers. Having groups of instructors and students, or entire programs of study involved in e-Portfolio activities allows an institution to gather information about the type of evidence published, the activities related to selecting and reflecting upon this evidence and other issues related to implementation within their own context. These issues may be related to assessment, privacy, and security.

With the advent of e-Portfolio enterprise applications that are now available an institution may also investigate the implementation of such a system. Now, an entirely different perspective of portfolio activity can be examined within this new context. Studies should also target new application support issues as well as the differences between skills sets required for e-Portfolio developers within different environments. Again, it is important to focus on the overarching questions that focus on administrative and pedagogical efficiencies. Is it likely that e-Portfolio systems can move an even larger percentage of students towards a web-based model where higher levels of academic, personal and professional responsibility might be more efficiently be demonstrated? To what degree does learner control influence or promote meta-cognitive activity necessary in reflection?

6. **The Line Across**

The line drawn across the framework has a positive slope and is located within the ‘Understanding e-Portfolio’ phase. This line represents a dichotomy in approaches to electronic portfolio implementation. First, some institutions have elected to install e-portfolio enterprise solutions providing users with web-based templates for uploading, managing and publishing evidence and artifacts. In contrast, institutions such as Penn State University provide MBs of online space, the software and support necessary for students to design from scratch their own unique online representation of their Penn State experience. Second, some institutions focus on the products associated with e-portfolio activity especially those related to assessment and accreditation. For others, the product is not as important as the process, supporting
the development of the reflective practice among other lifelong learning skills. In addition, the positive slope of the line serves to remind us of two important issues that play a central role in either implementation context. First, the positive slope should remind us of the importance of understanding Barrett’s notion of locus of control as it relates to student-centered empowerment as opposed to institutional accountability when examining either the enterprise solution or the open web space context (Barrett, 2004). Second, the positive slope also indicates that while adoption rates using open web-space have been positive but slow, would we see significant increases in adoption, i.e., a greater return on our investment with the implementation of an enterprise solution?

7. The Impact of e-Portfolio

It is only after having studied the nature and activity of program directors, instructors and students involved in e-portfolio work under a range of difference contexts, (both system and open web-space oriented), that we will begin to test our hypotheses regarding the overall impact that e-Portfolios have on a program of study or larger still the institution as a whole. Concepts such as empowerment and life-long learning will only become meaningful when these types of conditions for research exist within an institution. Program evaluation and the effectiveness of using e-Portfolio evidence for accreditation purposes are also issues that will be derived from a range and depth of experiences.

8. Concluding Remarks

The danger of providing any general overview on a topic is to over simplify and reduce the value of portions of this area of study. It is the intention of the author to share our understandings for the purpose of promoting conversation on the administrative and pedagogical efficiencies that this new perspective on teaching and learning can provide us.

9. References


10. Appendix 2: Staff and student focus group questions

10.1. Staff just starting to use/recently introduced to ePortfolio

- How did you hear of ePortfolio
- What has made you interested in wanting to use ePortfolio
- How do you think you may use ePortfolio with your students
- Do you have any concerns over using ePortfolio
- How much support do you think you will need
- Have you used reflective practices before with your students
- When are you planning on starting to use ePortfolio
10.2. Staff already using ePortfolio with their students

- When did you start using ePortfolio with your students
- How did you implement ePortfolio into your course
- What do you think helped with implementing ePortfolio
- What areas of ePortfolio are you using
- Were there any barriers
- What level of support did you receive
- What key improvements would you like to see
- Do you still have any concerns with ePortfolio

10.3. Students just starting to use/recently introduced to ePortfolio

- How did you hear of ePortfolio
- Is it compulsory to use ePortfolio
- What are your opinions on being introduced to ePortfolio
- Do you have any concerns over using ePortfolio
- How much support do you think you will need
- Have you used reflective practices before
- What are your initial impressions of ePortfolio
- Which parts of ePortfolio do you think you will find most useful
- Do you think you will use ePortfolio outside of your course
- Are there any areas you wish were different

10.4. Students using ePortfolio for a number of months

- When did you start using ePortfolio
- How were you introduced to ePortfolio
- What areas of ePortfolio are you using
- How has using ePortfolio helped you (benefited you)
- Were there any barriers to you using ePortfolio
- What level of support did you receive
- Are you using ePortfolio outside of your course
- What key improvements would you like to see
- Do you still have any concerns with ePortfolio

11. Appendix 3: Scalability Results 21/04/05

<table>
<thead>
<tr>
<th>User Number</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Staff user logged on for demonstration purposes.</td>
</tr>
<tr>
<td>2</td>
<td>Staff user logged in at 18.10, all fine and dandy, created an action plan and a webfolio uploaded an image and shared the webfolio.</td>
</tr>
<tr>
<td>3</td>
<td>Staff user logged in at about 18.25 from home (external), opened up three messages shared from another user; read, inwardly digested and (I'm afraid) responded to them via email, since the message were also available to me on email. No problems getting in.</td>
</tr>
<tr>
<td>4-9</td>
<td>5 staff users logged in at 18.10 and all created an action plan to which they added a file and then shared and opened the asset. Experienced no problems on laptops from within the university</td>
</tr>
</tbody>
</table>
Theme: ePortfolios in Higher Education

<table>
<thead>
<tr>
<th>User Number</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Staff user logged on at 18:00 from home. Whilst logged on they had a look around at the 'pebbles' and what they did and where they led. She entered a couple of sentences into two of the 'pebbles' and saved it. Logged out at around 18:20.</td>
</tr>
<tr>
<td>11</td>
<td>Staff user logged in at about 17.53pm and it took about two minutes to open (using dial-up...She then sent a thought to 2 other users. Tried to log out at about 6.15 but had to do an end task...CTR/ALT/DEL.. When tried to log out via the 'little door' she then had a screen asking me to confirm whether she really wanted to log out and it wouldn't let her confirm 'yes'.</td>
</tr>
<tr>
<td>12</td>
<td>Staff user logged on at about 18.10 and 'played' around with some assets sharing with another user and sending messages to him. The logging out took a little while though! (Seconds).</td>
</tr>
<tr>
<td>13</td>
<td>Was there, from home, no problem.</td>
</tr>
<tr>
<td>14-16</td>
<td>3 Staff users within MA Great Hall. Logged on at 18.30, created assets. No problems. Logged off at 19.00.</td>
</tr>
<tr>
<td>17-30</td>
<td>14 student users logged on at 18.20. Created assets, shared assets. Some sharing problems (community pad did not show – had to log off and log in again).</td>
</tr>
<tr>
<td>31-47</td>
<td>15 student users logged on at 18.30. Created assets, saved work. Still remained logged on at 19.00.</td>
</tr>
</tbody>
</table>

### Appendix 4: Impact of Legislation

<table>
<thead>
<tr>
<th>Area of legislation *</th>
<th>Relation to ePortfolio</th>
<th>Area of concern</th>
<th>Mitigating factors</th>
<th>Level of risk to the University</th>
<th>Further action recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPA</td>
<td>Does ePortfolio conform to University Registration under the act?</td>
<td>Not yet confirmed</td>
<td></td>
<td>Medium</td>
<td>Check with University Secretary</td>
</tr>
<tr>
<td>DPA</td>
<td>Data held in a student’s ePortfolio is personal information</td>
<td>Accuracy of information held</td>
<td>Data is created by the student themselves</td>
<td>Low</td>
<td>None</td>
</tr>
<tr>
<td>DPA</td>
<td>Data should be held only for as long as it is required</td>
<td>Retention of data after student's leave</td>
<td>Current plans envisage offering student’s a copy of their ePortfolio on CD-Rom</td>
<td>Low</td>
<td>Define procedure for producing CD-Rom and deleting student accounts on the ePortfolio system</td>
</tr>
<tr>
<td>DPA</td>
<td>Obligation to keep data secure</td>
<td>Unauthorised access</td>
<td>Electronic access</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Area of legislation *</td>
<td>Relation to ePortfolio</td>
<td>Area of concern</td>
<td>Mitigating factors</td>
<td>Level of risk to the University</td>
<td>Further action recommended</td>
</tr>
<tr>
<td>-----------------------</td>
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<td>-------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>DPA</td>
<td>Obligation to keep data secure</td>
<td>Data loss</td>
<td>Security patches applied to servers. Backups taken regularly and stored off-site.</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>RIPA</td>
<td>Tutor and student interaction is a form of electronic communication</td>
<td>Illegal to intercept except in specific cases</td>
<td>No mechanism for third parties to read information except under control of student</td>
<td>Low</td>
<td>Those developing and managing the system MUST not read the content of individual ePortfolios without permission or authorisation</td>
</tr>
<tr>
<td>FOIA</td>
<td>Public can request any information held by the University</td>
<td>Might be requests for information held</td>
<td>Exemption applies as ePortfolio is personal information subject to DPA</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>IPR</td>
<td>Pebble Pad design and source code</td>
<td>Support in event of failure of supplier</td>
<td>Important if ePortfolio becomes an integral part of Learning process</td>
<td>Medium</td>
<td>Should be addressed through contract with Pebble Learning</td>
</tr>
<tr>
<td>IPR</td>
<td>Contents of ePortfolio, Student generated material</td>
<td>Copyright holders permission needed when including other’s</td>
<td>Covered by University codes on use of IT</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>
### Theme: ePortfolios in Higher Education

<table>
<thead>
<tr>
<th>Area of legislation *</th>
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<th>Level of risk to the University</th>
<th>Further action recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPR</td>
<td>Contents of ePortfolio</td>
<td>A Tutors could consider they hold copyright to their contribution to an ePortfolio</td>
<td>Tutor comments can be regarded as similar to marks on an essay or exam paper</td>
<td>Low</td>
<td>Position should be made clear to staff contributing to the system</td>
</tr>
<tr>
<td>SENDA</td>
<td>ePortfolio must be accessible to those with special needs</td>
<td>Access by those with impaired vision, limited mobility or dyslexia</td>
<td>Accessibility is being considered for next release of the system</td>
<td>Medium</td>
<td>Must cover, font size and colour, background colour, contrast, compatibility with screen reader software and keyboard only access. Test in the adaptive technology suite.</td>
</tr>
</tbody>
</table>

*Key*

- **DPA**: Data Protection Act 1998
- **FOIA**: Freedom of Information Act 2000
- **IPR**: Copyright, Designs and Patents Act 1998 and other legislation
- **SENDA**: Special Educational Needs and Disabilities Act 2001