Review of Existing ePortfolio Policies and Practices

THE CENTRE OF INFORMATION TECHNOLOGIES IN EDUCATION (CITE), LITHUANIA

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Executive summary

Teams from different countries (Ireland, Lithuania, Slovenia, Cyprus, Spain, Bulgaria, Austria) came together to project EUfolio for design and test innovative ePortfolio models which will support the implementation of innovative learning environments using ICT across Europe.

One of project results - Review of Existing ePortfolio Policies and Practices seek to prove influence of the process of ePortfolio application in schools. A systematic review approach aims to analyse literature relevant to research questions.

Policy review has raised few main research questions on ePortfolio: How could it be defined? How could it be used as a tool for 21st Century Skills? What are the advantages, barriers, and impact of using ePortfolio? What are the principles of using ePortfolio? What key policy decisions and implementation activities (action plans) regarding ePortfolio are made within EU? What are the key specifications required for designing ePortfolio in schools? All these questions are analysed in two major parts covering theoretical and practical issues.

Scholar’s works have a lot of ePortfolio definitions. Yet, there are several key points that define ePortfolios in all definitions: authorship, organised and selective content, artefacts, reflection, and digital form.

An analysis of ePortfolio functions shows three types of ePortfolio:
- representation of learning (showcase);
- process of learning (development);
- products of learning (assessment).

ePortfolios provide benefits in several points: creation of an electronic portfolio serves to develop multimedia technology skills; provides a ‘rich picture’ of student learning and competencies; facilitate the exchange of ideas and feedback; encourage students to reflect on their work, foster a sense of pride in their work, a sense of personal accomplishment, and feeling of satisfaction; engage students in the evaluation and assessment process; ePortfolios are easy to maintain, edit and update, to carry, to share with others, to organise and search; inexpensive, especially to reproduce, have the potential to be standardised across regions and countries; can include a privacy feature.

Research on ePortfolio shows evidence on: developing learning and student motivation; students’ significantly higher grade point averages; active participation of learners in the process; self-discovery and self-reflection that the learning becomes meaningful. So, the impact of the electronic portfolios on students’ motivation for learning is evident.
On the other hand, implementation has some barriers as well: the need for adequate hardware and software; for support technology skills among students and staff; the need for support; issues of problems with security, ownership, intellectual property and privacy of data, and common standards between different e-portfolio systems.

It’s agreed worldwide that schools should need to have attention to transversal skills, such as communication, reflection, critical thinking, self-direction and others, so called 21st century skills. On the other hand, educators stresses the need to find new ways of ICT integration in learning processes to ensure sustainable development of 21st century skills through curriculum. ePortfolios are mentioned as one of ICT based tools for 21st century skills development and assessment.

Analysis of ePortfolio policies shows that European Commission sees ePortfolio mainly as tool for the assessment, validation and recognition of skills and competences, particularly for transversal competences (critical thinking, creativity), as tools for collaboration, self- and peer assessment. European countries are planning to use portfolio mainly for competencies and assessment as different types of ePortfolio:

- representation of learning (Career planning, employability, showing competencies in using new technologies);
- process of learning (school-parent contacts, sharing knowledge with peers, self-evaluation);
- products of learning (collection of learners achievements, assessment of vocational qualification)

As result of Policy review some policy recommendations were formulated:

1. Encourage the development of ICT environments and tools that support curricula, allow teachers to quickly, easily and flexibly create customized electronic learning and assessment environments.
2. Encourage networks on exchanging good practice.
3. To create scenarios as a tool to support decision making, school heads, e-learning planners, etc. for the better understanding what can actually be done with ePortfolios.
4. The full benefit of ePortfolio can only be achieved when one person is able to grow and use his/her ePortfolio anyplace anytime for any purpose. While it is quite possible to develop ePortfolio in isolation, the benefits of ePortfolio are limited.
5. In implementation of technologies for integration to take attention to standardisation of data formats
6. Set incentives for research and development of promising technologies for the assessment of Key Competences.
Changes such as new educator effectiveness systems, student assessments, and accountability for student success are also underway in education systems. Such changes affect what educators do daily. They might be teachers transforming their classrooms to integrate deeper learning strategies, increased use of technology, and more authentic demonstration of learning. Or they are principals and central office staff who are facilitating and leading the transitions by building understanding of the changes among teachers, students, families, and communities, and providing personalized support to individuals or teams of teachers to develop the expertise to plan, implement, and evaluate new instructional practices.

To meet the demands of these changes, most education agencies acknowledge the need for new educational practices and policies. The assumption behind this Review of Existing ePortfolio Policies and Practices (further on – policy review) document is that good practices and efficiency proves might influence e portfolio application in schools process. Effective practices inform the development of policy to expand and promote effective practice. “High-quality professional development can occur as a result of strong district or school leadership, but it is far more likely to be sustained if incorporated into policy language and collective bargaining agreements that drive day-to-day operations of schools and districts” (Killion, 2013). In this context, the consortium believes that the ePortfolio approach has the potential to act as a strategic catalyst for promoting the integration of ICT in teaching and learning in national education systems.

**EUfolio project and consortium**

**EUfolio - EU Classroom ePortfolios** is a project funded by the European Commission under the framework of the Lifelong Learning Programme (KA1 - Implementation of the European strategic objectives in Education and Training).

The aim of the project is to design and test innovative ePortfolio models which will inform and support the implementation of innovative learning environments using ICT across Europe.

*Policy review* is connected with one for objective of project: To deliver a systemic analysis of the current policy approaches and developments on the use of ePortfolios in education, including assessment and evaluation of students, learning planning, and professional development of teachers.
The members of the EUfolio consortium have direct experience of integrating ICT in teaching and learning and transforming classroom practice. Many different things have to work together – not least curricula, teaching practices, teacher training, assessment strategies, ICT infrastructure and digital resources generally. Systemic change needs creative change management, taking account of stakeholder dynamics which vary nationally.

The idea for EUfolio came from the ‘ICT and education’ Working Group created under the “Education and Training 2020” programme, A number of members including Ireland, Lithuania, Slovenia, Cyprus and Bulgaria came together with a common interest in implementing electronic portfolios as part of the ICT in education policy agenda at national level.

The EUfolio consortium brings together 14 teams from 7 European countries in a collaborative research and implementation process, establishing a network of policy experts, researchers, educational experts and practitioners. Consortium includes experts in the field of ePortfolio use in education, in research and educational practice, and they have themselves been coordinators of ePortfolio initiatives.

Analysis aims and scope

There is a lack of concise and systemised review on ePortfolio usage in K-12. According to Montes (2013), the use of ePortfolios has been studied in higher education, but the use of ePortfolio as part of assessment in K-12 schools has not been studied enough. This policy review aim to deliver a systemic analysis of the current policy approaches and developments on the use of ePortfolios in education, including assessment and evaluation of students, learning planning, and professional development of teachers. Closer attention was paid for assessment issues and practical ePortfolio application in schools considerations.

A systematic review approach in this paper aims to provide an exhaustive summary of literature relevant to a research question. Analysis was based on scholar papers, case studies, educational policies and institutional documents. The scope of documents mostly covers European practices.

In this paper few main research questions were raised:

1. What is definition of ePortfolio? What functions does ePortfolio could have?  
2. How ePortfolio could be used as a tool for 21st Century Skills development and assessment? What are ICT trends for 21st century skills assessment? What is ePortfolio perspective?  
3. What are the advantages and considerations in ePortfolio implementing?  
4. What key policy decisions and implementation activities (action
All these questions are covered in two major parts covering theoretical and practical issues. All policy review is ended with recommendations part.

Analysis structure – quick overview

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<td>To reveal advantages and considerations of ePortfolio implementation in learning process.</td>
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1. Theoretical Background

1.1. ePortfolio Definition and Functions

**ePortfolio Definition**

Before trying to define ePortfolio it is very useful to understand philosophical background that scholar literature refers to ePortfolios. Especially when ePortfolio is not only analysed in educational sciences, but it seems to be a multidiscipline object. According to Barker (2005) research demonstrates that the ePortfolio is linked closely with:

- **Human resources development and Human Capital Management** – as the means of identifying and managing what a person and a group of persons knows and can do;
- **Lifelong learning** – as the method of tracking and recognizing ongoing learning, as an incentive to the lifelong learning requirement;
- **Prior Learning Assessment (PLA)** – as the outcome of the PLA process of exploring and determining an individual’s non-formal and informal learning;
- **Education and training at all levels (K-12, PSE and workplace)** - as a teaching tool (reflection as a basis for learning), as a learning management tool (e.g., project-based learning) and as an alternative form of learning assessment;
- **eLearning** – as a type of Knowledge Management, a part of a Student Information System and a potential form of “Usable Learning Object” repository;
- **Learning organizations** – as a means of tracking and developing human capital and assisting professional development of employees within organizations across sectors;
- **Community economic development** – as an inventory of collective community human capital assets;
- **Future learning systems** that rely less on credentials and more on competencies.

An ePortfolios phenomenon is relatively new in scholar literature. First definitions of ePortfolios appeared in 2001. There are strong scholar schools analysing ePortfolios in Canada, New Zealand, and Scotland. Yet, the scope of scholar literature on ePortfolio usage in
secondary education is relatively small, comparing with researches done in higher education. It can be explained by research culture. Higher education practitioners are fonder to analyse, reflect and document their practice than secondary education teachers.

According to Montes (2013) understanding the definition of the electronic portfolio requires knowing about three philosophical assumptions:
- ePortfolio is a learning story or live text that is “OWNED by the learner, structured by the learner, and told in the learner’s own VOICE (literally and rhetorically)”.
- ePortfolio encourages lifelong learning by connecting formal and informal learning experiences across settings and backgrounds.
- ePortfolios should be created in a sharing community of learners that focus on developing a collective responsibility for the learning of all. In this community of learners, students are able to reflect on others’ work and give them feedback that promotes intellectual development.
- students record, interpret, integrate, and evaluate their own learning.

Barrett identified five steps inherent in the development of effective electronic portfolios:
1. Selection: the development of criteria for choosing items to include in the portfolio based on established learning objectives.
2. Collection: the gathering of items based on the portfolio's purpose, audience, and future use.
3. Reflection: statements about the significance of each item and of the collection as a whole.
4. Direction: a review of the reflections that looks ahead and sets future goals.
5. Connection: the creation of hypertext links and publication, providing the opportunity for feedback.

According to Scottish Qualification Authority (2012), evidence for assessment could include:
- written notes, letters or reports — based on surveys, experiments, investigations;
- entries from the learner’s blog;
- photographs, and scanned documents - pictures, posters, maps, graphs, diagrams
- narratives recording reflective accounts, witness testimonies, assessor observations and other commentaries, discussions and interviews that are relevant to the Learner’s work or evidence — presented as written or audio/video records;
- online presentations showing images and providing information about the learner’s work — products, displays, events, exhibitions;
- records of the learner’s contributions to electronic forums and social networking sites;
- online questionnaires or surveys the learner has used, with summaries of the responses;
- links to other websites and resources relevant to the learner’s work;
- audio or video clips of learners carrying out assessment-related activity;
- formal feedback from assessors on summative assessments activities.

In this review over 14 definitions of ePortfolio from various sources, countries and backgrounds were analysed. All definitions are provided in Appendix 1. ePortfolio definition analysis shows, that:

- the literature refers to several types of ePortfolio, in respect to their purpose;
- viewing ePortfolio both as a product and a process;
- combination of both, if possible to create overall better definition;
- every country has specific context and understanding of e portfolio definitions, depending on practices and e portfolio evolution in that country.

During analysis few types of definitions were found, stressing out three types of ePortfolio functions (see table 1).

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<th>Definition</th>
<th>Emphasis</th>
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<td>A collection of authentic and diverse evidence, drawn from a larger archive representing what a person or organization has learned over time on which the person or organization has reflected, and designed for presentation to one or more audiences for a particular rhetorical purpose”</td>
<td>Selected evidence</td>
<td>National Learning Infrastructure Initiative (2003), cited in Barker (2005)</td>
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<td>ePortfolio is a digital collection of “skilfully made works” (artefacts) of one person who thus wants to document and illustrate the product and the process of the development of her/his expertise in a certain time span and for certain purposes. The respective person picked the selection of the artefacts autonomously and arranged them in accordance with the learning target. As an owner, she/he has the complete control.</td>
<td>Artefacts, learning path, ownership, autonomously arranged</td>
<td>Hornung-Prähauser (2007)</td>
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<td>An ePortfolio is a purposeful aggregation of digital items - ideas, evidence, reflections, feedback etc, which 'presents' a selected audience with evidence of a person’s learning and/or ability.</td>
<td>Purposeful aggregation, presentation</td>
<td>Sutherland and Powell (2007)</td>
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<td>Student managed electronic learning portfolios can be part of a persistent learning record and help students develop the self-awareness required to set their own learning goals, express their own views of their own strengths, weaknesses and achievements, and take responsibility for them.</td>
<td>Student managed, learning record, develops the self-awareness</td>
<td>National Educational Technology Plan (USA) (2010)</td>
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<td>An ePortfolio is an electronic collection of evidence showing learning over time. An ePortfolio provides learners with a dynamic workspace whereby they can capture their learning, their ideas, access their collections of their work, reflect on their learning, share their learning, set goals, seek feedback and showcase their learning and achievements.</td>
<td>Collection of evidence, showing learning, digital form</td>
<td>National Council for Curriculum &amp; Assessment (Ireland) (2013)</td>
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An ePortfolio definition analysis show that defining ePortfolio may vary depending on functions and context that ePortfolio is described. Yet, there are several key points that define ePortfolios in all definitions:

- **Authorship** (ePortfolio belongs for the one that create ePortfolio, student or teacher);
- **Organised content** (ePortfolio content is organised in certain manner or strategy);
- **Selective content** (ePortfolios provide content has purposeful aggregation);
- **Artefacts** (ePortfolios contain authentic artefacts proving competences);
- **Reflection** (in any type of ePortfolio learner uses reflection to organise content);
- **Digital form** (ePortfolios performs in digital form, providing possibility to use digital artefacts).

For the EUfolio project through P2V activities, the following definition was chosen: **ePortfolios are (student-owned) dynamic digital workspaces whereby students can capture their learning, their ideas, access their collections of work, reflect on their learning, share it, set goals, seek feedback and showcase their learning and achievements.** Remarks on the definition and clarifications on terms and stakeholder’s roles:

- A digital workspace is a digital environment for learning. It implies active learning (i.e. active engagement of the learners). The term workspace also incorporates the notion that one might engage with the portfolio in many ways, for example collaboratively. A digital workspace, too, has roots in software development and symbolizes a temporary storage area. The ePortfolio is owned by the student, s/he has control over: file management, to share with whom, to hand in to the teacher, etc.
- The teacher’s role in working with ePortfolios is still important – if not more important than ever. The teacher supports the students in order to set and monitor learning goals, plan their strategies how to achieve goals, develop success criteria, collect evidence of their learning and reflect on and evaluate their learning, etc.
- **Reflection and sharing of learning:** Even though ePortfolios are completely controlled by the learners, they are not intimate diaries. They can be accessed by wide audience as required, such as teachers, fellow students and parents. Using ePortfolios can give teachers a new insight into the process of learning. When teachers integrate ePortfolios into teaching and learning it creates an opportunity to use a wide range of educational approaches.

**ePortfolio Functions**

According to Montes (2013), the collection in a portfolio also should have a specific purpose, making it more than just a space in which students’ work is collected. For example, a portfolio might be shared during evaluation
meeting to show that a student has achieved a particular goal. Students and teachers typically decide what will be included in the portfolios based on the purpose of the portfolio (Alper & Mills, 2001). Portfolios may include products related to social, cognitive, emotional, creative, physical, motor, and living skills.

ePortfolio purpose can be defined in specific context according to learner needs. Barker (2005) provides various possible purposes of ePortfolio e.g., the reflection portfolio, literacy portfolio, process portfolio, student reading portfolio, showcase portfolio, exit portfolio (transfer from school to work life or higher education). While analysing usages in the educational environment Barker (2005) distinguishes few ePortfolio functions:

1. in pre-service teacher training,
   - to open the way for students to construct alternative conceptions of teaching,
   - to think reflectively about experiences in a community service-learning program,
   - to bridge “personal and professional funds of knowledge;

2. in K-12 classrooms:
   - to assess student learning,
   - to achieve educational outcomes other than acquiring content knowledge and performing well on standardized multiple-choice tests, e.g., the ability to formulate statements about personal beliefs and values, goals and aspirations,
   - for students to communicate the story of their learning to their parents,
   - as the basis for reformed parent-teacher conferences,
   - to shift some of the responsibility for assessment from the teacher to the student,
   - to the advantage of special education students, e.g., in displaying authentic tasks;
   - in literacy programs, to assess reading in early primary grades.

Johnson and Mims-Cox (2006) describe 3 types of portfolios used in academic settings:

- Learning and teaching. In learning and teaching portfolios, students reflect on their learning process and personalize their work. This type of portfolio can be used as summative or formative assessment.
- Development. The developmental portfolio shows the growth and development of the student over time. In selecting content, students may reflect on their progress and, based on that reflection, choose the best examples of their growth. As is the case with learning and teaching portfolios, developmental portfolios can also be used as either summative or formative assessment.
- Showcase. Showcase portfolios demonstrate success; students demonstrate their competency and perhaps aim to impress their teachers or classmates (Johnson & Mims-Cox, 2006).
In the case of all three types of portfolios, the content depends on students’ learning experiences and desired outcomes. Possible materials include but are not limited to checklists, scrapbooks, observations, drawings, reading lists, photographs, self-evaluations, reflections, letters, videos, audiotapes, progress reports, test reports, homework, lists of books read, rating scales, behavioural observations, rubrics, and so on. These documents/artifacts may be stored in any form, including a box, a hanging file, an album. As already mentioned content and organization of portfolio depends on the purpose.

It is important to stress that creating an ePortfolio should be a continuous process and functions (and purpose) of ePortfolio might change. Most portfolios programs begin with the working portfolio. Over time, a student selects items from the working portfolio and uses them to create a display portfolio. Finally, the student develops an assessment portfolio, containing examples of his or her best work, as well as an explanation of why each work is significant. The explanation, or reflection, discusses how the particular work illustrates mastery of specific curriculum requirements or learning goals (Brown, 2011, educationworld.com).

Himpsl-Gutermann (2012) suggests 3-layer structure of ePortfolios (see Fig. 1). According to him the Process of Learning has to be put in the canter. The learning actions of the individual learner involve the reflected use of resources and result in artefacts. These Products of Learning - which are collected in a repository - are the output of a learning process that is symbolized in the illustration below as a cycle of planning, acting, and validation which depicts both instrumental learning by individual solving of problems and communicative acting.

The upper layer of the structure is called Representation of Learning. It allows the insight into the learning process and serves as a showcase. Different views can be offered for different target groups. One view corresponds to one representation of the own learning - like a snap-shot of a certain part of the own learning biography.
In Himpsl-Gutermann’s 3 layer ePortfolio model it is clear that ePortfolio has functionality to be transformed from process of learning to products of learning or representation of learning. It is continuous process that contains reflection loop – plan, act, validate and then plan again. So ePortfolio should be understood as a tool for continuous development, responding to lifelong learning needs. Even ePortfolios created in formal assessment in school educational environments can be transformed to any other type of ePortfolios, because it can share the same repository of learning artefacts.

A possibility to collect, store and reorganise those learning artefacts is one of the biggest ePortfolio advantages comparing with traditional portfolios. But one of the most influential advantages of ePortfolio is to transform learning to respond the needs of 21st century.

Changing roles and teacher-student relationships influence new approaches to learning outcomes assessment. Even learning outcomes are interpreted differently. For some it is exact specific subject content, for others – the overall experience and knowledge that learner gain. According to Montes (2013), teachers and students should engage in
an ePortfolio development process, from which should emerge the type of ePortfolio and any specific goals it should accomplish. It means that ePortfolio as a tool for assessment may be used depending on planned purpose.

Although in scholar literature it is widely recognised that ePortfolios developed in a collaborative process support assessment for learning, rather than assessment of learning. This is a very important distinction for several reasons. However, Barrett (2007) also reconciles these two purposes in which “reflection, documentation, and collaboration” intersect. This dual purpose allows students to own their ePortfolio, which also can be used for accountability (Barrett, 2007). On the other hand, this reconciliation could affect ePortfolio process/outcomes if the two purposes are not well incorporated.

When an ePortfolio is used for assessment, its purpose is imposed by an organization. Barker (2005) states that ePortfolio assessment combines many innovations in the appropriate assessment of learning, i.e., alternative assessment, authentic assessment, competency-based assessment, flexible assessment, and standards-based assessment.

Alternative assessment refers to alternative means of enhancing educational assessment through, e.g., confidence measurement, analysis of self-awareness, and performance evaluation.

- Authentic assessment involves examining students’ basic skills, control of information, high level of understanding, personal characteristics, and habits of mind; and allows students to participate actively in their own learning.
- Competency-based assessment is the assessment of competence against standards set for knowledge and skills in a particular area, typically used in vocational education and professional certification processes.
- Flexible assessment can include checklists, portfolios, performance tasks, product assessments, projects and simulations; observation of the learner, questioning, oral or written tests and essays, projects undertaken in groups or individually, role playing, work samples, computer-based assessment; and flexible assessment is intended to suit the learner’s pace and style of learning and assess the individual when s/he is ready.
- Standards-based assessment is intended to measure achievements against stated learning outcomes or objectives.

Combining elements of all these, portfolio assessment involves using the products in a portfolio as the evidence of learning for assessment purposes. Barrett identifies the following types of assessment and thus makes the portfolio itself a tool for assessment:
Traditional Assessment, with a focus on grades and rankings, knowledge, curriculum, and skills, implemented through classroom assessments (tests, quizzes, homework assignments), and standardized tests (either norm-referenced or criterion-referenced)

Performance Assessment, with a focus on observable results and standards, application and transfer, implemented through standards, tasks, criteria and scoring rubrics.

Portfolio Assessment, with a focus on growth and development over time, implemented through selection, reflection and inspection of classwork, along with goal-setting and self-evaluation.

Montes (2013) note, that there are a variety of assessment types but mostly all assessment falls into one of two categories: summative or formative.

- Summative (product oriented) and formative assessment refers to the function of the assessment. Summative assessment provides information about what the child has learned at a specific point in time. It is used to provide a summation of the student’s learning.
- Formative (process oriented) assessment provides information about how a child is learning, which teaching techniques are working and strongest learning style. This information is then used to alter the teaching process or content.

Summative and formative assessments may be formal or informal. Formal assessments, which typically include tests, quizzes, etc., can help teachers determine what has been learned. Informal assessments are casual, and include observations, conversations, self-evaluations, etc. Norm-referenced and criterion-referenced measures can be used as a part of eligibility determination, and to measure student progress in learning and overall development at a specific point in time. Although criterion-referenced measures would be considered summative, in certain instances these assessments can yield information that can be used formatively. For example, a teacher may use a student’s performance on a standardized test both to measure progress toward meeting a learning standard, and to identify areas where the student is in need of further instruction. In this case, the assessment tool is summative, but the information obtained is being used formatively (Jacobs, Martin, & Otieno, 2008; Taylor, 2006).

The type of assessment influence function type of ePortfolio (representation, process, product) and defines teacher and students role in the process (see Table 2).
According to Montes (2013), distinguishing summative and formative assessments can be complicated. For example, a portfolio can serve as either a summative or a formative assessment, depending on the purpose of the assessment. Formative portfolios are works-in-progress (Carmean & Christie, 2006), where teachers evaluate both the content and the students’ portfolio development process, thereby observing students’ progress while the learning process is taking place. Summative portfolios are usually evaluated at the end of the academic year. In this case, the learning process is not observed; only the final product is assessed.

Therefore, the type of assessment used will determine whether a portfolio will be treated as a final product to be assessed at the end of a semester or year (summative) or as an ongoing learning tool to improve student learning or teaching strategies (formative) (based on Beck, Livne, & Bear, 2005; Carmean & Christie, 2006, cited in Montes, 2013).

An ePortfolio combines individual student work with standards-based assessment, while also organizing and indexing student data.” The contents of the student’s portfolio can demonstrate how the student has met the standards.
by using hypertext links to connect the work to the standards it meets. The learner’s reflection includes the rationale for the artefact and how it achieves the specific standards. The teacher works collaboratively with the students to help them meet the different standards.

The portfolio is a vehicle for demonstrating student progress toward specific standards, then teachers must give plenty of assignments that tap into the skills and knowledge represented by each standard. The teacher adds their feedback as part of the assessment. The dialogue between the teacher and learner reinforces the learning process and reflection (Niguidula, 2005).

According Jan van Tartwijk, Erik Driessen (2004) there are various types of ePortfolio:
- Assessment portfolios Portfolios used for assessment purposes only are usually organized around items such as the candidates’ products, evaluations, photographs and video-recordings. Assessments in which portfolios are used differ from other assessments because candidates are not tested but are asked to prove their competence. To be convincing they must include information such as employers’ or supervisors’ evaluations and certain key products.
- Showcase portfolios When persons compiling a portfolio 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.
- Development portfolios. A portfolio may also be designed as an instrument to keep track of and plan the owner’s development. In such a case it is referred to as a development portfolio. The term Personal Development Plan is also frequently used.
- Reflective portfolios When portfolios are used for the purposes of monitoring the owners’ development, it is important to know how he evaluates and analyses himself.
- Combinations. Portfolios are usually used for a combination of different purposes and combine characteristics of each of the typical portfolios described above.

Summary

An ePortfolio definition analysis show that defining ePortfolio may vary depending on functions and context that ePortfolio is described. Yet, there are several key points that define ePortfolios in all definitions:
Authorship (ePortfolio belongs for the one that create ePortfolio, student or teacher);
Organised content (ePortfolio content is organised in certain manner or strategy);
Selective content (ePortfolio content has purposeful aggregation);
Artefacts (ePortfolios contain authentic artefacts proving competences);
Reflection (in any type of ePortfolio learner uses reflection to organise content);
Digital form (ePortfolios performs in digital form, providing possibility to use digital artefacts).

For the EUfolio project, the following definition was chosen: ePortfolios are (student-owned) dynamic digital workspaces whereby students can capture their learning, their ideas, access their collections of work, reflect on their learning, share it, set goals, seek feedback and showcase their learning and achievements.

Concluding ePortfolio functions it might be said, that ePortfolio usage depend on a context or need. EPortfolio design depends on purpose. Yet, there are few main trends:
representation of learning (showcase);
process of learning (development, formative assessment),
products of learning (learning and teaching, summative assessment).

Even ePortfolios created in formal assessment in school educational environments can be transformed to any other type of ePortfolios, because it can share the same repository of learning artefacts.

An in depth description of ePortfolio functions is given in the EUfolio generic functional specification.

1.2. ePortfolio as a Tool for Developing and Assessing 21st Century Skills

21st Century Skills Worldwide

According to Knight et. al. (2005) many criticisms exist of contemporary education. Some fear that students are not developing competencies such as communication, critical thinking, and a developed sense of social responsibility. The JISC report, Learning Literacy in a Digital Age (2009) suggests that, “the future demands skilled, digitally-aware learners with the capacity to participate in learning throughout their life, using
technologies of their own choosing”. In some scholar literature these mentioned skills are called 21st century skills. One of the biggest worldwide movements on 21st century skills assessment started in consortium of Australia, Finland, Portugal, Singapore, England, USA, sponsored by ICT industry giants Cisco, Intel and Microsoft. Project called The Assessment and Teaching of 21st-Century Skills (ATC21S) is a research project that proposes ways of assessing 21st-century skills and encourages teaching and adopting those skills in the classroom.

One of the biggest achievements of this project is a new conceptual structure of 21st century skills (see Fig. 2). This concept distinguishes skills necessary for thinking, working and living as a sustainable approach for individual development in life learning.

- Ways of thinking
  - Creativity and innovation
  - Critical thinking, problem solving
  - Learning to learn, metacognition
- Ways of working
  - Communication
  - Collaboration (teamwork)
- Tools for working
  - Information literacy
  - ICT literacy
- Living in the world
  - Citizenship – local and global
  - Life and career
  - Personal, social responsibility
- Ways of learning
- Ways of teaching

Figure 2. Conceptual Structure of 21st Century Skills (Griffin, 2012)

ATC21S project stresses the need to find new ways of ICT integration in learning processes to ensure sustainable development of 21st century skills through all curriculums thus, there is a need of change in ways of learning and teaching in schools. In one of five papers that was launch during this project, ePortfolios are mentioned as one of ICT based tools for 21st century skills development.

But not only Western world understand a need to response new age challenges by developing competences. Asia countries in 2008 supported by Asia-Pacific Economic Cooeration (APEC) cluster in 2nd APEC Symposium on Education Reform established project “Education to Achieve 21st Century Competencies and Skills for All: Respecting the Past to Move Toward the Future” which core subjects and priority areas to be focused on were:
Identifying the core content knowledge and skills in math, science, and languages all students must master; identifying the career and technical knowledge and skills needed in the 21st Century workplace; and identifying the ICT tools and systemic reform supports (new ways of teaching; assessment and accountability) necessary to ensure 21st Century Skills for All.

One of the purposes of educational reform was to merge Western and Eastern knowledge to create 21st century competences that needed to be developed in schools (see Fig. 3).

Figure 3. Moving Toward the Future: Competencies and Education Systems (APEC, 2008)

As a result of this project four key competences, as the most important for 21st century, were stressed out:
- Lifelong learning skills;
- Problem solving skills;
- Self-direction skills;
- Collaborative work skills.

These skills in scholar literature often are defined as “soft” skills that are most difficult to measure. Thus ePortfolio can be one of the recommended methods to develop and measure these skills.

Meanwhile in European Union the European framework for key competences for lifelong learning, identifies and defines the key abilities and knowledge that everyone needs in order to achieve employment, personal fulfilment, social inclusion and active citizenship in today’s rapidly-changing world. The framework includes competences in ‘traditional’ subjects, such as mother tongue literacy, numeracy, knowledge of foreign languages, science and IT skills. But it also covers other skills, such as learning to learn, social and civic competence, initiative-taking, entrepreneurship, cultural awareness and self-expression.
In “Key Competences For Lifelong Learning: European Reference Framework” (2007) document states eight key competences for 21st century:

1) Communication in the mother tongue;
2) Communication in foreign languages;
3) Mathematical competence and basic competences in science and technology;
4) Digital competence;
5) Learning to learn;
6) Social and civic competences;
7) Sense of initiative and entrepreneurship;
8) Cultural awareness and expression.

Further on in this analysis these eight competences will be analysed more deeply, referring to ePortfolio usage in developing and accessing these competences in K12 education curriculum.

**ICT trends for 21st Century Skills Assessment**

Redecker et al. (2013) stress out that initial education will need to react more effectively and promptly to changing job requirements and societal trends. They will need to better address and narrow the current gap between the world of education and the world of work. In the future, learner-centred, decentralised, and tailor-made learning strategies will prevail, which need to be accompanied by corresponding pedagogies and teaching strategies as well as flexible curricula, modified assessment and validation mechanisms and closer collaboration with other societal players.

Today information has become a commodity that is available anytime and anywhere. Thus, the future role of schools will be to guide students in identifying and selecting the learning opportunities that best fit their learning styles and objectives; to monitor progress, realign learning objectives and choices and intervene when difficulties arise; and to implement viable assessment, certification and accreditation mechanisms.

The portfolio allows students and teachers to improve the pedagogical sequence when in process. According to the constructivist theory of learning Students learn best through active participation in constructing their own learning, employing higher-order thinking, and reflective thinking in a collaborative and cooperative environment. This approach to learning is most represented in the electronic portfolios. Electronic portfolios can provide a learning environment in which learners construct meaning. The portfolio presents learning growth through a process of self-reflection, feedback and self-assessment based on artefacts chosen by the learner to meet a criteria or standard. The development of electronic portfolios utilizes several technological tools such as multimedia, software and hardware that is engaging
for students and enhances their learning experience.

Kimball (2005) argues that good portfolio pedagogy revolves around the thoughtful collection of evidence, reflection that reconsiders and makes a story out of learning experiences, and making connections between disparate ideas and actions. In his view, portfolio pedagogy “seeks to encourage students to become dynamic participants in their own learning students are not merely the users of the system; they are, or should be, the authors of it” (Kimball, 2005, p. 442). Of importance here are issues of ownership, authorship and the balance of power between students and lecturers. Kimball believes that portfolios can help to shift that power towards students. McNair and Galanouli (2002) likewise think that change can be brought about by the use of computers in tertiary education, as typified by the use of electronic portfolios. Technology skills must not be viewed as a discrete set of skills, but rather as a way of enhancing learning and teaching. The focus of electronic portfolios must be on learning, not on the technology used to facilitate that learning:

Increased utilisation of ICT in education and professional portfolio practice requires a whole new curriculum approach where teaching activities are clearly associated with practical learning outcomes and artefacts that can be stored in an ePortfolio. With this respect, ePortfolio research suggests the need for curriculum developers and institutional leaders of schools to also embed the concepts of ePortfolio teaching & learning in the curriculum, in particular the need to understand the interrelations of learning & reflection. Only if there is full institutional and curriculum support in ePortfolio initiatives, an enhancement of the value of ICT and ePortfolio supported pedagogical concepts will be achievable.

As ePortfolios are learner-cantered tools, the teacher’s role is mainly a supportive one. The coaching role means not to pretend all targets but to support learners to reach the self-directed targets in different ways. In the model of teaching using ePortfolio, students must take a proactive attitude on teaching and learning, both for themselves and their peers. For example, ideally, students learn how to analyse their learning process and of others; they learn to reflect, apply and internalize the criteria and evaluation standards, evidences.

Kimball (2005, p. 451) goes further, arguing that “neither collection nor selection [of pieces to be incorporated into a portfolio] are worthwhile learning tasks without a basis in reflection. Reflection undergirds the entire pedagogy of portfolios”. Two other key elements to portfolios are that they measure learning and development over time (Barrett, 2002), and that it is the process of constructing a portfolio,
rather than the end product, that is where the learning takes place (Smith & Tillema, 2003).

European Commission Joint Research Centre, Institute for Prospective Technological Studies in March of 2013 have launched document “The Use of ICT for the Assessment of Key Competences”. This document aims to overview tends of ICT usage in assessment, including ePortfolio. According to Eurydice (2012), “European countries have made significant progress in incorporating these key competences in to national curricula and other steering documents” (Eurydice, 2012). However, one of the key challenges for education systems in many European Member States is the assessment of these competences (European Commission, 2012).

ICT offer many opportunities for the provision of assessment formats which comprehensively capture all Key Competences, respecting the importance of the skills and attitudes dimensions and accounting for the less tangible themes underlying all Key Competences, such as critical thinking or creativity. There is a vast range of formats and approaches which can foster different aspects of key competence development and can be used to address the specifics of each key competence in a targeted way. There is a need to seize the opportunities offered by ICT, to encourage the development, deployment and large-scale implementation of innovative assessment formats in school education (Redcker, 2013, p. 2).

Barker (2005) states that there is a trend towards technology-assisted assessment of learning at all levels of learning systems. Areas of interest to watch include:
- ePortfolio for Formative Assessment (a specific purpose)
- ePortfolio and Reflective Learning (assessment of one type of learning)
- ePortfolio as a transition tool (between grade levels)
- Assessment of learning across subject matter silos
- Self-assessment of learning
- Assessment of lifelong learning

Figure 4 illustrates these focus areas. Currently, the potential of ICT in the comprehensive assessment of Key Competences, including less tangible and generic. (Redcker, 2013, p. 3).
EPortfolios are ideally suited to the assessment of collections of work produced by students and are thus particularly powerful tools for communication in the mother tongue, communication in foreign languages and cultural awareness and expression. As they are digital tools, basing on Web 2.0 technology, they are also very suitable for developing ICT skills and to embed learning products; made with various ICT tools (e.g. slide presentations, podcasts, videos etc.).

To date, most ePortfolio implementations, so far, took place in higher education. Teaching portfolios, accompanying teacher education are quite well documented. Even though there are comparatively few reports on ePortfolio use in school, ePortfolios are already used in some European schools as a means of supporting the formative and summative assessment of students’ creative productions (see Appendix 2). However, many of these implementations rather base on teacher’s initiatives rather than on a broader policy approach.

Redcker (2013, p. 4) suggest that ePortfolios, as a tool for 21st century skills is most suitable while assessing language and cultural awareness and expression competences (see Fig. 5), but ePortfolios may be used as an assessment tool in other competences assessment.
Although in research literature and reports ePortfolios are mentioned as tools for 21st century skills assessment they have a much broader impact on teaching and learning processes. Yet, as all technologies, they have advantages and disadvantages.

**Summary**

- Initial education will need to react more effectively and promptly to changing job requirements and societal trends to narrow the current gap between the world of education and the world of work. In the future, learner-centred, decentralised, and tailor-made learning strategies will prevail, which need to be accompanied by corresponding pedagogies and teaching strategies as well as flexible curricula, modified assessment and validation mechanisms and closer collaboration with other societal players.
- Increased utilisation of ICT in education and professional portfolio practice requires a whole new curriculum approach where teaching activities are clearly associated with practical learning outcomes and artefacts that can be stored in an ePortfolio. Changing roles and teacher-student relationships influence new approaches to learning outcomes assessment. Even learning outcomes are interpreted differently. For some it is exact specific subject content, for others – the overall experience and knowledge that learner gain.
- Nowadays students are not developing competencies such as communication, critical thinking, and a developed sense of social responsibility, while the future demands skilled, digitally-aware learners with the capacity to participate in learning...
throughout their life, using technologies of their own choosing.

- Worldwide movements started in order to prepare frameworks of so-called 21st century skills development and assessment. West and East world agree that most attention should be paid to transversal skills, such as communication, reflection, self-direction etc.

- Educators stresses the need to find new ways of ICT integration in learning processes to ensure sustainable development of 21st century skills through all curriculums thus, there is a need of change in ways of learning and teaching in schools. EUfolio team in P2V activities agreed that ePortfolios are one of ICT based tools for 21st century skills development and assessment.
1.3. Advantages of and Considerations for ePortfolio Implementation

**ePortfolio benefits**

According to Scottish Qualifications Authority (2011), ePortfolios are, in principle, the same as conventional portfolios, but they have additional benefits:

- They allow different types of electronic evidence to be used for assessment in its original format.
- They offer an assessment approach that’s inherently ‘learner-centred’, enabling the benefits of paper portfolios to be realised, while removing some of the disadvantages (eg. bulk; storage; duplicating material for different purposes).
- They offer more flexibility in that learners can assemble one portfolio and tailor it to specific audiences by tagging items for different purposes (including different assessments).
- They allow evidence to be stored in manner that’s more secure and more accessible to learners, Assessors and Verifiers.
- They make it easier for Assessors to give feedback, which strengthens the links between formative and summative assessment and between learning and assessment generally.

Literature analysis (Butler, 2006), show that e portfolios provide benefits in several points:

- **Skill development.** The creation of an electronic portfolio serves to develop multimedia technology skills, as well as more general literacy communication and problem solving skills. Electronic portfolios are also a way to showcase technology skills and to model technology skills for others.
- **Evidence of learning.** Electronic portfolios encourage “flexible, inclusive, and distributed evidence of learning including variable times and places for learning”. Electronic portfolios provide a ‘rich picture’ of student learning and competencies, thus facilitating authentic learning. They actively involve students in demonstrating past learning and current learning gains, and help students to make connections between their course projects and non-academic projects. They help students learn to manage their own professional development, and thus contribute to lifelong learning. They promise significant pedagogical benefits by stimulating class discussion and providing student-centred learning. Finally, electronic portfolios help a learning community to establish its goals and expectations.
- **Feedback.** Electronic portfolios facilitate the exchange of ideas and feedback. Students can receive feedback quickly and regularly
throughout the process of constructing their portfolios, across electronic media channels. Electronic portfolios contribute to the ‘feedback loop’ integral to formative assessment.

- **Reflection.** Just like traditional paper-based portfolios, electronic portfolios encourage students to reflect on their work and their reasons for choosing certain pieces to be incorporated in their portfolio. Students are encouraged to be reflective throughout the entire portfolio process, and to use that reflection to integrate their learning experiences and find meaning in them. Through reflection, electronic portfolios make meaning out of diverse and unconnected pieces of information.

- **Psychological benefits.** For those compiling them, electronic portfolios foster a sense of pride in their work, a sense of personal accomplishment, and a feeling of satisfaction.

- **Assessment.** Electronic portfolios engage students in the evaluation and assessment process, as they continually revisit and refine their portfolios. Students gain a better understanding of the assessment they are undertaking, and can use that assessment to constantly improve their learning. Electronic portfolios can also help to put failure into context; they can show the steps taken to redress failure, and what the student has learned from the experience.

- **Artefacts.** Many kinds of artefact can be incorporated into electronic portfolios. They can integrate text and multimedia elements such as pictures, graphics, and audio and video recordings. They also take advantage of work that is already in an electronic format.

- **Maintenance.** Electronic portfolios are easy to maintain, edit and update, and because of this are more likely to be constantly revised.

- **Portability and sharing.** Whether saved to the web, electronic portfolios are easy to carry, to share with others, and to transport into a new system or new working environment. For these reasons, they have longevity, existing beyond the end of a course or a student’s university career.

- **Access.** Especially when saved to the Internet, electronic portfolios are easily accessible by a number of people. Students can work on their portfolios, and supervisors can review and assess portfolios, from many different sites.

- **Audience.** Because of their accessibility, electronic portfolios are viewable by a much larger audience, including students’ peers, supervisors, assessors, parents, employers and others.

- **Organisation.** Electronic portfolios are easy to organise and search. Because of their electronic nature, they can be organised in complex ways, with navigational links connecting ideas and artefacts. They also look perpetually polished.

- **Storage.** Because they do not rely on large binders full of paper, electronic portfolios are easy and efficient to store.
Cost. Electronic portfolios are inexpensive, especially to reproduce, although initial set-up costs in software and equipment may in fact be quite high. Standardisation. Electronic portfolios have the potential to be standardised across regions and countries, if universal specifications can be agreed upon.

Privacy. Finally, electronic portfolios can include a privacy feature to protect student work. Access can be limited to only those that students wish to view their work.

dPortfolio Implementation Considerations

Before applying e portfolios systematically into schools practice, some staff and student support questions need to be answered. According to Butler (2006), a number of barriers to the implementation of electronic portfolios also exist. Summarising from the issues raised in the literature (Canada, 2002; Lorenzo & Ittleson, 2005a, 2005b; Sherry & Bartlett, 2005; Tosh et al., 2005; Wetzel & Strudler, 2005, cited in Butler, 2006), the following list has been compiled:

1. The need for adequate hardware and software;
2. The accessibility of that hardware and software;
3. Lack of technology skills amongst students and staff;
4. Technical problems with the equipment or electronic portfolio system;
5. The need for support when problems are encountered;
6. Maintenance of the hardware;
7. Adequate storage space and server reliability;
8. Demands on staff time;
9. How to use students’ time efficiently;
10. How to overcome issues of ownership and intellectual property;
11. Problems with security and privacy of data;
12. Lack of features or of control over those features;
13. The need for access and permission controls;
14. How to transport electronic portfolios into new systems as students move on; and
15. The need for common standards between different electronic portfolio systems.

There are three ePortfolio implementation phases that might need extra consideration:

Adoption

1. How likely is it that learners will accept and use the ePortfolio system?
2. Will the system be user-friendly enough for adoption?

Maintenance
3. How will information be maintained over time?
4. What policies are needed for transporting or deleting ePortfolios?
5. How will long-term storage requirements be managed?

Interoperability and standards
6. How will data entered for ePortfolio purposes be utilised in other ways? By other systems?
7. How will standards be adopted into a system that is being developed before robust standards are established?

Scholars suggest paying attention to three areas of ePortfolio implementation:
- Teaching practice – a shift to learner centered learning, defining what a purpose of ePortfolio in teaching is or learning practice, what are the desired pedagogical outcomes.
- Quality assurance – questions on how assessment quality can be verified, what procedures needed to make process clear and transparent.
- Legal considerations – legal questions on learner authorship, institutional considerations, and copyrights.
- Development and support considerations – main questions on responsibilities (who will do what?) and institutional or competence development support needed.
- Technical Checklist – technical specifications for ePortfolio hardware and software, implementation and support.

As P2V activities was organised selection and voting on barriers and benefits of eportfolio implementation between partners (for results see Appendix IV). As the main barriers were mentions: teacher competence, lack of systemic (policy) support, infrastructure (internet/hardware). As the main benefit were mentions: improved formative assessment, Improved ICT skills of students, excellent repository for work.

Full list of considerations and recommendations provided in Appendix III.
Summary

- EPortfolios provide benefits in several points:
  - Creation of an electronic portfolio serves to develop multimedia technology skills
  - ePortfolios provide a ‘rich picture’ of student learning and competencies
  - They facilitate the exchange of ideas and feedback
  - They encourage students to reflect on their work and their reasons for choosing certain pieces to be incorporated in their portfolio.
  - They foster a sense of pride in their work, a sense of personal accomplishment, and a feeling of satisfaction.
  - ePortfolio engage students in the evaluation and assessment process.
  - Many kinds of artefact (learning products) can be incorporated into electronic portfolios.
  - ePortfolios are easy to maintain, edit and update.
  - ePortfolios are easy to carry, to share with others, and to transport into a new system or new working environment.
  - Easily accessible by a number of people and viewable by a much larger audience.
  - They are easy to organise and allow searching their content.

- They are easy and efficient to store, excellent repository for work.
- ePortfolios are inexpensive, especially to reproduce, although initial set-up costs in software and equipment may in fact be quite high.
- They have the potential to be standardised across regions and countries.
- They can include a privacy feature.
- They improve formative assessment
- They improve ICT skills of students

- Disadvantages or challenges connected with the use of ePortfolios are:
  - a rather high workload – especially for teachers (less in preparation of classes, but considerably concerning the mentoring activities for student’s ePortfolios)
  - the ICT skills of both teachers and students (that are to a certain extent a prerequisite for the work with ePortfolio platforms)
  - the hardware (schools have to be properly equipped with computers, notebooks or tablets; if homework is connected to ePortfolio work is has to be made sure that all students are able to do this homework on a proper device)
o a stable internet connection (ePortfolios are usually Web-based)
o privacy and data security issues
In implementation of ePortfolios, there are several areas that need to be considered:
o Teaching practice and/or the necessary CPD and support for teachers
o Teachers competence

o Quality assurance
o Legal considerations
o Development and (policy) support considerations
o Technical checklists for implementation are – for example – provided by JISC (2008)
2. Practice Overview

2.1. ePortfolio Policy Review

This chapter focuses on ePortfolio good practice overview in different countries within EU in purpose to identify policy best practices or its elements to follow.

EU overview

In order to overview ePortfolio situation in European countries European commission documents and Eurydice reports were analysed.

According to analysis, European Commission (2013) seeks innovation for learning policy and plans to explore how established and emerging tools for the validation and recognition of skills, such as 'open badges', can be tailored to the needs of learners.

EC staff (2013) documents discusses assessment of key competences and how ICT can support assessment and recognition of competences. Special attention is paid for transversal competences as critical thinking or creativity, which are often acquired across subjects and even outside school, informal and non-formally. Commission noted that ICT-based assessment provides a gateway for more formative assessment, measuring actual learning, appreciated by teachers and students, and a potential shift away from summative high-stakes assessments at the end of the school year or term, criticised for measuring the ability to recall information at a given time.

Commission staff seen ePortfolios are ideally suited to the assessment of collections of work produced by students and are thus particularly powerful tools for communication in the mother tongue, communication in foreign languages and cultural awareness and expression. Educators often do not realise that ePortfolios can be powerful tools for encouraging online collaboration, self- and peer assessment, which contribute to and at the same time assess students' learning to learn skills.

ElIEI (2009) report notes that at European level, the Europass initiative,
coordinated by CEDEFOP, although limited to 5 documents (CV, portfolio language, mobility, the Diploma Supplement and Certificate Supplement) allowed the advance of some of ideas that were born in the ePortfolio movement such as interoperability. And the CV being always more perceived as the front page of the CV, there is a real opportunity to promote the development of ePortfolio through the promotion of Europass.

IPTS (2013) noted that a good learning management system include possibilities for document student achievement and archive learner portfolios containing samples and noticeable that ePortfolio in primary and secondary schools receiving more attention across Europe: ePortfolios have already been implemented in school education in Belgium, Austria, Portugal, Romania, UK and Turkey; Bulgaria, Germany, France and Iceland are in the pilot phase and eight countries in the planning, in Portugal and the United Kingdom ePortfolios are already available to students throughout their entire educational career and are assessed by awarding bodies in England, Wales and Northern Ireland. In contrast, Poland and Liechtenstein are focusing more on providing teachers with ICT tools to monitor pupil progress. (Eurydice, 2011). IPTS (2013) noted that in most cases, ePortfolios are employed to record individual progress.

**Figure 6. Central recommendations on using new approaches to pupil assessment in primary and general secondary education (ISCED 1,2 and 3), 2009/10** (EACEA 2011)

ePortfolios are mentioned in the Eurydice report as an assessment tool only. This is lamentable, as ePortfolios should be also used as a reflection and development tool, and even the showcase portfolio may contain elements that are more important for the student’s identity than for her/his assessment. The following figure, taken from the Eurydice report (EACEA 2011, p.58) shows recommendations, piloting and/or implementations of assessment tools in the year 2009, one of them listed as “ePortfolios” (see Fig. 6).
EU Countries National Policy Overview

Furthermore European countries national policy or cases of ePortfolio application in educations provided. This analysis was based on EuFolio project partners information (2013), document analysis from EIFEI (2009) report „ePortfolio a European Perspective“, European schoolnet reports (2005, 2007), European Commision working group countries sheet reports (2013) and others document analysis.

Austria

According to EIFEI (2009) report, in 2007, Austria set up a consortium of schools, universities and departments to develop a national policy for the ePortfolio. The ePortfolio working group includes the departments of education and work, research, economics and working with ELPA (per eLearning Austria), and OCG (Austrian Computer Society). Primary and secondary education.

Yet, according to Project partner information (2013) in Austria, there is no special policy in connection to ePortfolios. However, there are some projects in connection with ICT skills that are supported by the ministry of education (BMUKK). Some of them involve ePortfolios, some have a competence oriented approach that also gives an idea how the implementation of ePortfolios could look like. Below, we present two ICT initiatives supported by the ministry, followed by three case studies of ePortfolios in schools taken from master thesis from the Danube University’s master programme “e-education”.

eLSA. is an innovative project initiated by the Federal Ministry of Education, Science and Culture in Austria for students aged 10 to 15. It is the main objective of the eLSA network to make e-learning part of regular school life, thus fundamentally modernizing and adjusting didactics to the requirements of the world students live in. In 2002 eLSA started as a pilot project including four schools and was a few months later extended to nine schools, each of which was located in one of the nine Austrian provinces. In autumn 2004 eLSA II started with 15 new schools and in 2009 a high profile ‘eLSA advanced’ project was initiated taking e-learning to an even higher level.

Platform offers course materials to enhance ICT skills for secondary school teachers. The materials are mainly designed for the use with Moodle or for
the use as printed working sheets in the classroom. However, the material can give a good idea on development of exercises for competence oriented teaching.

In Austria, the “Neue Mittelschule” (a new type of lower secondary school which replaces the old type of “Hauptschule” - a process that will be completed by 2018/19) aims at new, cooperative and open forms of teaching. The didactic principles include the use of ICT. The students have to develop “Sachkompetenz, Selbstkompetenz und Sozialkompetenz” (expertise, self-competence, and social competence). For competence-based teaching and learning ePortfolios can be seen as an adequate environment for such a competence based education.

Belgium (Flemish)

According to Country sheets report (2013), Ministry of Education is currently working on a comprehensive media literacy initiative encompassing a whole range of ICT related actions such as ePortfolios, training of teachers, educational games, school infrastructures, affordable internet, OERs, e-safety, and others.

Bulgaria

According to project partner information (2013), using paper portfolios has never been popular in Bulgaria (in general schools - between teachers or students). Maybe this is the reason why in Bulgaria the experience of using ePortfolios is still very low but it’s getting more and more popular. There are new traditions to promote the use of ePortfolio, relying on Russian experience and mainly using materials made in Russian language. These people, still only a few, are aware of the benefits of using ePortfolio as a tool for evaluation and self-evaluation.

Two years ago a private organization started a training programme for using ePortfolio for teachers. They used "Mahara", "Prezi" or simply "PowerPoint". Nowadays the organization develops a programme for ePortfolios for students. The idea is that the student himself develops his/her’s own portfolio using different electronic formats from a CD, prepared by the organization. This is still not promoted in the schools and can be used as supplementary tool for ICT lessons.
Cyprus

According to Project partner information (2013), from the perspective of the Ministry of Education and Culture, there is no policy on the use of ePortfolio in schools, apart from an effort to use portfolio in secondary education for Language Arts modules and students’ extra-curricular activities. Below we describe the two cases of current portfolio use in lower and upper secondary education schools in Cyprus.

A use of portfolio is present in lower secondary schools in Cyprus, as part of the “European Language Portfolio (ELP)” project that was developed by the Language Policy Division of the Council of Europe. English or French Language teachers help their students develop portfolios (not ePortfolios though), where they present their language learning achievements and their experience of learning and using languages. Students start developing this portfolio during their first year in lower secondary school (~12 years old) and they continue developing it up to their third year of lower secondary school. Students take the portfolio with them when they graduate lower secondary school. This ELP portfolio includes three main parts; Language passport (i.e. achievements and certificates of language), Language experiences (i.e. language learning experience and reflection) and portfolio (i.e. copies of students’ learning activities and material showing their accomplishments in language learning).

Another use of portfolio is present in higher secondary schools in Cyprus under the programme “Action-Creativity-Social Service” that runs every year in higher secondary education schools only. Students’ start developing a portfolio of their extra-curricular activities in their first year of upper secondary school (~15 years old), following a form provided by the Ministry of Education and Culture. In this form, students self-assess their level of participation in several extra-curricular activities (i.e. volunteering in several institutions, participation in the school’s choir, sports team etc.). Students complete their portfolio and attach supporting certificates to prove their activities and by the end of each year, the responsible class-teacher co-signs and assesses their portfolios. When given their Apolyterion (High school certificate) by the end of their third year, students also get a formal grade on their “Action-Creativity-Social Service” activity, based on their portfolio. Students take their completed portfolio with them as they graduate and can use it later on in their further studies.

Apart from the above, we now describe two cases of Cyprus’ participation in ePortfolio research projects. Cyprus has
participated in the research project “The development of a European Digital Portfolio for the Evaluation of Educators” (EDIPED) within the framework of the Socrates Program (http://www.ediped.com.cy/), in 2002. However, this project focused mostly on the assessment methods of teachers and it was reported that non-digital portfolios were only used for pre-service teachers’ assessment in Cyprus’ educational system.

More recently, a researcher in Cyprus University of Technology has conducted a research piloting the use of web2.0 ePortfolios (using Wordpress) and paper-based portfolios by Language Arts teachers in primary education (Nicolaidou, 2012).

Denmark

According to ElfEI (2009) report Denmark in 2004 the national guidance portal (www.ug.dk) was enhanced with information on the recognition of prior learning. The two current national projects to develop portfolios for documentation and assessment of prior learning in respectively work and private life will be implemented as ePortfolios. The portfolio for learning in private life exists in an electronic version which has been tested.

Country sheets report (2013) show that in Denmark methods of assessment of competence are not standardised and include interviews, portfolios, practical exercises and tests.

Finland

According to EUN (2005) report, 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 refresh their teaching methods.

France

According to Country sheets report (2013), the VAE system (Validation des Acquis de l'Expérience), established in 2002, is used a “dossier” or a portfolio where the applicant describes his/ her experience. Further written evidence of the experience of the applicant is also frequently requested in order to support the evaluation. This “declaration” must include details of skills and competences used in their activities.
Germany

According to EIFEl (2009) report, in Germany there is no ePortfolio policy at the federal or regional level. Activities are limited to local research, the development of local ePortfolio solutions, and pilot projects. On the other hand, there are a number of portfolio and portfolio-related projects, in schools and employment (ProfilPASS).

The project Intelec (Integrated eLearning Campus), funded by the Ministry of Education and Research launched in 2005 and whose objective is to provide an integrated service digital learning includes an ePortfolio. EUN (2005) report state that in Germany the use of portfolios for students is integrated in the concept of the full day schools as a means of showing competencies students have in using new technologies.

Ireland

According to Project partner information (2013), while currently Ireland does not have a national ePortfolio policy, those working in the area of ICT in education are familiar with a number of ePortfolio models. In Ireland the Minister for Education & Skills on a number of occasions has stated that he believes that the use of ePortfolios could be useful in the revised Junior Cert. The use of ePortfolios can be seen as an important step in integrating ICT within the teaching, learning and assessment in our second-level system.

At third level there a number of examples:

- the Education in Employment Consortium (EIE) (which is focused on a model of education development, delivery, support and assessment designed to meet the learner needs in a way that is sympathetic to their circumstances) developed specifications for e-portfolios, piloted ePortfolio systems, and developed modules on portfolio development and mentor training, as well as producing learner guidelines for the preparation of a portfolio, and assessment guidelines for staff.
- Building on the work of the EIE consortium, the CIT-led Roadmap for Employment–Academic Partnerships (REAP) consortium researched and piloted the use of ePortfolios as a learning and assessment tool for work-placement students.
- CONTINUE project, the Institute of Technology, Tallaght’s Centre for Learning and Teaching installed Mahara e-portfolio as part of suite of learning technologies;
- the Galway–Mayo Institute of Technology (GMIT)-led ‘Student
Leadership Programme’ supported the design on an RPL online portfolio application facility.
- Dublin Institute of Technology (DIT) is undertaking a pilot project using MaharaePortfolios with selected groups;
- At professional sector level the Royal College of Surgeons in Ireland (RCSI) hosts the RCSI-IL Professional ePortfolio for Healthcare—an integrated weblog, résumé-builder, and professional networking system, connecting healthcare professionals both within healthcare organisations and via online inter-organisational communities.

**Italy**

According to EUN (2005) report, in Italy ePortfolio 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 portfolios in school with the Ministerial Decree Nr. 100 dated September 18th 2002. The article 7 describes the portfolio as “Competence 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 Decree 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. According to EUN (2005) report, 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.

**Lithuania**
In 2004 Lithuanian Ministry of Education and Science approved concept of student achievement assessment which noted that "evaluation provides information for assessing the application of modern management techniques and presentation, including the portfolio and computer tools; the portfolio is a student work samples collected and arranged in such a way that disclosure of student progress (evolution folder) or to show the best student’s work (demonstrator folder).

Approved standard for the teacher’s computer literacy recommended ePortfolio for assessment.

Netherlands

According to EIfEI (2009) report, the Netherlands voted a law relative to continuous evaluation and self-evaluation of professional development of teachers. To support this process the Dutch Association for Quality encourages teachers to collect evidence of their professional development in an online ePortfolio. The Dutch Committee on Labour Market Participation has formulated a series of recommendations:

- Digital ePortfolio. Every member of the labour force will be entitled to a digital eportfolio, i.e. an electronic inventory of their competencies, diplomas, experience, and accreditation of prior learning (APL). This will give people a better understanding of their position on the labour market and their career prospects and of any need they have for further training.

- Periodical talent analysis. Talent analysis and APL procedures must be introduced on a large scale, with maximum use being made of the ePortfolio. The right to a periodical analysis of one’s competencies and the right to APL assessment must be included in collective labour agreements, with mandatory arrangements for a “best-effort” obligation on the part of employees to undertake training.

This political declaration of intent followed several years of development of the ePortfolio in schools, with
support from Kennisnet and the world of work, with the support of Kenteq, one of the most advanced being the establishment of a regional ePortfolio in the Province of Limburg (draft Nedcar). According to Country sheets (2013) report, educational institutions have signed agreements with the government to carry out Accreditation of Prior Learning (APL; EVC or Erkenning van Verworven Competenties) procedures and guarantee a minimum quality standard of these procedures.

The ‘Ervaringscertificaat’ is the formal procedure in which a candidate can get accreditation of his/her learning outcomes. A candidate who wants to reflect his/her prior learning outcomes on a qualification, has to fill in a portfolio (showcase) in which s/he can demonstrate how his/her learning experiences match with the competences in the qualification s/he has chosen. In an assessment s/he is judged and gets a report stating all learning outcomes that match with the learning outcomes that are defined for the chosen qualification. With this Certificate of Experience (ErvaringsCertificaat) s/he can turn to an awarding body (the exam committee) of a school or university. Only the awarding body is allowed to turn the advice into an official exemption. This awarding body can decide on exemptions in the learning programme. On the basis of these exemptions it is possible to achieve a (partial or full) qualification. In VET and HE, the autonomous institutions decide for themselves how to use the results of EVC procedures (the extent to which these results lead to exemptions or a diploma).

**Norway**

Balanskat, Blamire (2007) in EUN report state, that major aim is to strengthen basic competencies for Norwegian pupils with ICT as one of the five basic competencies now integrated in the curriculum. The reform, affecting the major educational players, also goes in line with a strong focus on competence development for teachers, head teachers and school administrators and the creation of learning networks as set out in the Programme for Digital Literacy (2004-2008). Recent policies such as the e-Norway 2009 and the strategy for competence development (2005-2008) coherently focus on the development of Digital literacy. Norway also strives towards major progress in e-assessment using digital portfolios.

According to EIfEl (2009) report, from 2005 Norway proposed an ePortfolio vision where each learner was seen, not a mere consumer of knowledge, but as an active producer of knowledge that would be shared through the ePortfolio with peers. Kultur for læring (Culture for Learning), Parliamentary Report No. 30
(2006-2007) states that digital tools are being used in elementary and secondary schools to become a core competence for the entire period of 13 years of school life. The Program for digital kompetanse highlights some specific objectives for digital technologies in schools: by 2008, Norwegian schools have an infrastructure, organisation and culture in the application of ICT in teaching and learning, and "by 2008, digital portfolios should be used at all school levels." A reform on competency recognition placed the focus on giving adults the right to document their "realkompetanse" without having to take the path of traditional examinations. Regulations are put in place to ensure a more uniform recognition and validation of formal, non-formal and informal learning.

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 very desirable. When you introduce ePortfolios 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 ePortfolios, e.g. Personal Development Planning, Career planning, recruitment etc.

Slovenia

According to Project partner information (2013), there are no consistent national ePortfolio policy (personalisation is included in Action plan ICT in Education from 2006) but there are some experience with teachers development ePortfolio and with student’s job/showcase (Baumagrtner taxonomy) portfolios.

In Slovenia Action plan for ICT in education (2006) which includes: “changing the pupil’s role from a passive to an active one, in parallel with the use of all the forms of learning made possible by ICT”. One of the measures is: "Any individual is required to have a priority plan as to what knowledge and skills he/she intends to acquire in the subsequent period”. Also a project named Student’s success folder (mapa učnih dosežkov) took place, with focus on student’s showcase portfolio, with some development elements. There is some material, some work sheets for student’s self-reflection on Slovenian Mahara.

In Slovenia ePortfolio implemented in two other levels too:

- Teacher’s development portfolio (ePortfolio in function of teachers’ CPD): one of the important product of these (half face-to-face and half online
ePortfolio of a child in Kindergarten

According to EIfEl (2009), despite the fact that portfolio has been used for a number of years in the assessment and recognition of national vocational qualifications in the certification system, the use of ePortfolio is still in its early phase of development. The Slovenian Institute for Adult Education (SIAE) participated in the international project Key Pal (2004-2006, led by EIfEL), which objective of which was to learn about the importance and effects of ePortfolios in the development and assessment of basic skills / key competencies.

Slovenia conducted the pilot research in PUM project (Project Learning for Young Adults). EPortfolio of the mentors and participants in PUM were compiled. Another project developing ePortfolio is “Youth in Action” with the objective to create Youthpass, which is an instrument for the recognition of non-formal and informal learning. Forms for ePortfolio (in electronic form) are in the pipeline, whereby skills and competencies acquired in voluntary work will be incorporated as well. The Europass Language Passport is an electronic format of passport intended for employers and provides information about language skills.

The National Professional Qualifications Act emphasises learning outcomes and not the methods of acquiring knowledge, skills and competencies. NVQ assessment and recognition (certification) is designed for adults only and consists of either direct demonstration of knowledge, skills and competencies, or of documents and other proof collected in the applicant’s portfolio.

Country sheets report (2013) state that assessment and validation of knowledge and skills in the vocational qualification system is provided by a relevant commission, which examines the documents submitted and other evidence or the candidate's portfolio and determines whether the candidate meets all the requirements defined by the catalogue of professional knowledge and skills.

Spain
According to Project partner information (2013), in Spain the ePortfolio is used in language learning. There is an online version of the European Portfolio of Languages, coordinated from the National Agency of European Education Programmes (OAPEE).

Number of users are not accounted for. There is so use of portfolios in other subjects as such: teachers may use a folder to collect students works and the rubric / e-rubrics but there is no best practices in Secondary schools. There are examples at certain subjects in universities: e.g. Málaga.

According to ElfEl (2009), Spanish ePortfolio Network created in 2006, funded by the Spanish Ministry of Education and led by the Universitat Oberta de Catalunya. In addition, the Catalan Ministry of Education has supported the training and coordination of a small number of primary school teachers to lead the European Language Portfolio (ELP) in Catalonia. 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.

Sweden

In ElfEl (2009) report stated, that although portfolios up to now have been used primarily in pre-school and compulsory school, interest in the area of adult education is increasing. Within the framework of Soft Infrastructure there is a development project on digital portfolios where a web based ePortfolio has been produced This ePortfolio (based on SCAM8) is an open source product and during 2006 and the beginning of 2007 schools and others who work in education have been given the opportunity to test the digital portfolio free-of-charge via Skoldatanätet’s website in an informal trial.

United Kingdom

According to Balanskat, Blamire (2007) EUN report, the e-strategy outlines that by 2008 every school learner in England should have “access to a personalised online learning space with the potential to support e portfolios” and by 2010 all schools will have integrated learning and management systems. Concerning training and support for practitioners and improving organisational capability
much has been done in training head teachers in the UK. Head teachers are seen as a key driver for change. Over 10,000 head teachers have completed the Strategic Leadership of ICT professional development course jointly developed by Becta and the National College for School Leadership.

EIfEl (2009) report state that in 2005, the British Ministry of Education (DfES) published Harnessing Technologies, a report in which was indicated a number of priorities and technologies converging towards a digital portfolio, simplifying for learners the collection of their achievements throughout their lifelong learning journey. The e-portfolios will accompany the learners on their way through the education system and beyond. The transition between school and employment will be facilitated by the showcasing of skills in ePortfolio format. The work on ePortfolios will be based on progress files already in use in schools and qualification frameworks under development by various government agencies. Becta’s role includes working with government department to implement the government’s e-strategy. Among Becta’s publications are the yearly reviews on ‘Evidence on the progress of ICT in education’, which addresses infrastructure, educational, institutional, learning and teaching aspects. Linking to the government’s e-strategy Becta acknowledges the role of ePortfolios and provides a set of resources on ePortfolios covering educational, process and technical issues.

The results of Becta (2007) study suggest that ePortfolios benefit learning most effectively when considered as part of a joined-up teaching and learning approach, rather than as a discrete entity. The approach should include online repositories, planning and communication tools, and opportunities for both students and teachers to draw out and present ePortfolios at particular times and for particular purposes. There is then likely to be substantial impact on both learning processes and learning outcomes.

**Summary**

- European Commission sees ePortfolio mainly as tool for the assessment, validation and recognition of skills and competences, particularly for transversal competences (critical thinking, creativity), as tools for collaboration, self- and peer assessment. In primary and secondary schools ePortfolios are receiving increasing attention and importance across Europe.

- Competencies and assessment are the key elements in the mentioned case studies, but also other elements exist:
personalised online learning space with the potential to support e portfolios, collection of learners achievements (UK)
- School-parent contacts (NO, IT)
- Sharing knowledge with peers (NO)
- European Language Portfolio (ES)
- Recognition of prior learning recognition and validation of formal, non-formal and informal learning (DK, IR NO, FR)
- Self-evaluation (NL)
- Assessment vocational qualification (UK, SI, NL)
- Competence development for teachers (NO, NL)
- Personal Development Planning, Career planning (PR, DK)
- Employability (NL)
- Documenting lifelong learning (NL), ePortfolio to every citizens (Wales)
- Showing competencies in using new technologies (Germany).

In most European countries does not exist „ePortfolio policy“. EPortfolio is incorporated to ICT policy or other policy documents, related with student assessment (Ireland, Lithuania), ICT skills (Austria) education for Language (Spain, Cyprus), students’ extra-curricular (Cyprus), teacher professional development (Slovenia, Lithuania), ICT implementation plans (Slovenia, Lithuania) and etc.

- EPortfolio use is mostly driven by organisational initiatives or some pilot project activities.
- Mainly ePortfolios are going as policy-driven initiatives, but a more powerful incentive is from the local and regional initiatives.
- Countries use different types of portfolios can be adapted to different age levels and different educational settings or levels of education.
- Common educational culture of a given country effects 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 react to ePortfolio might be crucial in terms of implementation. It depends 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.
2.2. ePortfolio Practices Review

Impact on learning

Scholars worldwide find many benefits of ePortfolios in K-12 education.

Üstünel and Deren (2010) investigated the use of ePortfolios among a group of primary school students, learning English in Turkey. Their results indicate that, while the ePortfolio work did not influence students’ attitudes towards learning, it did improve their attitude towards exams. Romova and Andrew (2011) used portfolios collecting different successive drafts of written assignments in an academic writing university course. Their findings suggest that a multi-draft portfolio is an effective assessment tool, because it provides a feedback loop and enhances learners’ understanding of writing as a recursive process.

Peacock and colleagues (2010) interviewed 23 tutors in a range of subject areas, from Scottish further and higher education on their experiences with ePortfolios. Tutors pointed out that ePortfolios could encourage personal development and a more reflective approach to studies; assist student transition; and, in some cases, support assessment.

Chang and Tseng (2009) compared the use of ePortfolio assessment among a group of junior high school students with conventional assessment. Their experimental results indicate that ePortfolios have significant positive influence on students' performance, in particular as concerns reflection, self-assessment, continuous improvement, goal setting, problem solving, data gathering, work and peer interaction.

There is some evidence that portfolios increase student understanding and performance. Burks (2010) found that ePortfolios used in an undergraduate mathematics course lead to increased student performance. Interviewing (US) primary school students, their parents and teachers, McLeod and Vasinda (2009) found that all parties attributed subjective satisfaction to the portfolio process; that students developed deep-thinking skills and that teachers obtained valuable insights into students' thoughts. Similarly, Ocak. and Ulu (2009) investigated the opinion of more than 300 5- and 8-grade students, 37 teachers and 92 parents. Their findings indicate that all three groups positively agreed with using portfolio in learning and they all believed that the use of portfolio plays prominent roles in the assessment of students' progress.
Kim and Olaciregui (2008) tested an ePortfolio system in a fifth-grade science class. The student constructed science portfolio was a result of a collection of digital artefacts such as graphic images, instructional videos and textual files on terms and definitions relevant to the Earth’s atmosphere. They found that the students who had followed the ePortfolio approach scored significantly higher than the control group, both in the information-processing performance test and in the 3-day delayed memory retention tests.

As cited in Montes (2013), Acker and Halasek (2008) published one of the most recent studies of ePortfolio use in high school. They used ePortfolios as a means to help students improve their writing skills and prepare them for a successful transition to post-secondary education. They found this approach was an effective way to assess students’ writing, improve their writing skills, and push them to reach a higher writing level.

In another study, Meyer, Abrami, Wade, Aslan, and Deault (2010) involved 14 teachers and 296 students in the examination of using ePEARL, a web-based ePortfolio tool. the ePEARL. Using a non-equivalent pretest/post-test design, they found that, when used regularly, teaching with ePEARL had a positive impact on the development of student literacy and self-regulated learning skills.

Dubinsky (2003) described his observations of classes wherein teachers had implemented ePortfolios. These observations led him to conclude that ePortfolios empower students to improve their own learning process because ePortfolios encourage students’ to reflect on their own learning. In a similar discussion, Zuger (2008) describes how ePortfolios have been used in different schools, and their effect on student motivation.

Knight et al. (2005) students with portfolio artefacts had significantly greater credit hours earned than graduate students without ePortfolio artefacts, while undergraduate students with ePortfolio artefacts had both significantly greater cumulative grade point averages and credit hours earned than undergraduates without ePortfolio artefacts. Research found that students with ePortfolio artifacts had significantly higher grade point averages, credit hours earned, and retention rates than a matched set of students without ePortfolio artifacts. Also, there were significant positive relationships between various measures of ePortfolio utilization and grade point average, credit hours earned, and retention rates among undergraduates.

The active participation of learners in the process of creating their portfolios is motivating for students for a few reasons. They have ownership and responsibility over their creation and which artefacts they choose to include.
as evidence of their learning. No one is dictating what must be included and assessed. Their portfolio portrays their learning through their own voices. Feedback is also a motivating factor for students because the learning comes from knowing how others judge their work. The feedback received, either from peers or teachers, is a valuable part for the learner’s reflections. Through the reflections, students exhibit growth and mastery of skills.

The process of creating and developing a portfolio empowers the learners to take control of their own learning. They discover their strengths, weaknesses, achievements and hopes for the future (Barrett, 2007). It is through this self-discovery and self-reflection that the learning becomes meaningful. The impact of the electronic portfolios on students’ motivation for learning is evident. However, the portfolio process has to engage active learning and ownership for it to be a positive experience in the learner’s life. Students benefit from an awareness of the processes and strategies involved in writing, solving a problem, researching a topic, analysing information, or describing their own observations. Without instruction focused on the processes and strategies that underlie effective performance of these types of work, most students will not learn them or will learn them only minimally. And without curriculum-specific experience in using these processes and strategies, even fewer students will carry them forward into new and appropriate contexts. Portfolios can serve as a vehicle for enhancing student awareness of these strategies for thinking about and producing work - both inside and beyond the classroom.

**Practical Recommendations**

Hiles (2013) (edutopia.org) based on his long time practice in implementing ePortfolios in education have developed five best practices for implementing an education portfolio platform in any K-12 or college classroom:

1. **Build in Opportunities for Peer-to-Peer Learning.** Focus on the goal of increasing students' digital literacy by fostering a collaborative learning environment where some of the more tech-savvy students can guide and help others learn. These practices can generate trust, offer problem-solving opportunities, and deepen peer-to-peer learning on the educational lessons taught in the course.

2. **Create Lessons That Foster Data and Knowledge Curation.** Sifting through the endless hoards of information on the Internet is becoming a necessary skill. Students need to learn how to find reliable sources and how to conduct research in an organized and discriminating way. Eleventh-grade English teacher Amy McGeorge of Leadership Public Schools, a high school in the San Francisco Bay Area, began
using next-generation education portfolios in the classroom to teach the literary classic Catcher in the Rye. She assigned a digital literary analysis and asked students to create an online portfolio that included what they learned about the characters. The results showed better-than-ever student engagement and understanding of the story.

3. Engaging for All Levels of Learners. One of the biggest challenges for today's large classrooms and high student-to-teacher ratios is offering high-performing students engaging activities that won't hold them back while the teachers focus on students who need additional support. Online portfolio projects are a stimulating activity that allows learners of all levels to deepen their knowledge on a subject matter or assignment while maintaining a common ground with their peers.

4. Develop Organization Skills and Plan for the Future. Instead of sorting through crumpled assignments in the bottoms of backpacks, students are able to login to their online portfolios and find everything in an organized manner. Using tags for common subject areas helps students sort through all of the information they have collected so that they can see the "bigger picture" and be reminded of all the work they have done in a specific area. I saw one example from a graduate level course at the University of Illinois in the School of Library and Information Science. Here, students were given the assignment of creating an online portfolio that showed digital materials reflecting theoretical concepts on gender, race and sexuality learned in the course. Not only did student understanding of the concepts far surpass the classes that weren't using online portfolios, but students also reported high levels of satisfaction with their ability to share their class portfolios with professional and personal contacts beyond the classroom.

5. Not All Online Portfolios are Created Equal. When picking an online portfolio, look for portfolios where the creators remain the owners of the data compiled. It's important that students and users have access to the content of the portfolio beyond the course or college education. Using online portfolios successfully gives early adopters in the classroom the latitude to teach peers how to master the technology. Learning can be accelerated through the process of independently curating new knowledge and can also be extended beyond the classroom for a long-term collection of academic and professional successes.
Summary

- It is a powerful tool to increase student motivation:
  - Students with ePortfolio artefacts had significantly higher grade point averages, credit hours earned, and retention rates than a matched set of students without ePortfolio artefacts.
  - Active participation of learners in the process of creating their portfolios is motivating for students for a few reasons: they have ownership and responsibility over their creation; easy to get feedback; self-discovery and self-reflection that the learning becomes meaningful.

- Has impact in developing skills:
  - Enhances learners' understanding of writing;
  - Goal setting,
  - Problem solving,
  - Data gathering,
  - Work and peer interaction,
  - Student literacy,
  - Self-regulated learning.

- Support assessment and helps in successful transition to post-secondary education.
3. Conclusions and Recommendations

Conclusions

1. An ePortfolio definition analysis shows that defining ePortfolio may vary depending on functions and context that ePortfolio is described. There are several key points that define ePortfolios in all definitions: authorship, organised content, selective content, digital artefacts, reflection, digital form. For the EUfolio project, the following definition was chosen: ePortfolios are (student-owned) dynamic digital workspaces whereby students can capture their learning, their ideas, access their collections of work, reflect on their learning, share it, set goals, seek feedback and showcase their learning and achievements.

2. There are few main types of ePortfolio: representation of learning (showcase), process of learning (development, formative assessment), products of learning (learning and teaching, summative assessment). Even ePortfolios created in formal assessment in school educational environments can be transformed to any other type of ePortfolios, because it can share the same repository of learning artefacts.

3. Increased utilisation of ICT in education and professional portfolio practice requires a whole new curriculum approach where teaching activities are clearly associated with practical learning outcomes and artefacts that can be stored in an ePortfolio. Changing roles and teacher-student relationships influence new approaches to learning outcomes assessment. Even learning outcomes are interpreted differently. For some it is exact specific subject content, for others – the overall experience and knowledge that learner gain.

4. Worldwide movements started in order to prepare frameworks of so called 21st century skills development and assessment. West and East world agree that most attention should be paid to transversal skills, such as communication, reflection, self-direction etc.. EPortfolios are mentioned as one of ICT based tools for 21st century skills development and assessment.

5. EPortfolios provide benefits in several points: creation of an electronic portfolio serves to develop multimedia...
technology skills, provide a ‘rich picture’ of student learning and competencies, facilitate the exchange of ideas and feedback, encourage students to reflect on their work and their reasons for choosing certain pieces to be incorporated in their portfolio, foster a sense of pride in their work, a sense of personal accomplishment, and a feeling of satisfaction, engage students in the evaluation and assessment process, they are easy to maintain, edit and update, carry, to share with others, and to transport into a new system or new working environment, accessible by a number of people and viewable by a much larger audience, easy and efficient to store. In ePortfolio implementations, there are several areas that need to be considered: teaching practice, teachers’ competence quality assurance, legal considerations, and development and support considerations, technical solutions.

6. European Commission sees ePortfolio mainly as a tool for the assessment, validation and recognition of skills and competences, particularly for transversal competences (critical thinking, creativity), as tools for collaboration, self- and peer assessment. In primary and secondary schools ePortfolios are receiving increasing attention and importance across Europe. Yet, in most European countries does not exist „ePortfolio policy“. EPortfolio is incorporated to ICT policy or other policy documents, related with student assessment ICT skills education for Language, students’ extra-curricular, teacher professional development, ICT implementation plans and etc. EPortfolio use is mostly driven by organisational initiatives or some pilot project activities. Mainly ePortfolio are going as policy-driven initiatives, but a more powerful incentive is from the local and regional initiatives.

7. Countries use different types of portfolios can be adapted to different age levels and different educational settings or levels of education. Common educational culture of a given country effects 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.

8. Case studies in practice shows that ePortfolios is a powerful tool to increase student motivation, as students with ePortfolio artefacts had significantly higher grade point averages, credit hours earned, and retention rates than a matched set of students without ePortfolio artefacts, active participation of learners in the process of creating their portfolios is motivating for students for a few reasons: they have ownership and responsibility over their creation; easy to get feedback; self-discovery and self-reflection that the learning becomes meaningful. EPortfolio usage has impact in developing skills, support assessment
and helps in successful transition to post-secondary education.

**Policy Recommendation**

Policy recommendations, basing on EU action plans, a questionnaire, filled by the EUfolio partners and desktop research. In one of last partner P2V meeting policy recommendations was approved and sorted by importance in this way:

1. **Connection with curricula and national policy.** Encourage the development of ICT environments and tools that holistically support curricula (IPTS, 2013)
2. **Attention to teacher’s competence / network of teachers.** One of the main considerations when implementing ePortfolios is the availability of appropriate professional development for teachers. Many of the ICT-enhanced assessment practices within schools are promoted by a small number of teachers who enthusiastically and critically engage with ICT for assessment. To upscale and mainstream and also to establish good practice, it is necessary to better support these teachers, encourage them to exchange their experiences, establish good practice and peer-review mechanism (IPTS, 2013)
3. **Step by step implementation.** There are a number of issues that need to be taken into consideration in order to set up an efficiently-working ePortfoliio system in European classrooms. These steps are appropriate for all levels of implementation – national, regional and school level implementations:
   1. Set objectives and decide approaches
   2. Define the assessment strategy for implementing ePortfolios on a large-scale concentrating on the following topics
   3. Document the objectives for implementation including
   4. Outline operational plan for implementation
   5. Deploy technology platforms
   6. Conduct a pilot to gather evidence based information before large-scale implementation
4. **Attention to ePortfolio tools.** Encourage the development of ICT environments and tools that allow teachers to quickly, easily and flexibly create customized electronic learning and assessment environments. Open source tools that can be adapted by teachers to fit their teaching style and their learners’ needs should be better promoted. Teachers should be involved in the development of these tools and encouraged to further develop, expand, modify and amend these themselves (IPTS, 2013).
5. **Incentives for research.** Set incentives for research and development of promising
6. **Support decision making**. Scenarios as a tool to support decision making. School heads, e-learning planners, policy-makers, etc. could benefit from these types of scenarios to better understand what can actually be done with ePortfolios (EUN, 2005).

7. **Interoperability**. The full benefit of ePortfolio can only be achieved if one person is able to grow and use his/her ePortfolio anywhere, anytime, for any purpose. While it is quite possible to develop an ePortfolio in isolation, in a single class of a school, or in a single discipline (e.g. ICT), the benefits of the ePortfolio in such a scenario is limited. A more holistic approach should support the ePortfolio as a LLL tool throughout educational institutions, workplaces and spheres of nonformal and informal learning. Such an approach can be achieved at different levels: territorial (national, regional, district, county or municipality) or sectorial (schools, universities, vocational education and training, organizations) (EifEI, 2009). In implementation of technologies for integration needs to take attention on standardisation of data formats (IMS ePortfolio, LEAP2A, HR-XML ePortfolio).
References


### Appendix I. ePortfolio definitions overview

<table>
<thead>
<tr>
<th>Definition</th>
<th>Emphasis</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>A portfolio is a purposeful collection of student work demonstrating the</td>
<td>Demonstration or</td>
<td>Bergman (2002)</td>
</tr>
<tr>
<td>student’s achievement or growth as characterized by a strong vision of</td>
<td>growth</td>
<td></td>
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<tr>
<td>content.</td>
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<tr>
<td>representing what a person or organization has learned over time on which</td>
<td>representation.</td>
<td></td>
</tr>
<tr>
<td>the person or organization has reflected, and designed for presentation to</td>
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<td></td>
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<tr>
<td>one or more audiences for a particular rhetorical purpose</td>
<td></td>
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<tr>
<td>EPortfolio as a collection of artifacts that are selected, organized, and</td>
<td>Organised artefacts</td>
<td>Heath (2004)</td>
</tr>
<tr>
<td>reflected upon by the author with a specific purpose and audience in mind.</td>
<td></td>
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<tr>
<td>demonstrate students’ growth and competencies, and involve the teacher,</td>
<td>students’ growth.</td>
<td></td>
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<tr>
<td>the student and the parents in the assessment process. The works</td>
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<tr>
<td>included in a portfolio are called artefacts.</td>
<td></td>
<td></td>
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<tr>
<td>In general, a thorough definition of ePortfolios must address the use of</td>
<td>Development</td>
<td>Siemens (2004)</td>
</tr>
<tr>
<td>technology, the importance of representing students’ development, the</td>
<td></td>
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<tr>
<td>creative and flexible possibilities for presentation, and the notion of</td>
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<td>sharing knowledge.</td>
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<tr>
<td>“a process portfolio can be defined as a purposeful collection of student</td>
<td>Process, showcase and assessment</td>
<td>Abrami and Barrett (2005)</td>
</tr>
<tr>
<td>work that tells the story of a student’s effort, progress and/or</td>
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<tr>
<td>achievement in one or more areas (cited from Arter &amp; Spandel, 1992;</td>
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<td></td>
</tr>
<tr>
<td>Maclsaac &amp; Jackson, 1994)”</td>
<td></td>
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<tr>
<td>A collection of authentic and diverse evidence, drawn from a larger</td>
<td>Selected evidence</td>
<td>National Learning Infrastructure Initiative (2003), cited in Barker</td>
</tr>
<tr>
<td>archive representing what a person or organization has learned over</td>
<td></td>
<td>(2005)</td>
</tr>
<tr>
<td>time on which the person or organization has reflected, and designed for</td>
<td></td>
<td></td>
</tr>
<tr>
<td>presentation to one or more audiences for a particular rhetorical</td>
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<td></td>
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<tr>
<td>purpose”.</td>
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<tr>
<td>An electronic portfolio is essentially an electronic version of a</td>
<td>E form of portfolio</td>
<td>Butler (2006)</td>
</tr>
<tr>
<td>paper-based portfolio, created in a computer environment, and incorporating</td>
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</tr>
<tr>
<td>not just text, but graphic, audio and video material as well.</td>
<td></td>
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<tr>
<td>ePortfolio is a digital collection of “skilfully made works” (lat.</td>
<td>Artefacts, learning path, autonomously</td>
<td>Hornung-Prähauser (2007)</td>
</tr>
<tr>
<td>artefacts) of one person who thus wants to document and illustrate the</td>
<td>arranged.</td>
<td></td>
</tr>
<tr>
<td>product (learning outcomes) and the process (learning path/growth) of</td>
<td></td>
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</tr>
<tr>
<td>the development of her/his expertise in a certain time span and for</td>
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<tr>
<td>certain purposes. The respective person picked the selection of the</td>
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<tr>
<td>artefacts autonomously and arranged them in accordance with the learning</td>
<td></td>
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<tr>
<td>target. As an owner, she/he has the complete control who can review at</td>
<td></td>
<td></td>
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<tr>
<td>what time which amount of information from the Portfolio.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An ePortfolio is a purposeful aggregation of digital items - ideas,</td>
<td>Purposeful aggregation, presentation,</td>
<td>Sutherland and Powell (2007)</td>
</tr>
<tr>
<td>evidence, reflections, feedback etc, which ‘presents’ a selected</td>
<td>evidence of learning</td>
<td></td>
</tr>
<tr>
<td>audience with evidence of a person’s learning and/or ability.</td>
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</tr>
<tr>
<td>An ePortfolio is the product, created by the learner, a collection of</td>
<td>Learner ownership, achievements,</td>
<td>JISC (2008)</td>
</tr>
<tr>
<td>digital artefacts articulating experiences, achievements and learning.</td>
<td>represents learning process.</td>
<td></td>
</tr>
<tr>
<td>Behind any product, or presentation, lie rich and complex processes of</td>
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<tr>
<td>planning, synthesising, sharing, discussing, reflecting, giving,</td>
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<tr>
<td>receiving and responding to feedback. These processes - referred to here</td>
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<tr>
<td>as ‘ePortfolio-based learning’ - are the focus of increasing attention,</td>
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<tr>
<td>since the process of learning can be as important as the end product.</td>
<td></td>
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<tr>
<td>Student managed electronic learning portfolios can be part of a persistent</td>
<td>Student managed, learning record,</td>
<td>National Educational Technology Plan (USA) (2010)</td>
</tr>
<tr>
<td>learning record and help students develop the self-awareness required to</td>
<td>develops the self-awareness</td>
<td></td>
</tr>
<tr>
<td>set their own learning goals, express their own views of their own</td>
<td></td>
<td></td>
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<tr>
<td>strengths and achievements, and take responsibility for them.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPortfolio would be virtual platform software to support portfolios, which</td>
<td>E form, personalized learning,</td>
<td>Dr. Manuel Cebrián de la Serna (2011)</td>
</tr>
<tr>
<td>means a type of supervisory or a more personalized learning, based on a</td>
<td>formative assessment model.</td>
<td></td>
</tr>
<tr>
<td>constructive learning theory and a formative assessment model.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An ePortfolio is an electronic collection of evidence showing learning</td>
<td>Collection of evidence, showing learning,</td>
<td>National Council for Curriculum &amp; Assessment (Ireland) (2013)</td>
</tr>
<tr>
<td>over time. An ePortfolio provides learners with a dynamic workspace</td>
<td>workspace to capture ones</td>
<td></td>
</tr>
<tr>
<td>whereby they can capture their learning, their ideas, access their</td>
<td>learning, digital form.</td>
<td></td>
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<tr>
<td>collections of their work, reflect on their learning, share their</td>
<td></td>
<td></td>
</tr>
<tr>
<td>learning, set goals, seek feedback and showcase their learning and</td>
<td></td>
<td></td>
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<tr>
<td>achievements.</td>
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</tr>
</tbody>
</table>
### Appendix II. ePortfolio Case Study Overview

<table>
<thead>
<tr>
<th>Case</th>
<th>Main result</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EPortfolios in Schools</strong></td>
<td></td>
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<tr>
<td>Investigated the use of ePortfolios among a group of primary school students, learning English in Turkey. Their results indicate that, while the ePortfolio work did not influence students’ attitudes towards learning, it did improve their attitude towards exams.</td>
<td>Improves attitude towards exams</td>
<td>Üstünel, E., &amp; Deren, E. (2010). The effects of ePortfolio based assessment on students’ perceptions of educational environment. <em>Procedia-Social and Behavioral Sciences</em>, 2(2), 1477-1481.</td>
</tr>
<tr>
<td>Teacher used portfolios collecting different successive drafts of written assignments in an academic writing university course. Their findings suggest that a multi-draft portfolio is an effective assessment tool, because it provides a feedback loop and enhances learners’ understanding of writing as a recursive process.</td>
<td>Enhanced learners’ understanding of writing as a recursive process</td>
<td>Romova, Z., &amp; Andrew, M. (2011). Teaching and assessing academic writing via the portfolio: Benefits for learners of English as an additional language. <em>Assessing Writing</em>, 16(2), 111-122.</td>
</tr>
<tr>
<td>Interviewed 23 tutors in a range of subject areas, from Scottish further and higher education on their experiences with ePortfolios. Tutors pointed out that ePortfolios could encourage personal development and assist student transition; and, in some cases, support assessment.</td>
<td>More reflective approach to studies</td>
<td></td>
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<tr>
<td>Investigated the opinion of more than 300 5- and 8-grade students, 37 teachers and 92 parents. Their findings indicate that all three groups positively agreed with using portfolio in learning and they all believed that the use of portfolio plays prominent roles in the assessment of students’ progress.</td>
<td>Help in assessment of students’ progress</td>
<td>Ocak, G., &amp; Ulu, M. (2009). The views of students, teachers and parents and the use of portfolio at the primary level. <em>Procedia-Social and Behavioral Sciences</em>, 1(1), 28-36.</td>
</tr>
<tr>
<td>Scholars tested an ePortfolio system in a fifth-grade science class. The student constructed science portfolio was a result of a collection of digital artefacts such as graphic images, instructional videos and textual files on terms and definitions relevant to the Earth’s atmosphere. They found that the students who had followed the ePortfolio approach scored significantly higher than the control group, both in the information-processing performance test and in the 3-day delayed memory retention tests.</td>
<td>Significant positive influence on information-processing performance</td>
<td>Kim, P., &amp; Olaciregui, C. (2008). The effects of a concept map-based information display in an electronic portfolio system on information processing and retention in a fifth-grade science class covering the Earth’s atmosphere. <em>British Journal of Educational Technology</em>, 39(4), 700-714.</td>
</tr>
<tr>
<td>Used ePortfolios as a means to help students improve their writing skills and prepare them for a successful transition to post-secondary education. They found this approach was an effective way to assess students’ writing, improve their writing skills, and push them to reach a higher writing level.</td>
<td>Improves writing skills</td>
<td>Acker, S., &amp; Halasek, K. (2008). Preparing High School Students for College-Level Writing: Using ePortfolio to Support a Successful Transition. <em>The Journal of General Education</em>, 57(1), 1-14.</td>
</tr>
<tr>
<td>Study, involved 14 teachers and 296 students in the examination of using ePEARL, a web-based ePortfolio tool, the ePEARL. Using a non-equivalent pre-test/post-test design, they found that, when used regularly, teaching with ePEARL had a positive impact on the development of student literacy and self-regulated learning skills.</td>
<td>Impact on the development of student literacy and self-regulated learning skills</td>
<td>Meyer, E., Abrami, P. C., Wade, C. A., Aslan, O., &amp; Deault, L. (2010). Improving literacy and metacognition with electronic portfolios: Teaching and learning with ePEARL. <em>Computers &amp; Education</em>, 55(1), 84-91.</td>
</tr>
<tr>
<td>This article reports on the outcomes from the &quot;e-scape Primary Scientific and Technological Understanding Assessment Project&quot; (2009-2010), which aimed to support primary teachers in developing valid portfolio-based tasks</td>
<td>Portfolio-based tasks to assess pupils’ scientific and technological enquiry skills</td>
<td>Davies, D., Collier, C., &amp; Howe, A. (2012). Assessing Scientific and Technological Enquiry Skills at Age 11 Using the E-Scape System. <em>International Journal Of</em></td>
</tr>
</tbody>
</table>
This paper describes an action research, school situated project conducted with partnership funding from Learning and Teaching Scotland, Scottish Qualifications Authority and Becta. This paper provides a summary of the reactions and responses from teacher practitioner, learner and researcher perspectives based on their experiences and the results of the classroom trials. It discusses the potential contribution in terms of supporting learning, teaching and assessment within the framework of Scotland’s “Curriculum for Excellence” (“2004”) “Technologies” (“2009”) learning area.

This article describes how a K-12 school in South Florida adopted a course management system with ePortfolio capabilities. ePortfolios are available tools, though more costly, in higher-end course management systems and are gaining recognition in the K-12 market. Participants in the survey included 163 high school students who received training from their teachers to create ePortfolios in major subject areas. From the survey, students indicated that they are still unsure as to the application of ePortfolios.

Reports on how web-based initiatives are changing the GCSE assessment and improving students’ motivation and grades in Great Britain. Use of Managed Assessment Portfolio System, a web-based assessment system from Tag Learning; Trial of an electronic portfolio option for GSCE information and communications technology; Role in teaching students on how to design a website and a database for organizations of their choice. INSET: EPortfolios.

The article discusses the development and implementation of ePortfolios for high school students at Moreau Catholic High School in Hayward, California, providing advice for other schools wishing to utilize ePortfolios. It addresses the teaching of positive professional online digital footprints, copyright laws, and collaboration with others via the Internet.

**EPortfolios in Higher Education**

Learning portfolios as a reflective practice to improve student learning and develop personal responsibility, growth and autonomy in learning in a Visual Arts course. Students use PowerPoint presentations to demonstrate their concepts by creating folders that are linked to ePortfolios on the University website.

In this study we aimed to establish how current trainees evaluate portfolio-based learning and ARCP, and how these attitudes may have changed since the foundation programme was first introduced. Methods: Deanery-wide trainee attitudes were surveyed by an electronic questionnaire in 2009 and compared with perceptions recorded during the pilot phase (2004-2005). Results: Many trainees continue to view the ePortfolio negatively.

This paper discusses the findings of a research study concerning the use of ePortfolios to develop independent learning, from the perspectives of teachers and students in a Hong Kong university. While most of the findings confirm the value of ePortfolio practice reported in other contexts, they throw into relief a complicated interplay and conflict of factors that may thwart the good intentions of ePortfolio design and implementation.

This paper presents a straightforward preparation on how EPortfolio as successful.
to innovate a menu that addresses the 21st century skills blended with higher order thinking skills, multiple intelligence, technology and multimedia. Specifically, this cyber portfolio is an administrative tool that manages, organizes, displays and evaluates the ePortfolio of students.

This paper presents a model for selecting, designing, and implementing an electronic portfolio project and illustrates its application through the presentation of a detailed case study of a successfully implemented and ongoing electronic portfolio project used as a comprehensive assessment measure to determine degree mastery in the Department of Business, Management, and Accounting at the University of Maryland Eastern Shore.

The primary objective of the action research project discussed here was to monitor the implementation of an innovative course redesign in which the PebblePad ePortfolio system was used as the medium to support the introduction of self- and peer-based formative assessment strategies to approximately 170 students in the first year of a Bachelor of Education Honours Degree (BEd (Hons)) course.

Two case studies of ePortfolio pilot programs are described by the author to support the value of ePortfolios in demonstrating and articulating on-the-job knowledge acquisition equitable to college-level learning.

In this case study, the aim was to implement project-based learning by utilizing ePortfolio assessment in a small-scale classroom (N = 8). The compulsory Design, Development, and Evaluation of Educational Software course in the curriculum of the Department of Computer Education and Instructional Technology was selected due to its strong relationship with real life while lending itself to addressing the major concern of project-based learning.

<table>
<thead>
<tr>
<th>General Technological Innovations in EPortfolios</th>
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<tbody>
<tr>
<td>Study how ePortfolios are taking on new capabilities by integrating with a range of other e-learning technologies. EPortfolios were among a handful of maturing educational technologies that have cleared the fin and are now heading, slowly, toward mainstream adoption.</td>
</tr>
<tr>
<td>This paper presents a new approach of an ePortfolio system design based on Private-Public (PrPI) data index system, which integrates cloud computing applications and storages with Semantic Web architecture, making semantic web-based visualisation and advanced intelligent search possible.</td>
</tr>
<tr>
<td>This article focuses on design, implementation, management and evaluation of the ePortfolio system for PSTTP. In ePortfolio system, it is expected that the managerial decisions (i.e. program/course design and selection, technology selection, teaching method selection, so on.) are effective and efficient in many stages.</td>
</tr>
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</table>
### Appendix III. ePortfolio Implementation Checklist

<table>
<thead>
<tr>
<th>Considerations</th>
<th>Recommendations</th>
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<tbody>
<tr>
<td><strong>Teaching practice</strong></td>
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<tr>
<td>What is the purpose of the ePortfolio?</td>
<td>The portfolio is viewed as a personal, learner-in-control tool. It is treated as central to the learning and assessment process.</td>
</tr>
<tr>
<td>What learning objectives will be considered?</td>
<td>Learners are introduced to the concept, and instructed on how to use the system (both from a technical and from a “how will this help you” perspective);</td>
</tr>
<tr>
<td>Who is the primary audience of the portfolio?</td>
<td>The curriculum has been designed to require learners to use the portfolio in completing their course work and assignments;</td>
</tr>
<tr>
<td>What is the role of teachers and pupils?</td>
<td>The portfolio is used for assessment of learning objectives.</td>
</tr>
<tr>
<td>How will pupils learn how to reflect effectively on their work?</td>
<td>Instructor feedback can be integrated back into the portfolio and treated as an artifact;</td>
</tr>
<tr>
<td>Who will provide feedback on the quality of reflections?</td>
<td>Learners are provided staged advising sessions evaluating their effective use of portfolios (this is a meta-cognitive evaluation of portfolio use);</td>
</tr>
<tr>
<td>How is the ePortfolio going to be assessed? (For assessment portfolio)</td>
<td>An ePortfolio culture exists, encouraging learners to include personal life experiences, awards, non-academic activities, and other character/learning revealing artifacts in their portfolio: dialogue, debate, discussion, and examples of eportfolio use are common, time is allotted for portfolio development, faculty understand and promote the value of ePortfolios, technical details are well managed, resulting in a simple, positive end user experience.</td>
</tr>
<tr>
<td>How are the results going to be linked to the curriculum? (For assessment portfolio).</td>
<td></td>
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<tr>
<td><strong>Quality assurance</strong></td>
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<tr>
<td>What are main activities ensuring assessment transparency?</td>
<td>Internal verifiers can monitor more often if needed;</td>
</tr>
<tr>
<td>How to ensure internal and external verification of assessment?</td>
<td>Advance planning by internal verifiers is easier;</td>
</tr>
<tr>
<td></td>
<td>Remote access is available to assessors;</td>
</tr>
<tr>
<td></td>
<td>The audit trail of the assessment cycle is clearer;</td>
</tr>
<tr>
<td></td>
<td>Remote external verification is possible.</td>
</tr>
<tr>
<td><strong>Legal considerations</strong></td>
<td></td>
</tr>
<tr>
<td>How will the ePortfolio system authenticate that all the work, documentation and demonstrations were created by the author?</td>
<td>Advise learners to ensure they are clear about how to access resources, especially from the internet, how to reference the material they use, and the extent to which they may confer with others or seek support as they create their ePortfolios.</td>
</tr>
<tr>
<td>Who is the real owner of the artefacts in the ePortfolio file repository?</td>
<td>Provide learners with electronic signatures, and require them to warrant that their work is their own by signing it as they upload it to their ePortfolios for assessment.</td>
</tr>
<tr>
<td>How will intellectual property used in an ePortfolio be protected?</td>
<td>Require both Assessors and learners to sign and date any scanned evidence.</td>
</tr>
<tr>
<td>What can or cannot be included in an ePortfolio?</td>
<td></td>
</tr>
<tr>
<td>Who owns the learner record (transcript)?</td>
<td></td>
</tr>
<tr>
<td><strong>Development and support considerations</strong></td>
<td></td>
</tr>
<tr>
<td>Who will be providing staff support and development?</td>
<td>learners intending to use ePortfolios should be given as much guidance as possible. Encourage them to start building their ePortfolios early in their course or training programme, so the ePortfolio can be integrated with learning and assessment from the outset.</td>
</tr>
<tr>
<td>Have teachers been consulted about the type of development they would like?</td>
<td>advisable to let learners see examples of completed, good quality ePortfolios at an early stage, to show what’s attainable and suitable.</td>
</tr>
<tr>
<td>Teachers might have different attitudes toward ePortfolio especially related to how they valued reflection in learning.</td>
<td>students should be encouraged to maximise opportunities to create digital evidence and then use the technology to store, link and integrate it to best demonstrate their achievements. Some learners will need support to do this.</td>
</tr>
<tr>
<td>What are the roles of teachers and what are the roles of support staff, for example, careers advisors for the ePortfolio implementation?</td>
<td></td>
</tr>
<tr>
<td>Who will show learners how to use the system? Will there be an institutional programme or will it remain the responsibility of the teacher?</td>
<td></td>
</tr>
</tbody>
</table>
Technical Checklist

Hardware and software considerations
8. Integration – how will the issues of integrating an institutional management information system or virtual learning environment with the ePortfolio be dealt with and by whom?
9. Server performance and storage – scaling up to cope with increasing numbers of ePortfolio users and the growing size of the ePortfolios as users expand them over time
10. What plug-ins, file formats and browsers will be required or supported?
11. What technologies will be used to implement an offline, portable ePortfolio that authors can take with them?
12. Service level agreements for future software releases – once the system is being used on a basis wider than a pilot study and a resilient and reliable delivery becomes paramount
13. What back-up systems are in place to ensure operational integrity and disaster recovery?

Support and scalability considerations
14. Can the system scale adequately as its usage grows and storage expands?
15. Will there be adequate staff to develop, deploy and maintain the system?
16. Will there be an infrastructure in place to properly train learners and administrators how to use the ePortfolio system?
17. Will there be adequate online help or will a staffed help desk be required?

Security and privacy considerations
18. What policies need to be in place for governing information access, security and privacy?
19. How will Data Protection Act agreements be ‘signed’ on a larger scale?
20. What are the issues associated with pre-18 year olds using the system?
21. What progress can be made with a unique identification number?
22. Local security issues with institutions allowing access to learner records
23. Is the ePortfolio system easy to use? A simple interface, easy to upload, display & edit information, requires minimal teacher supervision in maintenance of the system
24. Are resources easily accessible by pupils to update their ePortfolio? Hardware such as cameras, videos, multimedia computers are available, software such as graphic and video editing suite are available; training and support on use of resources is provided
25. Is the system accessible by stakeholders? Accessible by teachers, peers and parents to view/feedback/evaluate.
26. Can the system accommodate multiple formats? Is it possible to upload different media like text, graphic, audio, video clips, files, databases, virtual reality, etc, can the ePortfolio content be readable by or exportable to other systems?
27. Can the system maintain a high level of security? It means to keep personal data secure and free from hacking
Appendix IV. ePortfolio Implementation barriers and benefits (voting results of EUfolio team)

### Barriers of eportfolio implementation

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure (internet/hardware)</td>
<td>4.5</td>
</tr>
<tr>
<td>Lack of systemic (policy) support</td>
<td>4</td>
</tr>
<tr>
<td>Teacher competence</td>
<td>3.5</td>
</tr>
<tr>
<td>Huge amount of work for teachers</td>
<td>3.5</td>
</tr>
<tr>
<td>Student competence with technology use</td>
<td>3</td>
</tr>
<tr>
<td>Teachers dissatisfaction</td>
<td>3.5</td>
</tr>
<tr>
<td>Teaching philosophy</td>
<td>3</td>
</tr>
<tr>
<td>Lack of leadership</td>
<td>3</td>
</tr>
<tr>
<td>Curricular integration</td>
<td>3</td>
</tr>
<tr>
<td>Fears of teachers to lose control over their student's work</td>
<td>2.5</td>
</tr>
</tbody>
</table>

### Benefit of eportfolio implementation

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent repository for work</td>
<td>5</td>
</tr>
<tr>
<td>Improved ICT skills of students</td>
<td>4.5</td>
</tr>
<tr>
<td>Improved formative assessment</td>
<td>4</td>
</tr>
<tr>
<td>Improved ICT skills of teachers</td>
<td>4</td>
</tr>
<tr>
<td>The student to take more control of their learning</td>
<td>4</td>
</tr>
<tr>
<td>Effective feedback</td>
<td>4</td>
</tr>
<tr>
<td>Supported for learner-centered teaching</td>
<td>3.5</td>
</tr>
<tr>
<td>Students have a greater sense of ownership of</td>
<td>4</td>
</tr>
<tr>
<td>Develops 21st century skills</td>
<td>4</td>
</tr>
<tr>
<td>Increased student motivation</td>
<td>4</td>
</tr>
<tr>
<td>Helped learn to learn by setting learning goals</td>
<td>4</td>
</tr>
<tr>
<td>Helped in reflection</td>
<td>4</td>
</tr>
<tr>
<td>Empower teacher for teaching and learning</td>
<td>4</td>
</tr>
<tr>
<td>Peer learning opportunities</td>
<td>4</td>
</tr>
<tr>
<td>Teachers reflection their teaching</td>
<td>4</td>
</tr>
<tr>
<td>Improved work group</td>
<td>4</td>
</tr>
</tbody>
</table>

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**Note:** The scores represent the voting results of the EUfolio team.