The Use of Electronic Portfolios in Nurse Anesthesia Education and Practice

Nurse anesthesia practitioners must attain a variety of competencies in order to deal with the complexities of healthcare in the 20th century. Increasing population size, technological advances and ever-changing healthcare needs will require Certified Registered Nurse Anesthetist (CRNA) competency in not only anesthesia principles and advanced sciences but also in the area of leadership, ethical decision-making, and organizational management, just to name a few.

Electronic portfolios provide student registered nurse anesthetists (SRNAs) with a method of storing and viewing documents, which can be used as evidence for meeting learning outcomes and course objectives. Students would use a variety of technologies including video, blogs and wikis. For the CRNA, electronic portfolios are a method of storing and displaying achievements over time. Electronic portfolios show both a retrospective and prospective view of the CRNA's progress such that the transition from new graduate or “novice” CRNA to the experienced and ultimately “expert” practitioner can be observed. Because the CRNA or SRNA can view their achievements, gaps in learning are more easily identified.

Keywords: Competency, electronic, learning outcome, portfolio.

In its 2010 report on the future of nursing, the Institute of Medicine (IOM) reported that the methods used to educate nurses during the 20th century are no longer adequate to prepare nurses for dealing with the complexities of healthcare in the 21st century. Increasing population size, cultural diversity, technological advances, and soaring healthcare costs have created a chaotic healthcare environment, which requires a specific set of nursing competencies, including leadership, health policy, process improvement, research and evidence-based practice, teamwork, and multidisciplinary collaboration. The pedagogical foundation of education is student evaluation in order to demonstrate specific learning and terminal program outcomes. When a student receives a passing grade for a particular course or the Certified Registered Nurse Anesthetist (CRNA) meets program objectives for a continuing education opportunity, competence in the specific area of study is assumed. The IOM report challenges this thinking by emphasizing not only the end result (the learning outcome) but also the skills used to meet the outcome (competencies).

Competency is defined as an ability to do something, especially when measured against a standard or core competency. Levels of competency can range from “novice” to “expert” and are based on the range of skills a provider may possess. An example of this range in competencies is demonstrated by comparing the newly graduated or “novice” CRNA with the experienced or “expert” CRNA. Although competency can be inferred from proxy measures, such as years of nurse anesthesia education or years in clinical practice, true competency attainment is based on acquisition and demonstration of a skill-set particular to a specified competency.

Student registered nurse anesthetists (SRNAs) and CRNAs perform skills that can be used to demonstrate competency in a variety of clinical and nonclinical settings. These demonstrations are not always attached to an academic course of study or a continuing education program; however, they should be documented and viewed as contributing toward competency attainment. An important question to ask is: How will SRNAs and CRNAs document and demonstrate competency attainment and evidence of lifelong learning? An organized and iterative method for documenting initial certification and recertification competency is needed. Electronic portfolios (EPs) provide a means of storing, organizing and showcasing achievements. Student registered nurse anesthetists...
and CRNAs should consider using EPs to record and provide evidence of lifelong learning and competency attainment.4,5

Portfolios are defined as collections of evidence used by an individual to document specific achievements, competencies, and learning outcomes.6 This general definition has been extended by developing a more dynamic view of portfolios as being a focused, purposeful collection of traditional and nontraditional work that documents an individual’s progress and achievement over time. Portfolios can be used for learning assessment or for showcasing one’s accomplishments, much like a photographer’s portfolio of photographs.7 An electronic portfolio is a collection of electronic evidence assembled and managed by a user and may contain inputted text, electronic files, images, multimedia, blog entries, and hyperlinks.8

Student registered nurse anesthetists and CRNAs can use portfolios to document proof of didactic and clinical achievement, as well as a means of demonstrating role development and personal and professional growth.9 A portfolio shows evidence of lifelong learning by demonstrating a CRNA’s continuing acquisition of skills, knowledge, attitudes, understanding, and achievements.6 Electronic portfolios are dynamic and potentially offer a fuller and richer image of the individual than traditional assessments.10 An electronic portfolio is both a retrospective and prospective mechanism for evaluating competencies that may otherwise be difficult to assess, such as leadership, use of scientific evidence in practice, professional behavior, and creative endeavors.11

Portfolios originally took the form of a paper file and were used most often by artists, architects and photographers. A typical outline for constructing a hard copy portfolio includes: (a) creation of a neat grammatically correct document, and (b) placement of the document into a 3-inch thick 3-ring binder complete with table of contents, numbered pages, and section dividers. One can only imagine how unmanageable hard copy portfolios become due to increased size and complexity after only a few years of development. With today’s available technology, there is no need to cart a 20-pound document from place to place. By serving as a storage and display mode for achievements and unique learning experiences, EPs have the potential to change not only which works are used to measure competencies and learner outcomes but also how the work is viewed.12

• Why Use Portfolios? Few would assume that the knowledge students possess upon graduating from any educational program last a lifetime. Over time, certain competencies a student possessed at graduation may be lost, while other new and different competencies are attained. Although new and critically important competencies will be achieved throughout a CRNA’s career, it is equally important that fundamental competencies obtained during nurse anesthesia education be maintained. This places special emphasis on the use of EPs in nurse anesthesia as a tool, not only to inform but also to transform a newly graduated CRNA from a “novice” to an “expert” CRNA. Paulson13 found the primary worth of an electronic portfolio is that learners are provided with an opportunity to evaluate their work and identify gaps in existing knowledge and competency level.

Portfolios delivered electronically have an added advantage, as work can be shared with a broad audience easily and often. Because EPs are portable and accessible at any time, faculty, students, accrediting bodies, and potential employers are able to connect in a way never before possible. Student registered nurse anesthetists and CRNAs can decide which documents to share based on the viewing audience and the reason for sharing.9,14 For example, SRNAs would provide course faculty with documentation of clinical case reports, academic achievements, publications, presentations, service work, certifications, and unique experiences demonstrating competency attainment. Nurse anesthetists seeking recertification or credentialing would provide similar documentation (plus teaching experiences, mentoring opportunities and their level of participation in professional organizations) to potential employers or accrediting bodies.

• Reflective Practice. Reflective practice is the foundational competency for effective use of EPs in educational programs.7 Reflection is one of the most important aspects of portfolio use and can be used to facilitate self-evaluation and development of future goals. When students participate in the self-reflection process they are more likely to take charge of their own lifelong learning.13 After a document is added to the portfolio, reflection helps the student determine if learning goals were met. As a result, it is not only the accomplishments but also the actual process of portfolio development that reinforces learning. Through the reflective process, gaps in knowledge, skills and competence are identified.

• Components of a Portfolio. Primary components of an EP include carefully selected and documented examples of the individual’s best work. The items selected would differ depending on individual clinical proficiency and expertise, past and current learning experiences, and enrichment activities and interests. In an educational portfolio, the SRNA chooses experiences that provide documentation of achieved learning and program outcomes. Regardless of the document presented, students should provide rationale for why a document was selected for inclusion in
the portfolio and should also reflect on and evaluate the submitted material. Ultimately, portfolio content depends on the viewing audience, EP purpose, creativity of the SRNA or CRNA, applicability of past experiences, and depth of self-reflection. Electronic portfolios can be created and shared for a variety of purposes including CRNA recertification, potential employment, evaluation for academic progression and tenure, or application to a doctoral program. Each EP would contain unique entries and documents used to demonstrate competencies and outcomes relevant to the specific EP purpose (Table 1).

- Portfolios and Outcome Evaluation. Educational program competencies can be assessed using a variety of assessment methods. When electronic portfolios are used to evaluate learning outcomes, multiple-choice testing will no longer be the sole method for determining whether learning has occurred. Direct observation of clinical performance, assessments of on-campus class learning activities, and end-of-semester and end-of-program presentations can be used to demonstrate the SRNA’s understanding and achievement of national or state competencies and to document progress in competencies difficult to measure such as leadership, mentoring, and ethical behavior. The portfolio could contain evidence of competency achievement, such as clinical preceptor evaluations of a SRNA’s clinical skills and the SRNA’s written reflections on their level of clinical performance. The goal is for students to be able to link competency standards and program outcomes to the skills and activities that they performed during clinical practice placements or during enrichment activities not attached to a particular course (Table 2).  

- Domains of Learning: Theoretical Basis for Portfolio Use. It is generally agreed that the theoretical basis underpinning the portfolio approach is Knowles’ set of 5 assumptions regarding adult learners:\textsuperscript{18}

1. The learner is self-directed.
2. The student’s past experiences are a rich resource for learning.
3. Readiness to learn develops in response to life tasks and problems.
4. Learning must be relevant and contribute a better quality of life.
5. The more potent motivators are internal, such as self-esteem, recognition, better quality of life, and self-actualization.

There are 6 levels of cognitive complexity including knowledge, comprehension, application,
What have I mastered and what remains to be learned?
How has my practice changed over the past year or semester?
What would I do differently next time?
When working with a difficult peer or colleague: How I changed the relationship.
In the next 5 years, what would I like to accomplish professionally?
What are my major strengths?
In what areas could my clinical performance be improved?
In what ways can I make a positive impact on my profession and my organization?

Table 3. Nontraditional Events to be Included in an Electronic Portfolio

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<tr>
<th>Event</th>
<th>Description</th>
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<tr>
<td>Video recordings</td>
<td>A student's performance of a specific psychomotor skill can be displayed as a student artifact. In addition to presenting a checklist or clinical case record, SRNAs can demonstrate competency in obtaining and maintaining a mask airway by adding a video recording of the skill demonstration. Portfolios allow students to combine graphics, video, text, sounds, and other digital artifacts into an organized, portable, and Internet-ready format that can be modified and shared with others at any time.</td>
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• **Challenges to Portfolio Use.**
  Guidelines and recommendations for “best practice” EP use in nursing and nurse anesthesia education continue to evolve. No common or universally accepted EP creation software has been identified. This may prevent EP dissemination outside of the parent institution, as the EP may not be accessible to a potential employer unless the employer has compatible software. The development of “open source” access to EP software, such as Google Sites and Word Press, has provided a partial solution to this problem. Institutionally based EP software systems, which integrate specific program outcomes with institutional values and philosophy, are currently being developed. An EP component specifically for nurse anesthesia educational programs is currently included with the Typhon (Typhon Group LLC, Metairie, Louisiana) case tracking system. Optional EP development software is also included with certain learning management systems, including Blackboard (Blackboard, Inc, Washington, DC).

Dedicated time for student and faculty orientation and training will be needed. However, if EP development is included as a course assignment, such as in a Role Development course, time would be less of an issue. Because the EP development process is time-consuming, it must be perceived as valuable by students and faculty in order to be successful.

Students will require continuous support by faculty and information technology staff. Although this is a potential area for concern, most students are “tech-savvy” and can typically find a solution to their own technology issues. Technology support may become an issue when students rotate to clinical sites without an Internet connection.

Privacy concerns with respect to institutional policies dealing with student, faculty and patient HIPAA rights are a significant issue. Privacy guidelines for EP development and dissemination must be developed and vetted through the appropriate institutional channel. For CRNAs, this issue is less threatening, as sharing information with anyone except an employer is done voluntarily. In contrast, SRNAs are required to share electronic information with faculty, compliance departments at multiple clinical sites, and clinical faculty and support personnel for each site. This increases the opportunity for breaches in student confidentiality.

The use of electronic portfolios to document lifelong learning, such as for CRNA recertification, is less complex than the use of EPs in an educational program. In this case, the EP’s primary function is to serve as a showcase for the CRNAs accomplishments and to demonstrate continued competency in the practice of nurse anesthesia.

Finally, an important question is: Will employers or potential audiences outside of academia view the EP as a viable method of documentation, or will the paper portfolio be preferred, regardless of its size or weight? Although there is mounting evidence of increasing EP use in academia for content management, intradisciplinary collaboration, and student evaluation, no data indicating that EPs improve student outcomes are yet available.

For those students, faculty, and practitioners who would like to learn more about using an electronic portfolio, there are many available websites (Table 4).

Table 4. Websites of Interest

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<tr>
<th>Website</th>
<th>Description</th>
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<tbody>
<tr>
<td>Google Sites</td>
<td><a href="https://sites.google.com">https://sites.google.com</a></td>
</tr>
<tr>
<td>Word Press</td>
<td><a href="http://wordpress.org/">http://wordpress.org/</a></td>
</tr>
<tr>
<td>MERLOT</td>
<td>Multimedia educational resource for online learning <a href="http://www.merlot.org/merlot/index.htm">http://www.merlot.org/merlot/index.htm</a></td>
</tr>
<tr>
<td>Mahara</td>
<td>Open source eportfolio and social networking web application <a href="http://demo.mahara.org/">http://demo.mahara.org/</a></td>
</tr>
<tr>
<td>Moodle</td>
<td>Open source community-based tools for learning <a href="http://moodle.org/">http://moodle.org/</a></td>
</tr>
<tr>
<td>Educause</td>
<td>Advancing higher education through the intelligent use of technology <a href="http://www.educause.edu/">http://www.educause.edu/</a></td>
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Conclusion
Competency demonstration by both SRNAs and CRNAs has future implications for nurse anesthesia certification and recertification. The National Board of Certification and Recertification for Nurse Anesthetists has defined continuing professional competence as an ongoing, multimodal, and progressive process that maintains and enhances proficiency in nurse anesthesia practice from entry level to complete mastery. The determination of what knowledge and skills equate to proficiency at the level required for initial professional certification and recertification ranges from that of the novice to the experienced nurse anesthetist. Certified Registered Nurse Anesthetists will be required to demonstrate competency and lifelong learning in various areas of practice to maintain practice certification. Student registered nurse anesthetists must demonstrate acquisition of novice level competencies in not only airway management, hemodynamic monitoring, and patient assessment but also in the competencies identified in the IOM report. Electronic portfolios should be considered as a reliable and effective method of storing and displaying the accomplishments and best work for both SRNAs and CRNAs.

REFERENCES
3. Leach DC. Competence is a habit. JAMA. 2002;287(2):243-244.

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