Over the past 2 decades, the prevalence of portfolio use for monitoring and assessing student achievement in K-12 education has increased. The impetus for including portfolios in teacher education programs was inherent in recommendations from several reports. Collectively, these reports call for improvement in assessment methodology.

Included in the recommendations was proposed development of high-quality performance assessments of teachers. Electronic portfolios were among the assessment tools educators employed to address these recommendations. As a result, electronic portfolios are now considered digests of evidence representing the critical skills required for professional and accreditation standards. Uses of electronic portfolios by institutions and departments include assessment of the integrity of academic programs as well as evaluation of the success of students enrolled in the programs.5

The use of electronic portfolios is relatively new to higher education and to nursing; however, during the past decade school health educators have used the electronic portfolio as a viable method for demonstrating student learning in outcome-based education and preparation. Electronic portfolios also have been used as professional development tools for school health educators to demonstrate teaching effectiveness and professional preparation.6 Use of the portfolios encourages students to “write for a real audience” and encourages students to publish their work employing various media formats.

Sorrell et al7 implemented portfolios as a way to assess students’ critical thinking abilities across the disciplines of Nursing and English. Conclusions of the study included 2 emergent themes: (1) critical thinking involved “seeing” in a special way and (2) it involved not only such components as analysis and synthesis, but also a creative process.7 This finding is supported by Baker’s8 proposition that creative opportunities in writing are integral to the critical thinking process as perceived by students.

In 1999, a position statement provided by the American Association of Colleges of Nursing (AACN) cited the importance of defining and documenting the scholarship of teaching. Under-scored in this publication was recognition of the relationship among the discipline and pedagogy.9 Nursing education programs, like teacher education programs, require accreditation and are accountable to national licensure standards. It is important for the profession of nursing to consider the curricular trends exemplified in teacher education for documenting and assessing both faculty and student achievements as well as to employ new and innovative ways to assess outcomes and document program integrity. Nurse educators may begin this process by understanding the types of electronic portfolios outlined in the existing literature. Furthermore, it is important for nurses to acknowledge and embrace writing as a method to think critically while making connections among ideas.7

Portfolios are much more than an extensive résumé. Prototypes of electronic portfolios described in the literature include “working portfolios,” which contain all material completed for an educational experience. Another group of portfolios, referred to as “presentation or collection” portfolios,10 contain only exemplars selected by students that support a set of predetermined key indicators or outcomes. These outcomes are usually associated with a particular curricular experience.6 Students must determine (according to the criteria provided) which type of portfolio best suits their intended purpose for the electronic portfolio. Therefore, a portfolio may begin as a working portfolio and subsequently emerge as a presentation portfolio.

**Using Electronic Portfolios to Measure Student Achievement and Assess Curricular Integrity**

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Successful achievement of program outcomes is the primary goal of nursing education programs. Electronic portfolios are a contemporary method by which to measure student achievement, assess curricular efficacy, and evaluate program integrity in nursing education. The authors outline the sequential process of understanding, introducing, and integrating electronic portfolios into a curriculum.

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Portfolios are viewed both as reflective tools to document students' academic progress as well as organized digests of artifacts documenting professional development. Portfolios include artifacts supporting evidence of personal reflection on and embodiment of outcomes. Other uses of portfolios include program exit assessment, demonstration of competency achievement, and documentation of personal growth and social development.

**Portfolio Construction Model**

Development of an electronic portfolio involves 2 major constructs: selection of artifacts for inclusion, and development of the multimedia component (Web page) housing the portfolio. Development of a Web page is a separate process from the identification of artifacts. However, both artifact selection and physical construction of the portfolio Web page are necessary parts of the portfolio construction process.

Figure 1 depicts our model for electronic portfolio construction and development. The 5 areas addressed are authentic assessment, key indicators, reflection, Web page (multimedia component), and evaluation.

**Authentic Assessment**

In this model, the first component depicted is authentic assessment. Authentic assessment is highly individualized and, when used properly, is highly reflective of an individual student's learning and professionalism. "Authenticity" is measured according to standards set by the students and faculty. The concept of authenticity is actually embedded in all components of the portfolio development process; however, it is most prominent when initially developing the outcomes to be addressed, and when comprehensively evaluating the completed portfolio.

This authentic assessment methodology might be used for evaluation of individual achievements as well as for the purpose of academic program evaluation and accreditation. In some programs, authentic assessment is utilized as an exit assessment tool (eg teacher education).

**Key Indicators**

The second component depicted in the model is acknowledgment of key quality indicators. The term "key indicator" may be equated to what most educators refer to as "program outcomes." Key indicators (program outcomes) may be specific to individual colleges, departments, and majors within an institution. Portfolios may reflect general curriculum outcomes (as written in a college mission statement) as well as specific outcomes addressing college-wide requirements for graduation. Other examples of key indicators include outcomes required for accreditation, licensure, or certification for the individual student as dictated by their major.

According to existing literature, students should become familiar with the key indicators at the beginning of the educational experience. Reflection on the indicators should occur peri-
odically throughout the process of portfolio development. Program outcomes help students direct their learning and behavior. Understanding of key indicators begins when students look critically at the indicators and come to know what it means to “embody” that outcome. A student must truly understand what embodiment of these indicators “looks like” in order to select exemplars that demonstrate and support knowledge associated with that outcome. Student understanding of key indicators (outcomes) may be enhanced when the indicators are concisely written and clearly articulated by faculty.

Some examples of key indicators include but are not limited to achievement of critical and higher order thinking skills; competence in a particular discipline; cultural competence; and self-directed learning as well as personal and social skill development. The implications of these indicators include demonstration of “holistic” growth in addition to “academic” growth. This demonstration is formalized with evidence of technology skills, interpersonal skills, and diversity.

Reflection
The third component depicted in our model is the process of reflection. Reflection is purposely placed in the center of the model because it is central to the critical thinking process. Without the process of reflection, the meaning of an electronic portfolio is diminished. Because the electronic portfolio is viewed as a systematic anthology of work collected over time, the portfolio should provide evidence of self-reflection. Reflection on the key indicators (outcomes) involves student identification of reasons why certain exemplars might be selected to support achievement of the outcomes. Student reflection on the quality indicators should begin to glean a sense of which exemplars might best demonstrate learning and successful achievement of the indicators.

This process involves concurrent reflection on the concepts of learning and behavior as well as recognition of the symbiotic relationship that connects these concepts. Recognizing this connection among behavior and learning typifies the critical thinking process, and students should be reminded when they are “practicing critical thinking.” Behavior and learning also affect development of the Web page and artifact selection.

Web Page Housing
The fourth component of our model depicts the multimedia component (Web page) as the “housing” of the portfolio contents. The portfolio houses the selected exemplars (artifacts), which provide supportive evidence for specific outcome achievement from the student’s academic major. The Web page also provides links to showcase students’ personal and professional growth.

Evaluation
In the final component of the model, evaluation, authentic assessment is again used to reflect on and evaluate the artifacts selected that are housed within the Web page. Weidmer11 suggests applying rubrics when evaluating and assessing portfolio contents. Students should be provided with copies of the selected scoring rubrics prior to development of the electronic portfolio. Three types of rubrics may be considered. First, an analytical rubric compartmentalizes the sections of the portfolio and each component is scored accordingly. Second, a holistic rubric, as the name implies, considers the project in its entirety without “small scale analysis.” Finally, a primary trait rubric evaluates performance in several major areas of interest.11 p.586 When the evaluation process is complete, the results may be used to assess program integrity as well as students’ ability to achieve the established outcomes.

Figure 2 depicts how selected artifacts in a student’s portfolio might support an outcome addressing professionalism in a BSN curriculum. This example depicts critical inquiry as a composite of attitudes and ways of considering knowledge. According to the Grand View College Nursing Program Assessment Plan (in the practice of nursing), critical inquiry is used to develop meaning and understanding, as well as to see present and future possibilities through interpretation of both the nurse’s and client’s lived experiences. These attitudes and multiple ways of considering knowledge are diverse, and include but are not limited to reflection, creativity, research utilization, analysis, dialogue/social interaction, and synthesis.

Inclusion of appropriate artifacts in the electronic portfolio allows students to exemplify achievement and embodiment of successful integration of critical thinking into their practice. These artifacts would include but not be limited to journal reflections, aesthetic projects, multimedia presentations, video clips, resolutions written for the National Student Nursing Associations (NSNA), and legislative correspondence.

Implementation and Integration
Faculty Role
Successful implementation and integration of electronic portfolios into a baccalaureate curriculum demands student, faculty, and administrative support. Among the constituency that must be included in the process of curricular integration are the faculty and administrators who will be working with students as they develop electronic portfolios. The faculty
teaches the concepts, requires the finished product, and models the use of electronic portfolios. The faculty introduces the electronic template for the portfolio and clearly defines the criteria and expectations of the portfolio. Faculty must provide illustrations suggesting how current course activities could be realigned to become portfolio activities.

Key courses, sometimes referred to as “checkpoints,” are selected by faculty to periodically monitor the portfolio construction process. Faculty and departments should identify key courses along the way in which portfolio “entries” should be made. This will ensure that both the student and his/her faculty mentor allow adequate time for the reflective process to occur.

Identification of key courses and checkpoints facilitates reinforcement of important concepts in certain classes and encompasses reminding students about certain items that might be considered as artifacts for inclusion in the portfolio. Faculty may provide opportunities for reflective writing in the context of certain classes as well as assist students in recognizing the value of writing to learn. This results in ongoing mentoring of students by the engaged faculty members. Furthermore, this faculty/student interaction provides the student with an opportunity to reflect on the work accomplished in the course and to frame their accomplishments within the parameters of the key indicators (outcomes). Understanding how the individual course outcomes connect with program outcomes may help students to “micro-manage” the task of portfolio development. The faculty mentor role is further extended to cover guidance in development of portfolios, selection of artifacts and exemplars, and serve as a sounding board for the reflective process.

Departmental and college curriculum or assessment committees initially determine what the portfolio will address and which outcomes should be evidenced. These outcomes may be found in college catalogs, curriculum guides, and department philosophies. Although desired outcomes may already exist within departments, they may require some modifications for inclusion in electronic media. Recognizing that this process relegates a great deal of responsibility to faculty, it is recommended that individual faculty members acquire lived experience with construction of a personal portfolio before attempting to facilitate students in the process. Faculty mentors should become familiar with portfolio concepts themselves, as well as with the many technological challenges that can be encountered.

According to Young, meaningful reflection often includes dialog with a coach, a mentor, an advisor, or a peer. Regularly scheduled interaction between a faculty advisor/mentor and students is essential for clarification, reassurance, and confidence building. Faculty mentors and students need to conference on a regular basis to discuss portfolio contents, what changes are being implemented, and the student’s progress. Faculty might also encourage students to include some artifacts that do not reflect their “best work.” These “less than perfect” examples are valuable artifacts used to illustrate the developmental nature of the critical thinking process as well as the process of writing skill acquisition.

**Student Role**

The students have the most to gain from development of an electronic portfolio. Students select artifacts for inclusion that support achievement of the key indicators (outcomes). What is most important is the students’ reflection on why an artifact is chosen for inclusion in the portfolio, what was gained from a particular experience, and how the experience will impact future behavior and learning. This process involves student reflection on the “meaning” of an experience and recognition of how the experience (substantiated by the artifact) demonstrates their competence and embodiment of an indicator or outcome. Reflective writings are included as artifacts and are selected by students to showcase the individuality and uniqueness of each student.

Organization of the electronic portfolio is at the discretion of the student. Student creativity is innate in the process. Students create the finished electronic portfolio, and although the portfolio is never really “finished,” the students illuminate benchmarks achieved and embodiment of outcomes from their unique perspectives.

In areas requiring certification, accreditation, or licensure, the electronic portfolio will demonstrate the students’ competence in a specific area as well as their successful development as a competent professional.

Clearly, students must consider the contextual purpose of the portfolio when selecting the artifacts for inclusion. The term “constructionism” reminds us that the best way to actualize knowledge is to build something tangible. Constructionism is based on the principle that transmitted knowledge is constructed. Papert connotes learning as “building knowledge structures” and purports that engagement in this activity encourages students to experience their own personal construction. The student “constructs” the portfolio according to his/her interpretation and understanding of how the tangible work completed supports the key indicators. Hence, the student becomes the “constructionist.”

**Portfolio Artifact Selection**

The contents of a portfolio are directed by its purpose. The purpose usually is to provide archival support of a predetermined set of key indicators. A variety of concepts are included, specifically evidence of academic growth, development of skills (especially important in a professional portfolio), and personal changes that the student has experienced. Specific benchmarks required by accrediting bodies also should be included, as should artifacts reflecting competency in those benchmark areas. The most important part of a portfolio, electronic or otherwise, is the reflective component provided by the student while reviewing the process of learning, building the portfolio, development as an individual, and growth as a skilled professional. A presentation portfolio currently in active use may be viewed at a Web site, developed jointly by the authors, at the following URL: faculty.gvc.edu/sramey.

**Timeframe**

Adequate time should be allotted for the process of electronic portfolio de-
development. The construction process cannot and should not be rushed. It is a lengthy, ongoing process best approached as a long-term project. Students (and faculty) should be introduced to the concepts and desired outcomes early in their academic career. This will promote and facilitate student development of organizational skills and reflective patterns.

Students will also require an electronic template or “road map” to get to their final destination: a professional portfolio that reflects their personal, academic, and professional successes. The most expedient way to achieve this end is to utilize existing software packages to “showcase” the students’ work. As mentioned previously, checkpoints in specific courses along the way will serve to facilitate the process for students in an organized, predictable manner.

In actuality, an individual’s electronic portfolio is never completed. Individuals may choose not to contribute to the portfolio for extended periods. However, it is always available for modification. An individual does not stop learning, hence their life experiences are dynamic and the process of reflection is ongoing.

**Portfolio Web Page**

Development of an electronic template is essential for individuals and institutions new to the electronic portfolio development process. Technological support is essential for the multimedia formatting and housing of the portfolio. Initially, faculty should evaluate students’ computer competency and facilitate remediation as necessary. This will empower students to actively and comfortably participate in the portfolio construction and development process. Access to digital tools (hardware, software, and networking) and a technologically successful mentor are integral to the successful construction of the electronic portfolio. As faculty become more experienced with this portion of the process, they may feel greater empowerment to directly assist students in the technical development of the multimedia portion of the portfolio. Some authors suggest the use of a decision matrix to identify feasible human and financial resources available to facilitate integration of portfolios into a curriculum. Barrett further suggests that identification of supporting technologies to manage the “digitalizing” process is necessary to “make sure the electronic portfolio process works as intended.”

The “housing” of an electronic portfolio is secondary compared to the issues required in portfolio content development. A CD-ROM, a World Wide Web site, or even a 3-ring binder could serve as the venue for a portfolio. The housing includes a home page. This page should reflect the individuality of the student, and “anchors” the student and the portfolio. Inclusion of a “menu” of items assists the reader with navigation through the portfolio. Relevant links connect the sections and facilitate smooth mobility throughout the collection of artifacts.

The top portion of Figure 2 represents a hypothetical “home page” and how it might be configured. The Professionalism page illustrates what artifacts the reader might choose to open and review. How the sections are connected is at the discretion of the student; however, creativity should be encouraged when developing the multimedia aspect of the portfolio layout. Humor, for example, may be incorporated into the portfolio by including a section entitled “graduation” that uses music and tasteful graphics to convey the meaning of this occasion as embraced by the student. The final format of the portfolio is at the discretion of the student and is dependent upon the reader’s preference, purpose, and the culture in which the portfolio will eventually be reviewed.

**Conclusions and Implications**

Comprehensive assessment of student and faculty progress utilizing electronic portfolios is becoming mandated by a growing number of national accrediting bodies in several disciplines. Exposure to electronic media formatting enhances students’ writing skills while showcasing achievements in an accessible, sophisticated format. The portfolio development process encourages creativity, deliberation, and relationship development among faculty and students.

Students and faculty grow and enhance their learning by experiencing the portfolio development process together. Therefore, we encourage nurse educators to consider proactively mirroring the patterns embraced by our colleagues in teacher education programs and art curriculums to incorporate electronic portfolios innovatively into BSN curriculums.

Use of electronic media enhances and increases the visibility of our students’ work and accomplishments to audiences within and outside the nursing profession. Furthermore, integration of new teaching and assessment methodologies will further enhance the image of the profession embraced by the public and continue to reinforce the dynamic, innovative nature of the discipline of nursing.

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**References**

From the Editor
Online Manuscript Management

January 1, 2003, marked a momentous event in the 28-year life of Nurse Educator. For the first time, with implementation of our manuscript management system, all manuscript-related events occur online. First, authors go to our Web site (http://NE.EdMgr.com), register, and then post their manuscripts and supporting documents. Acknowledgment of manuscript receipt occurs in minutes. Thereafter, authors can track key events as their manuscript progresses through the editorial system.

Reviewers receive e-mail notification that a manuscript is ready for review. They log in to the Web site, access the assigned manuscript, complete the assessment, and submit their review to the editor. The system maintains our tradition of anonymous peer review (reviewers and authors never know each other’s identity). Within minutes of a completed review’s submission, the editor receives notification that a review is complete. Staff at the editorial office also process all manuscripts through the online system, including communication with authors and submission of accepted manuscripts to production.

While the manuscript management system ultimately facilitates a more efficient and effective process for steps in the publishing process, it is a new approach to a very traditional process. Initially, authors, reviewers, and editors will spend more time on submission, review, and tracking tasks as they learn the system. Assistance is available through online help menus and staff at the editorial office. Once familiar with the system, people will find numerous benefits—access to the system and the manuscript any time from any place that has Internet access, decrease in postage, duplication, and secretarial costs, and automated tracking of author, review, and editor key events. Perhaps the most gratifying benefit is a faster submission-to-production process that gets good ideas into readers’ hands in a more timely way.