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Complex Moving Parts: Assessment Systems and Electronic Portfolios

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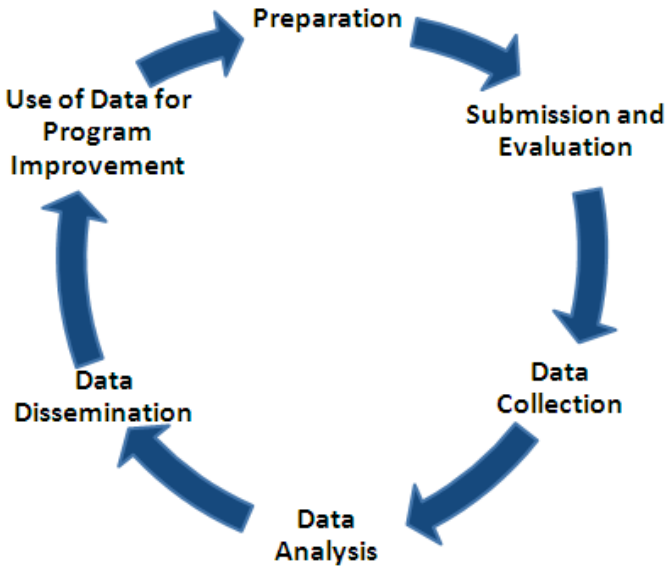
The largest college within an online university of over 50,000 students invested significant resources in translating a complex assessment system focused on continuous improvement and national accreditation into an effective and efficient electronic portfolio (ePortfolio). The team building the system needed a model to address problems met throughout the planning, design, and implementation of the assessment and ePortfolio systems. The team adopted the FEAT model to ensure that multiple stakeholder perspectives were an integral component of how the assessment system and ePortfolio development worked together. This model consisted of four domains: *functional* encompassed how the software tool worked and was used; *educational* reflected the desired learning as a result of system implementation; *administrative* included policies and procedures, financial and human resources, and planning necessary for project implementation; and *technical* included the hardware, software, and networking infrastructure necessary for ePortfolio and assessment system implementation. The researchers documented the types of problems encountered in the process, the problem solvers involved, strategies used, and actions implemented. The researchers concluded that evaluating system development is more informative if a systemic approach is used to examine the interdependent relationships among the FEAT model domains that influence the overall system maturity.

The university, a leader in distance education, has been preparing graduates in the field of education for over 40 years. This study was performed in the College of Education and Leadership, a college with over 13,000 enrolled students in 12 different degree programs and over 40 specializations (Walden University, 2012a). Degrees range from a bachelor's in educational studies to PhD programs in special education. Less than 1% of the total college enrollment is in teacher preparation programs, including the Master of Arts in Teaching (MAT), which is the primary environment used to prepare this study (Walden University, 2012b). The teacher preparation programs, including the MAT degree, are in early childhood education and special education. Also offered is an education specialist (EdS) degree in principal preparation. All programs lead to educator licensure in the State of Minnesota and are accredited by the National Council for the Accreditation of Teacher Education (NCATE). The programs are pursuing national recognition through the appropriate professional associations (Walden University, 2012c).

In 2007, the College of Education and Leadership began developing licensure programs intended to certify teachers, and in 2008 decided to pursue national accreditation. The decision to pursue national accreditation sparked the need to examine the existing assessment system, emphasizing transition points and key program assessments to measure and validate program outcomes. A discourse followed that required the institution to define the components (e.g., transition points) of the assessment system. Transition points are the milestones that occur within a program, allowing all stakeholders to determine whether the candidate is meeting the expectations that lead to graduation. For the purpose of this study, the university students in teacher preparation programs will be referred to as candidates. Key program assessments, which are components of the transition points, are standards-based artifacts (e.g., tests, projects, papers) that demonstrate the candidate's academic performance. Program outcomes and professional standards are used to guide what the candidate should know and do by program completion. Since the decision to pursue national accreditation, numerous concurrent projects related to the electronic portfolio (ePortfolio) were launched (e.g., implementation of new program assessments and transition points). The process to examine the assessment system also included due diligence to determine the best tool for the specific requirements of the college's assessment system, which included the ePortfolio. The college selected the commercial product, TaskStream, as its ePortfolio and assessment management system. The web-based application, at the least, allows teacher candidates to submit assessments to their ePortfolio for scoring by trained faculty members using valid, reliable rubrics. TaskStream also allows faculty members to manipulate data and assessment personnel to run reports necessary for data-informed discussions.

Figure 1 describes the general assessment process used by programs that lead to teacher licensure within the College (Walden University, 2010). The first step, preparation, includes the process of candidates moving through a structured curriculum that provides the defined knowledge, skills, and professional dispositions within a framework of transition points whereby progress is monitored and support, when needed, is provided. The institution's curriculum and course designers use a rigorous program and course

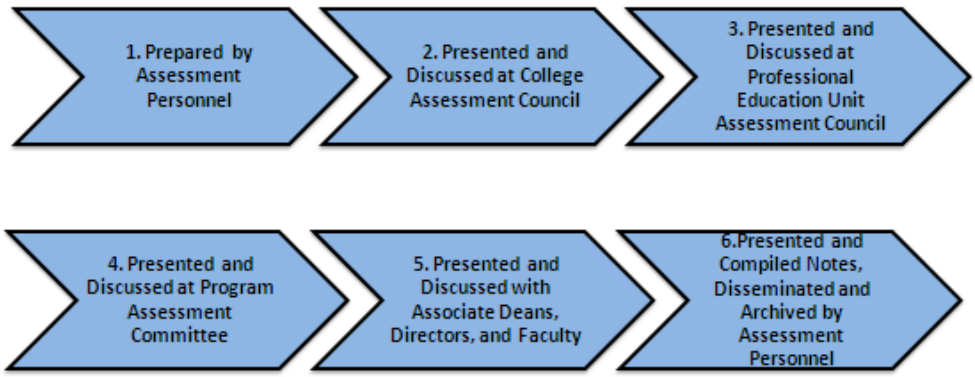
Figure 1
The Assessment Process



development process to ensure that the curriculum effectively supports what is assessed and vice versa. Faculty evaluators receive training in the use of scoring rubrics, enhancing reliability within the process. The required training, developed in the institution's learning management system (i.e., BlackBoard), is self-paced, customized by program and assessment, and facilitated by veteran ePortfolio users. The second step has two parts related to the assessments submitted by candidates and evaluated by faculty members. The first part, submission, includes candidates submitting assessments electronically to the faculty evaluator in their portfolio. The second part, evaluation, includes faculty evaluators providing detailed feedback to the candidates about their performance on assessments used to determine progress in course and program requirements. Feedback on all rubric criteria is not required; however, when feedback is provided to candidates, evaluators can copy and paste rubric language to clarify what is necessary to improve work from one performance level (e.g., acceptable) to another (e.g., target). Candidates have the opportunity to revise an assessment three times and resubmit for additional feedback and final approval. The third step, data collection, includes items collected in the ePortfolio, such as the assessments, standardized examinations, and field and clinical experience evaluations. Also used are follow-up surveys (e.g., candidate, exit, and alumni), grade point average, and course evaluations that are not part of the ePortfolio. The fourth step, data analysis, includes analysis and disaggregation from the college level to the program level. A synthesis of both quantitative data from major assessments and other sources and qualitative data from faculty members and other external groups is provided in reports generated by the assessment personnel using the ePortfolio software. The fifth step, data dissemination, includes disseminating data to appropriate groups at a defined time, thus allowing different groups to reflect on and engage in meaningful discussions about the results of data collection. Figure 2 illustrates the movement of data and reports through the required councils and committees. The sixth step, use of data for program improvement, involves time allocated to allow the major stakeholders – including faculty, candidates, and school partners – to discuss the results of data collection on a systematic basis. Feedback on major assessments is solicited, and scoring rubrics and revisions of rubrics are made as necessary. Recommendations for changes at the program or unit levels are vetted through a defined process, including the formal governance structure. All changes are documented through the formal process, as defined by the institution. The use of a cyclical model allows data to be introduced, reviewed, and revisited as improvements are implemented and determined to be effective.

Incorporating the ePortfolio into the college's complex assessment system effectively and efficiently created several challenges. To meet accreditation expectations, the assessment system must include the technological capability to construct, implement, and maintain an ePortfolio to track individual candidate

Figure 2
Data Preparation, Dissemination, and Discussion



learning. The system itself must use a technological vehicle to construct, implement, and maintain an ePortfolio for each candidate. The internal and external partners in solving this problem had to design and customize the ePortfolio to maximize positive candidate and faculty perception and intended use level. Specific barriers were overcome to operationalize the assessment system within a technological vehicle to harvest, organize, and format ePortfolio data. Barriers included the selection and implementation of a new ePortfolio system, the dismantling of a prior ePortfolio system that no longer met the needs of the institution, and rapid consensus-building amongst business and operational personnel who had little or no experience developing ePortfolio or assessment systems. Significant outreach to the partners who manage field experiences was necessary in order to design and customize the ePortfolio reports that would allow stakeholders to make data-based decisions and guide subsequent program improvement.

In the following paper, we share our three-year journey to design, implement, and mature not only an assessment system, but also the ePortfolio template used to collect, organize, and report the data collected for program recognition and national accreditation. As such, our journey is one of balancing multiple institutional forces and voices, emphasizing many of the functional, educational, administrative, and technical problems that can arise in an initiative of this scope. Our journey is one to share, for it contains insight into how to handle the complex, sometimes competing, elements of successful assessment systems and ePortfolios.

Literature Review

The purpose of this article is to describe the lessons learned from the simultaneous development of an assessment system and corresponding ePortfolio template within a compacted time frame. Within the context of the literature review, the topics studied and reviewed include ePortfolios and assessment systems as well as a model for establishing stakeholder roles and perspectives. The literature review also serves as a critical step in this study, which utilizes a development methodology.

In order to develop simultaneously an assessment system and a corresponding ePortfolio template, the assessment working group adopted the FEAT model (Robertson, 2006) to help balance multiple, competing forces within the stakeholder team. The FEAT model consists of four domains. The *functional* domain encompasses how the software tool works and how it is used (e.g., the application and its features). The *educational* domain reflects the desired learning as a result of implementing the system (e.g., teaching and learning). The *administrative* domain includes policies and procedures, financial and human resources, and planning necessary to implement the project (e.g., sustainable budgeting). Finally, the *technical* domain includes the hardware, software, and networking infrastructure necessary to implement the ePortfolio tool and the assessment system. Establishing FEAT domains ensures that multiple perspectives are an integral component of how the assessment system and ePortfolio development work together.

ePortfolios serve a critical function by providing the data to inform the assessment system. The functionality of an ePortfolio system ideally reflects process and product (Anderson & Robins, 2006; Reeves & Okey, 1996). The process involves identifying which ePortfolio requirements inform various assessment system benchmarks. The product is what the candidate creates and uses to demonstrate candidate, program, and institution learning. For the institution, this may

include regional and professional accreditation (Brickley, Schwartz, & Suen, 2000; Carney, 2004; Clarke, 2009). In order for the process and the product to be mutually beneficial, certain criteria must be addressed. First, instruments used to evaluate candidate work must be varied, valid, and reliable (Wilkerson & Lang, 2003). Second, faculty evaluators must have the ability to assess the work quantitatively and qualitatively using such instruments as rubrics and checklists (Choban, 2004). Third, the ability to manipulate the data collected to report on specific groups or timeframes allows the institution to respond to specific audiences and needs (Barrett, 2001; Oner & Adadan, 2011). Balancing the complex needs of the ePortfolio and the assessment system often comes through differentiating the outcomes of the process and the product. The use of learning outcomes is a critical measure of success and involves applying the functionality of the ePortfolio tool in a manner that meets the educational needs of the candidate, program, and institution.

ePortfolios containing candidate work and performance data assist in achieving the educational outcomes measured through the components of the assessment system. In this case, a clear purpose for the ePortfolio is critical (Barrett, 2001; Burke, Fogarty, & Belgrade, 1994, 1995) for pinpointing how the data from the ePortfolio are used to measure achievement of educational outcomes. This type of approach diminishes candidates' ability to select their own artifacts, a common benefit of ePortfolios (Barrett, 2001). However, pre-determining the artifacts makes the alignment between curriculum and assessment more thorough and coherent, which is similar to the curriculum vitae level of maturity described by Love, McKean, and Gathercoal (2004). The use of pre-determined artifacts solidifies a program's adherence to professional standards (Dorn, 2002; Ehrmann, 2004), which ideally are also aligned with the educational outcomes. Overall, a coherent design of the ePortfolio within the context of the assessment system allows the institution to determine whether an individual candidate or a related cohort have achieved the outcomes set forth by the program or institution. A common understanding of the context of the ePortfolio and assessment system must be shared among all stakeholders, including institutional administration, in order to realize fully the costs and benefits of both.

Broad and deep administrative support is necessary to craft an assessment system that is informed by a robust ePortfolio. First, the executive leadership (e.g., Vice President, Chief Academic Officer) must establish a sustainable business plan (Jafari, 2004) that commits the resources necessary for both the ePortfolio and assessment system to thrive. Second, academic and operational team leadership (e.g., Program Directors, Product Manager) must understand where and how the ePortfolio will be used to inform the assessment system and address rigorous accountability and accreditation measures (Clarke, 2009). Using this data productively for accreditation has an impact on the reputation and marketability of the institution (Levine, 2000). Third, academic leadership (e.g., Program Director) must hold faculty accountable for evaluating the candidate work in the ePortfolio, providing clear expectations and incentives for proper completion of the evaluation of candidate work without either trivializing the process or making the workload too cumbersome for faculty (Strudler & Wexler, 2008). Overall, the complexity of our online organization has allowed executive leadership to allocate fiscal and human resources to tackle problems using the best-fit decisions in which the proper teams and individuals are leading the execution of specific plans. For example, assessment personnel (e.g., one Assessment Director and one Assessment Coordinator) focus on building assets in the ePortfolio tool while Information Technology (IT) staff are assigned technical tasks such as account roles and creation processes; rarely are the roles reversed. The relationship between the technical stakeholders and others relies on the ability of each role to fulfill its commitments and inform other stakeholders of the strengths and weaknesses of various technical strategies.

Implementing ePortfolios within an assessment system requires complex technical decision making. Modern ePortfolio tools are maturing in sophistication. Their ability to disrupt the functioning of higher education classrooms (Christensen, 1997) depends on whether decision-makers can promote the variables that allow innovations to "stick" at the institutional level (Jafari, 2004). There are generally two types of ePortfolio tools, common tools and custom tools (Barrett, 2001). Common tools involve the use of everyday technology productivity tools, such as word processors, web page editors, and institutional homepage space to post static web pages that satisfy the need for an ePortfolio (Batson, 2002). Custom tools involve more sophisticated web-based database applications that may or may not be housed virtually at the institution. The database design of the custom tools allows for more robust privacy features, structured interactions with reviewers, and date-stamped feedback from portfolio viewers (Greenberg, 2003). With proper database design, the information can be harvested for use at the departmental or institutional level. Custom tools may require more institutional support and are generally more expensive. The authors recommend the use of custom tools because of the privacy and feedback features as well as large glossaries of standards (Truer & Johnson, 2003) that can be used to drive reporting capabilities. Batson (2002) specifically

refers to these types of tools as ePortfolios, which are also generally commercial software products with a global market requiring adherence to adaptability (Ittleson, 2001), flexibility, growth, and interoperability (IMS Global Learning Consortium, 2004). The institution selected the specific custom ePortfolio tool because it possessed superior privacy and interoperability along with robust reporting that can be adapted to inform specific requirements of the assessment system.

The combination of the four domains of FEAT provides for a balanced and thoughtful approach to many of the problems faced by teams charged with determining a solution. Very few large, complex projects survive without administrative support and the technical resources to launch successfully. The authors found that even when a project does launch, sustainability is difficult if the functional relevance and educational outcome are weak.

In order to create structure and ensure predictability as well as maximize efficiency, the authors adopted a developmental research approach. Richey, Klein, and Nelson (2003) described two types of developmental research in the area of media and technology. Type I research is intended to focus on a single instance of production, providing highly detailed descriptions of specific methods, including case studies. Type I research also emphasizes drawing conclusions based on context-specific models, analyzing the products and conditions. Type II research is intended to build knowledge and understanding of specific design processes rather than explore and explain a particular instance (as preferred in Type I). Type II developmental research commonly is used for model-building and includes survey research, observations, program evaluation, literature reviews, case studies, Delphi techniques, and think-aloud protocols (Richey et al., 2003; van den Akker, 1999). For the purpose of this study, Type I research will be used because of the emphasis on the design, development, and evaluation of a specific item (Richey et al., 2003).

Type I research is specific to contextual projects and designs. Specific elements of a Type I study may include the type of program being developed, the particular design processes used, the tools and techniques used in the process, and the context of the organization for which the program has been designed (Richey et al., 2003). Specifically, this research examined the development of an assessment system and a complementary ePortfolio template.

This research extends in multiple ways the scholarly conversation regarding ePortfolio implementation. First, the FEAT model provides a framework for establishing a balanced and knowledgeable implementation team. Second, the assessment process and data diagrams describe tangible outcomes associated with collecting and discussing the data. Third, the methodology and timeline articulate specific actions and milestones necessary for successful implementation. Overall, the addition of this work in the scholarly conversation will help fellow adopters implement assessment systems and ePortfolios with greater clarity and collaboration.

Methodology

The design of this research represents formative approaches to the developmental methodology. The developmental method suggested by van den Akker and Plomp (1993) has a two-fold purpose. First, developmental research tends to support the development of prototypical products, including empirical evidence of effectiveness. In this study, the products include the assessment system and the ePortfolio template. Second, the developmental method tends to generate methodological directions for the evaluation of such products. In this study, the design teams met several times to evaluate the products as they evolved. This research involved studying the whole process and specific parts of the ideal assessment system and an ePortfolio used to inform it. The instructional components of this process and the subsequent products were designed as a result of the research. As a result of this study, new knowledge was created about the design of the assessment system and ePortfolio template, their development, and their evaluation (Richey et al., 2003). The overall design of the research was to explore, explain, and design (Gibbons & Bunderson, 2004) an assessment system and ePortfolio template that is specific to the institution's needs and outcomes.

To develop the product described in this study, the following procedure (Figure 3 and Table 1) was used. First, a thorough literature review was conducted, including both professional and academic resources. The search primarily focused on assessment systems and processes, teacher education and its accreditation environment, and the design and content of ePortfolios. Institutional documents, such as the existing assessment plan, were used to identify and define the assessment system, including guiding principles, best practices, standards alignments, transition points and major assessments, support systems, and assessment resources.

Second, a formative group of stakeholders was convened. This internal committee consisted of various academic, assessment, business, and leadership representatives (e.g., Program Directors, Field Experience Coordinators, and Assessment Director). These individuals were chosen because they represented the highest level of institutional intelligence about assessment systems and the ePortfolio. One of the

Figure 3
Methodology

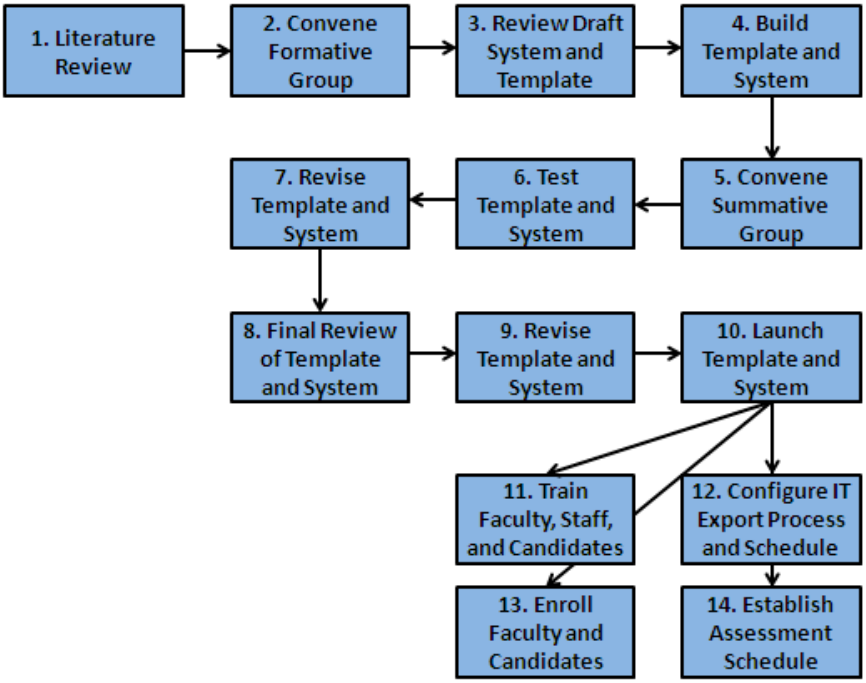


Table 1
Methodology Summary

Step No.	Title	Outcome
1	Prepare Literature Review	Determine existing research and institutional information.
2	Convene Formative Group	Translate the existing requirements and guidelines into assessment system and ePortfolio.
3	Review Draft System and Template	Provide feedback for revision.
4	Build Prototype Template and System	Construct real and technological components.
5	Convene Summative Group	Evaluate the revisions to the ePortfolio template.
6	Use Feedback to Revise Template and System	Make changes based on feedback.
7	Test Template and System	Determine if all components of template work properly.
8	Complete Final Review of Template and System	Provide feedback for revision.
9	Revise Template and System	Make changes based on feedback.
10	Launch Template and System	Start using ePortfolio and collecting data.
11	Enroll Faculty and Candidates	Add faculty as evaluators and candidates as ePortfolio owners.
12	Train Faculty, Staff, and Candidates	Provide written and live instruction on the components and use of the systems.
13	Configure IT and Export Process and Schedule	Ensure reliable data passage from one system to another.
14	Establish Assessment Schedule	Determine calendar for when assessment data will be discussed.

roles of the formative committee was to translate the existing requirements and guidelines regarding the assessment system into an ePortfolio structure and operation. The commitment of the formative committee included weekly teleconference meetings and individual work time spanning a multi-year time frame.

Third, an initial review of the draft assessment plan and ePortfolio template was performed by the formative group. A series of open-ended questions was used to determine whether or not the title, purpose, and order of the ePortfolio requirements matched the assessment system process.

Fourth, a prototype ePortfolio template was developed based on input from various sources. Each requirement within the ePortfolio template was matched to an evaluation method, such as a rubric, and mapped to specific institutional, state, national, and/or professional standards. Each evaluation method also was assigned a frequency based on how often it needed to be reported.

Fifth, the formative group was reconvened as a summative group to evaluate the revisions to the ePortfolio template. The role of the summative group was to provide feedback and/or approval of each individual requirement in the ePortfolio template.

Sixth, a series of questions related to the content and design of the project was developed to guide the summative group in providing feedback. The questions solicited feedback on titles, structure, order, and formatting. The group also provided comments on the evaluation methods and standard alignments associated with the major assessments.

Seventh, the summative group met via web-based conference to test the template with sample candidate and faculty evaluators. The sample candidate account was used to enter fictitious work, and the sample faculty account was used to evaluate the submissions. This step provided validation that all parts of the ePortfolio template were working properly. Sample reports also were generated to illustrate completion of assessment system requirements.

Eighth, in order to complete the final review of the template and system, feedback from the summative group on both the ePortfolio template and the assessment system was analyzed and compiled. Comments specific to content were analyzed for pertinence to the development of the template and the system. Comments specific to design were analyzed for feasibility. The analysis of this data also was used to provide further refinement to the ePortfolio template and the assessment system.

Ninth, to triangulate data from the committees and the institutional document review, the ePortfolio template was reviewed by the other members of the assessment staff and by representation from the ePortfolio vendor. The other assessment staff provided feedback on comparability and interoperability with other institutional ePortfolio templates. The vendor representative provided guidance on efficient use of the product, including building individual data points that could be aggregated later for use with the entire assessment system.

Tenth, revisions were made to the template based on input from the assessment staff and vendor. Pertinent content and feasible design revisions compiled in steps eight and nine were integrated into the template. A revised assessment system and final draft of the ePortfolio template were launched.

Once the tenth step had been completed, a series of subsequent steps were launched related to supporting and extending the use of the assessment system and the ePortfolio. Eleventh, the assessment personnel were allowed to enroll faculty, staff, and candidates in the ePortfolio. Twelfth, the following stakeholders were provided training specific to their role in the process:

- Candidate technical support staff were trained to solve or escalate technical questions.
- Faculty were trained on the assessment system and the ePortfolio template, including evaluation methods (faculty members are not allowed to score assessments and be compensated without having completed the training).
- Program directors and field experience staff were trained to use the system to check for submissions, evaluate transition point requirements, and generate reports.

The authors noted that training ideally would occur before faculty and candidates gained access to the ePortfolio; however, the implementation timeline overlapped in such a manner that training prior to enrollment was not feasible. Also, the following tasks were performed as part of the launch of the ePortfolio:

- Thirteenth, the IT team aligned each assessment placeholder with an associated requirement in the student (candidate) information system used to track progress on the degree audit.
- Fourteenth, the assessment staff planned a detailed calendar of when assessment data would be harvested from the ePo16rtfolio, formatted into coherent data presentations, and disseminated to appropriate assessment committees for discussion.

Types of Problems

Figure 4 describes four general types of problems that have occurred in the process of designing the assessment and corresponding ePortfolio. These problems have been classified according to the FEAT domains (Robertson, 2006).

Functional

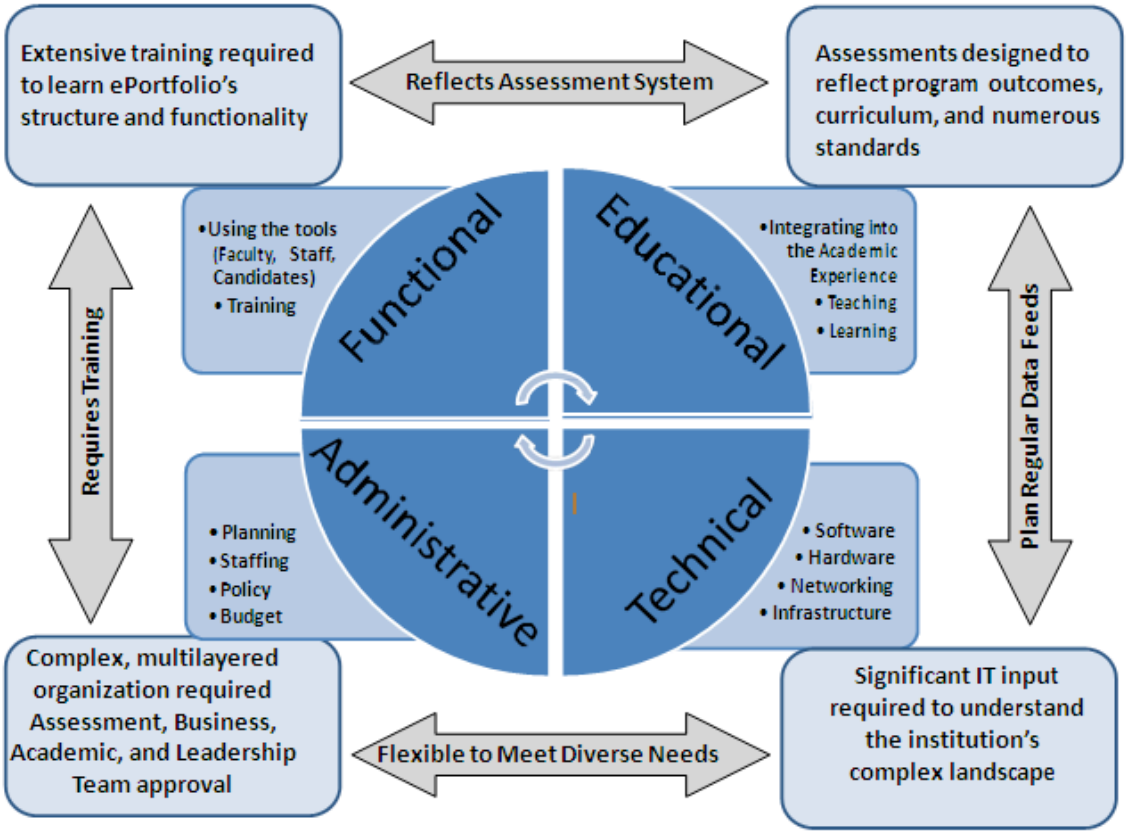
All groups within the organization needed basic knowledge of the ePortfolio and its functionality. Translating a paper-based portfolio into an electronic one revealed several functional issues: scoring choices for evaluators using rubrics and design and use of forms used to track eligibility and performance at field experience sites.

- Scoring choices for evaluators using rubrics: Software options and settings have the ability to exclude evaluators from awarding partial point scores. The system was designed to allow only whole number scoring choices offered to the evaluator in a pull-down menu.
- Design and use of forms used to track eligibility and performance at field experience sites: The original forms, which were very well-organized word processed documents, lost their complex formatting to achieve a simple, linear look and feel. Therefore, translating the form to the ePortfolio template took more time than expected. Some stakeholders also preferred the original word-processed version for aesthetic reasons.

Educational

A significant educational problem existed due to the numerous standards and outcomes that the assessments are used to measure. To address this problem, the stakeholders used functionality – called "tagging" – within the ePortfolio tool to manage all of the standards and outcomes. Tagging is the process of associating specific rubric criteria (rows) with a variety of standards and/or outcomes. Once a rubric row is tagged, it is possible to report the data associated with all rubric rows tagged to determine the degree to which a standard or outcome has been met by individual

Figure 4
FEAT Diagram



candidates or cohorts. For example, major assessments in the program use a rubric criterion related to the skill of "selecting and using informal assessment." The knowledge and skills related to this rubric criterion are aligned with various standards and outcomes. Numerous conditions influenced the decision to use tagging as a strategy to track how candidates performed at the skill of selecting and using informal assessment.

- At the *institutional* level each criterion is aligned with program-level learning outcomes, college-level learning outcomes, and the college's professional education unit outcomes that relate to assessment.
- At the *state* level each criterion is aligned with Minnesota assessment-related standards including the Standards of Effective Practice, Core Standards for all Special Educators, Standards for Special Educators: Emotional Behavioral Disorders, Standards for Special Educators: Learning Disabilities, and the Standards for Early Childhood Educators.
- At the *national* and *professional* levels, each criterion is aligned with assessment-related standards within the Council for Exceptional Children (CEC) Common Core, Emotional Behavioral Disorders, and Learning Disabilities, as well as the National Association for the Education of Young Children (NAEYC), and the National Council for the Accreditation of Teacher Education (NCATE) program standards.

Administrative

A significant administrative problem existed with the various levels of approval (i.e., IT, assessment, academic, and business) of a multi-layered, complex organization. Because of the highly integrated nature of the systems, even seemingly insignificant changes triggered a domino effect of system adjustments requiring the leadership from various teams to concur on changes before they happened. For example, for each ePortfolio there are various placeholders where assessments are submitted and evaluated. After an assessment is evaluated by a faculty member, the score is submitted to the administrative record. The content of the administrative record is exported from the ePortfolio system and imported into a table in the student (candidate) information system. This export-import process occurs on a weekly basis. After the information is imported, various staff members in the Registrar's Office use the data to determine whether candidates have completed all of the requirements necessary to graduate (i.e., degree audit). The following scenarios illustrate how system-level changes required a proactive approach from team-level leadership.

- If any problems occurred with the export-import process, or if the process failed, degree conferral was impacted. Any problems with the import process required the directors of several academic, technical, and business teams to hold spontaneous meetings to resolve issues.
- If the name of a placeholder or the source template undergoes name changes or other revisions, the linkages of the export-import process are broken and must be rebuilt. It was determined that name changes required a lock-step pattern of communicating any changes from academic to assessment to IT to business leaders to make system adjustments. In order to manage the process and reduce faulty data, the administrative stakeholders suggested and implemented a form to describe and manage changes. The use of this form mirrors the steps required to edit the template and adjust the export and import process, thus lending accountability to the entire process.

Technical

Significant technical problems needed the attention of the IT staff. For example, the integration of the student (candidate) information system and the ePortfolio allowed the data to be stored in the institutional data warehouse, thus allowing the data to be integrated into the institutional reporting scheme. Before the institution could rely on these reports for making institutional resource decisions, the IT staff had to design and build reliable reporting mechanisms. Members of the IT staff met with assessment and academic staff to determine reporting needs, including the demographic fields needed for filtering and disaggregating data. The outcome of the consultation was to create a library of reports related to specific aspects of the assessment process. A specific, critical report takes data from the ePortfolio and combines it with course rosters to determine which candidates have completed the assessment. This report had widespread positive impact for multiple reasons.

- The information in the report allowed staff to monitor course sections and cohorts to determine the submission and completion rate for a given assessment.
- Due to the nature of the institution, this report was necessary to track the work of

adjunct faculty who may or may not know all of their specific responsibilities.
- Since the assessments are submitted during a specific course but are not necessarily a course requirement, this report allows academic and assessment personnel to track submission and cohort completion.
- The programs range in size from dozens to thousands of candidates, so technical solutions that make data more accessible improve productivity.

The four areas of FEAT are interdependent and often require a team of diverse professionals to resolve problems in order to reduce the chance that one particular lens—functional, educational, administrative, or technical—is exerting too much influence on the problem-solving process. The use of the FEAT domains allows the program leadership to balance the roles and perspectives of the teams assigned to solve specific problems in the development of the assessment system and ePortfolio template.

Problem Solvers

The decision to pursue accreditation and implement the assessment system and ePortfolio had broad representation throughout the university and college. Throughout the process of developing the assessment system and ePortfolio, the institution's Project Management Office was charged with the task of making, managing, and monitoring the actions and outcomes of every team engaged in the accreditation process. In the functional domain, the Office of Field Experience collaborated on the development of the components of the ePortfolio related to what candidates experience in school classrooms and other types of educational settings. The Assessment Directors and Coordinators developed the ePortfolio template, participated in rubric development, and anticipated the types of reports needed from the ePortfolio. Faculty members participated in training and also engaged in rubric development and evaluation of candidate work. The Student (candidate) Support Team developed multiple resources used for training candidates to use the ePortfolio and answered numerous questions via telephone and web-based help. In the educational domain, the Program Directors provided leadership in the development of the transition points, key program assessments, and accompanying rubrics. In the administrative domain, the president of the university and vice president of the college provided direct (e.g., financial) and indirect (e.g., professional development) support necessary to implement the assessment system and develop the ePortfolio. The dean provided academic leadership and oversight on the accreditation process. The associate deans facilitated working groups including academics, assessment, and administrative representatives. In the technical domain, the following was accomplished. Operational teams, such as IT, designed the infrastructure necessary for efficient account creation, etc. The vendor (TaskStream) provided technical and design training and consultation as needed. Overall, 500 candidates used the ePortfolio in licensure programs that certify teachers, and over 13,000 candidates used it throughout the college.

Problem Solving Strategies

Once the team, consisting of a balanced representation of the FEAT domains, was assembled, the following strategies were used to address the problems identified as the assessment system and ePortfolio were developed.

Collaborate to Find Solutions

Collaboration was a primary method of solving problems. Many existing teams, such as the academic leadership for each program, were used as platforms to discuss problems and seek direction. New teams also were developed to respond to emerging needs. For example, the assessment team, which began as one individual, has grown to eight people to meet the demands of assessment, accreditation, and the ePortfolio. As new teams emerged, so did new methods of addressing problems collaboratively through shared responsibility. In many cases, when a problem arose, the owners formed a meeting to discuss and plan how to solve the problem. The appropriate actions were arrived at through consensus. The assessment team, assigned the task of developing the ePortfolio, constructed a prototype of how the ePortfolio would be configured to respond to the problem. Changes were tracked using internal forms. Then, multiple remote employees convened on a conference call to review the prototype and test its use. Various team members selected specific areas of the prototype to review in depth. Once all functionality of the prototype was revised and agreed upon, the assessment team built the active version in the live ePortfolio template. Other stakeholders then implemented plans to communicate the changes through coursework, e-mail, and announcements in the ePortfolio tool.

Use Technology Effectively to Develop and Implement the ePortfolio

Another method of working toward solutions has been the effective use of technology. For example, application sharing and web-based meetings have been used to conceptualize, complete, and review many of

the detailed steps in the development of the ePortfolio. For example, multiple stakeholders reviewed ePortfolio components to ensure that the design and content were ideal for the purpose. In many cases, the component of the ePortfolio was best reviewed by the office or team responsible for implementing the component. In the case of field experience applications and evaluations, the Office of Field Experience staff was charged with reviewing the functionality of the components.

Pilot to Ensure Accuracy and Reliability

A third method of working toward solutions, piloting, has been used to various degrees. Whether as proof of concept or trial-and-error testing, to ensure accuracy and reliability various members of the team have developed prototypes for the working parts of the ePortfolio. When a form or evaluation instrument was deployed, it was first built and tested in a controlled environment. In one case, a field experience placement form had to be translated from its complex word-processed format into a form used in the ePortfolio. Many stakeholders liked the organization of the word-processed form; however, it did not allow for easy, efficient aggregation, thus limiting the ability to make data-informed decisions about placements and supervision. Ultimately, the visual appeal of the word-processed document was forgone in favor of the simple ePortfolio form, which allowed for more efficient use of data.

Respect Complexity to Understand and Rebuild the System or Process

The final method, respect for complexity, has allowed the team to address problems by breaking down the components of the system or process and rebuilding it in a manner that works within the ePortfolio tool. For example, at one time the entire field placement process worked through word-processed forms delivered via e-mail. The team accepted the challenge of dismantling the complexity of the process and rebuilding the forms in the ePortfolio to create a new and innovative model for managing field placements. All of the aforementioned methods would not be as effective without a solid relationship with the ePortfolio vendor, where suggestions could be made freely in order to enhance the product and make the institutional operations more efficient. The vendor understood the complexity of the work being completed and made gradual improvements to address the needs. The use of practical meetings and team management strategies supports future steps in the process, including specific actions used to address problems and move the project closer to completion.

Actions

As a result of implementing the steps in the methodology, the following actions were taken. Each action was categorized according to the FEAT domains in order to assess the balance of perspective and workload occurring with any given phase of the project. Table 2 summarizes the actions.

Early in the process, proposed actions were conceptual in nature and balanced among FEAT domains. Between July 2009 and December 2009, the following tasks were accomplished. Most important, in the educational domain, the heart of the assessment system – the transition points and major assessments – were conceived, defined, and approved for each program. This work was led by the administrative action of hiring the first program assessment coordinator, who would eventually become an assessment director after an organizational change. These two tasks enabled the technical action of building, testing, publishing, and piloting the ePortfolio templates for all programs involved. Finally, once all of the educational, administrative, and technical tasks were completed, the assessment staff was able to begin preliminary faculty training on the transition points and major assessments.

The next phase, spanning from January 2010 through June 2010, involved finalizing the ePortfolio aspects of the assessment system for candidate work and data collection. All of this work was bolstered by the administrative action of hiring a program assessment coordinator to support the director. In the educational domain, the major assessments were written, edited, aligned with various standards, and approved for each program. These tasks enabled several technical actions. First, all forms used for field experience were developed, tested, and implemented in the ePortfolio. Second, all requirements in the ePortfolio templates were completed and reviewed for accuracy. Third, all components of the assessment system necessary for tracking candidate progress were mapped for regular exporting from the ePortfolio to the student (candidate) information system. Once all of the educational, administrative, and technical tasks were completed the assessment staff was able to begin continued faculty training on the major assessment rubrics, field experience forms, and the ePortfolio template layout.

The following phase, spanning from July 2010 through December 2010, involved the first candidate work and data collection cycles. All of the data collection work in this phase was used for the administrative action of submitting data reports for national accreditation. In the educational domain, the first major assessments were submitted by candidates to the ePortfolio and evaluated by faculty assessors; the

Table 2
Timeline and Actions Organized by FEAT Domains

Timeframe	Major Tasks with FEAT References
July 2009 – December 2009	F: First faculty training
	E: Transition points defined
	E: Major assessments conceived and approved
	A: First assessment coordinator approved and hired (Later became assessment director)
	T: ePortfolio template built, tested, and piloted
January 2010 – June 2010	F: Second faculty training
	E: Major assessments and rubrics completed and approved
	A: Second assessment coordinator approved and hired
	T: Field evaluation forms built and tested
	T: Program ePortfolio built, piloted, tested, and approved
	T: Export to student information system mapped and tested
July 2010 – December 2010	F: Field evaluation faculty training and support
	F: First cohort field evaluation forms submitted
	E: First major assessment data harvested and discussed
	A: National recognition reports approved and submitted (SPA)
	T: Export to student information system implemented
January 2011 – June 2011	F: Field evaluation faculty training and support
	F: Second cohort field evaluation forms submitted
	E: All Major assessments submitted once each, data harvested and discussed
	A: National recognition reports approved and submitted (SPA)
	T: Export to student information system continues
July 2011 – December 2011	F: Field evaluation faculty training and support continues
	E: Refine ePortfolio requirements
	E: All major assessments submitted twice each, data harvested and discussed
	E: First program completers in new assessment system
	A: National recognition reports revised (SPA)
	T: Export to student information system continues
January 2012 – June 2012	F: Field evaluation faculty training and support continues
	E: Refine ePortfolio requirements
	E: All major assessments submitted three times each, data harvested and discussed
	E: Second program completers in new assessment system
	A: National recognition reports revised (SPA)
	A: Accreditation visit completed and recognition achieved
	T: Export to student information system continues

Note. Robertson and Larkin (2011)

data then were harvested by the assessment staff. The field forms also were submitted and harvested for the first time. Next, assessment staff members continued the functional tasks of faculty training to assess candidate work using the rubrics in valid and reliable ways. After the first submission of data was complete, the technical task of exporting data from the ePortfolio to the student (candidate) information system continued.

As the implementation continued from January 2011 through June 2011, the actions focused on refining the major assessments as they operate within the assessment system. All of the data collection work in this phase also was used for the administrative action of submitting data reports for national accreditation. In the educational domain, the major assessments were submitted by candidates to the ePortfolio and evaluated by faculty assessors; the data then were collected by the assessment staff for the second time. The field forms also were submitted and harvested for the second time. Next, assessment staff members focused the functional tasks of faculty training by collaborating with other offices to train field faculty members who assess candidate teaching in field. After the second submission of data was complete, the technical task of exporting data from the ePortfolio to the student (candidate) information system continued.

From July 2011 through December 2011, the actions continued to focus on refining the assessment system and assessments the after the third cohort was complete. All of the data collection work in this phase

was also used for the administrative action of submitting data reports for national accreditation. In the educational domain, the major assessments were submitted by candidates to the ePortfolio and evaluated by faculty assessor; the data were harvested by the assessment staff for the third time. The field forms also were submitted and harvested for the third time. Next, assessment staff members focused the functional tasks of faculty training by collaborating with other offices to train field faculty members who assess candidate teaching in the field. After the third submission of data was complete, the technical task of exporting data from the ePortfolio to the student (candidate) information system continued.

From January 2012 through June 2012, after the fourth cohort was complete, the actions continued to focus on refining the assessment system and assessments. All of the data collection work in this phase was also used for the administrative action of submitting data reports for national accreditation, which culminated in February 2012 with a successful site visit (notice provided as of April 2012). In the educational domain, the major assessments were submitted by candidates to the ePortfolio and evaluated by faculty assessors; the data then were harvested by the assessment staff for the fourth time. The field forms also were submitted and harvested for the fourth time. Next, assessment staff members focused the functional tasks of faculty training by collaborating with other offices to train field faculty members who assess candidate teaching in the field. After the fourth submission of data was complete, the technical task of exporting data from the ePortfolio to the student (candidate) information system continued.

Findings

The actions of the study led the researchers to the following findings about the simultaneous development of assessment and ePortfolio systems. They found that evaluating system development is more informative if a systemic approach is used to examine the FEAT model domains. The domains—functional development, educational connection, administrative support, and technical infrastructure established—have interdependent relationships that influence the overall maturity of the systems.

As new tools were adopted, functional problems were treated as teaching opportunities. In this case, multiple layers of training needed to be addressed. First, the staff developing the assets with the ePortfolio needed skill development with the application. This included frequent web-based training with the product vendor as well as informal communities of practice for sharing new learning. Second, the faculty members needed training in three areas: the assessment system, the ePortfolio tool, and the process of evaluating the assessment submissions. The training on the assessment system contained information about the process of assessment, key definitions, transition points, assessment requirements, and remediation plans. The training on the ePortfolio tool included authentication, navigation, locating candidate work, using rubrics and feedback mechanisms, and managing the revision process. Training on the process of evaluating the assessment submissions included describing each assessment, addressing all of the standards, analyzing comments and qualitative feedback, determining the rubric score, and submitting the evaluation. There also was a special section of the training that focused on eliminating bias, reducing ambiguity, and increasing accuracy and fairness in the scoring process. After completion of the training, the issues that surfaced included:

- Compensation. Fifty dollars was provided for an intense training intended to last four hours. Comments were shared that many individuals did seven to eight hours of work and that one hundred dollars would have better represented the amount of time spent.
- Ownership. The assessment personnel planned and delivered the first two training cycles; however, academic leadership determined that academic program directors would be the more ideal point persons. The third cycle of training would be led by the program directors, with consultation and guest facilitation from assessment personnel.
- Corroboration. It was determined that more candidate samples were necessary to have a positive impact on any norming exercises.
- Documentation. Academic leadership charged program directors with documenting which faculty have been trained and with assigning any and all evaluator tasks only to those who have been trained.

Collecting data throughout the program ensures that tracking progress can occur objectively. Currently, one of the common notions of best practice in assessment includes using a variety of methods that are strategically distributed across the learning experience. This can be difficult in compressed programs or ones in which the conventional wisdom involves putting more assessments at the end of the program for fear of candidates not performing as well when they are less experienced with the knowledge and skills. In this case, transition point requirements were classified in three categories: administrative, academic, and field-based requirements. Once all of the requirements were juxtaposed in the ePortfolio template, a distribution

across all three categories was clearly demonstrated. However, most academic requirements were placed toward the end of the program, while many field-based requirements occurred earlier. Early in the program candidates are required to show fitness to be in the field (e.g., proof of professional liability insurance). Later in the program candidates need to demonstrate competency in field-based assessments (e.g., internship evaluation).

Conclusions

In this study, the ability to evaluate the assessment system as a whole is dependent on how the ePortfolio is designed. The assessment system, by describing the process and requirements that each candidate must complete, also identifies the benchmarks that determine program accountability. In order to track accurately candidate progress within and across cohorts, the ePortfolio template must reflect each and every requirement of the system. The risk of not representing each requirement may result in incomplete data or an inability to track candidate progress. The assessment system is built on transition points from admission to program completion. Each of the transition points contains multiple requirements, such as completing courses, passing assessment projects, or completing administrative forms. Each of those requirements must be translated to the ePortfolio design in order for such data to be available to program stakeholders. If requirements are ignored or combined, then data are missing or become more ambiguous. Ignoring or combining requirements makes the data more difficult to disaggregate, thus it becomes difficult to determine where program improvement is most needed.

Once the assessment system and the ePortfolio are aligned and data are being collected, there will come a time when change is evidently needed. The data may come from a variety of sources such as surveys, rubrics, or other instruments. Once the data are organized and aggregated, importance should be placed on categorizing the data based on what the data suggest as potential improvements to the teaching and learning process. The categories may include the assessment itself, the course in which it is implemented, the academic program as a whole, the learning outcomes achieved by completing the program, and the operational actions of managing the program. In this case, data revealed that candidates had difficulty with rubric criteria related to applying concepts of valid and reliable assessment. After lengthy discussion, it was determined that the candidates who performed poorly on that particular component had not yet taken the elective research course, which most candidates save until the end of the program. Further discussion occurred as to whether this was an assessment, course, or program problem. It was determined to be a course problem. The solution determined was to introduce just enough new content to one course in order for candidates to succeed at the specified rubric rows without overloading the course or removing the rubric criteria. Without the creation of an assessment system and an ePortfolio sophisticated enough to collect the data, this problem likely would not have been identified.

When implementing the assessment system and collecting data through the ePortfolio, identifying efficiencies in data entry can save time and effort. One solution is to implement any data import features that the commercial ePortfolio tool may possess. For example, demographic data were imported in order to aid in disaggregation. Alternately, time and effort can be saved by using export features to benefit systems outside of the ePortfolio system, such as the student (candidate) information system. In this case, many candidates are required to take and pass a standardized teacher licensure examination to complete a transition point and the subsequent program. Once the test is taken and evaluated, the scores are sent from the test provider to the institution and then entered in the student (candidate) information system. The IT team, a partner in the technical domain, exports a file from the student (candidate) information system, importing it into the ePortfolio. At this point, faculty and program administrators can determine whether the candidate has taken the test and whether or not the score meets the minimum and the requirement has been met. This import allows hundreds of data points to be handled at once without the need for entering each one manually. More time can be spent on analysis and outreach to those who have not met the minimum score. Whether a candidate has or has not met all of the requirements necessary to move on to the next transition point can also be determined much more quickly. It is critical for the technical system to be developed for viewing data over both short and long periods of time in order to observe how the system is maturing.

The assessment system and ePortfolio have been used for four academic semesters and have included hundreds of data points related to each candidate; the system is maturing in some ways, but not all. Much like human development, time alone is not an adequate indictor of maturity. While no specific definition exists, the authors consider the maturity of the assessment system to be dependent on various indicators that reflect maturity as an on-going process rather than a completed project or deliverable. None of the following indicators can be the sole indicator of maturity; rather, a balanced combination of multiple indicators is required. First, the authors value time or completed cycles as one critical indicator. The longer an assessment system has been in place, the more annual cycles over which it has

matured, although whether the activity within each cycle has been productive needs to be considered. Second, clear data points that can be expanded or collapsed are another indicator of assessment system maturity. The action of expanding and collapsing the data can help with drawing conclusions during analysis and discussion. Third, volume of data, including both overall quantity and breadth across the reporting unit, illustrates a commitment to collecting data. However, a commitment to collect data is not as significant as a maturity indicator as using the data is. Finally, regular and thorough use of the data provides opportunities to mature the assessment system. Maturity is stabilizing in terms of the quality and quantity of data collected; however, this is not a sole indicator of the maturity of the assessment system. More maturity is necessary regarding the data-informed discussions, actions as a result of data, revisions to courses and programs, and revisiting changes for efficacy. In reference to Figure 1, in order to mature the assessment, the cycle must be executed multiple times with special attention to efficacy: are the changes we are making having an effect? Or, when considering Jafari (2004), has data been used often enough—with proper attention to effectiveness—in order to eliminate the variables that cause changes not to "stick"?

Next Steps

Considering that much of this research is on the ideal design and content of the assessment system and the ePortfolio, future research should focus on the implementation of the system and its impact on candidate performance. In this case, prudent analysis would include determining whether early success on transition point requirements has any impact on success in later stages of the academic program. The analysis would include a comparative study between the rubric criteria for assessments used early in the program and rubric criteria for assessments later in the program, as well as program completion examinations used at the end of the program. Also, future study should be devoted to how revisions to the assessment system and ePortfolio are proposed, approved, and executed given the organizational structure and associated decision-making process. The future study would include an examination of the path followed by course and program changes proposed as a result of data discussed in various faculty and leadership meetings. Finally, the program will be reviewed by external consultants as part of the academic program review process to determine the maturity of the assessment system including the volume of data, process for dissemination and discussion, suggestion and tracking of action, quality and quantity of proposed changes, and impact of changes on subsequent assessments. The external program review would include steps leading to the identification of areas for improvement within a maturing system. Then, stakeholders would brainstorm the most efficient actions to improve the system as a whole.

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