



## Final Report to Cohort 2

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### Assessing the Learning Potential of E-Portfolios in Graduate Education through Thinking Sheets

#### Abstract

This case study examined thinking processes of seven students of education during creation and explanation of electronic portfolios. Portfolios were required by the institution for these Master and Ph.D. programs, with an option to choose e-portfolios. Through use of thinking sheets, interviews and demonstrations, researchers found insights about what happens during creation of the portfolios, captured in real time and retrospectively. Findings include struggles with technology, attention to directions, and progression from Bloom's knowledge level to higher order thinking skills. However, students demonstrated higher order levels less frequently than expected. The study indicates there may be a common progression, with an identifiable moment when students see the possibilities and connections e-portfolios can afford. Suggestions for programs offering e-portfolios are offered.

#### Introduction and Context

Our study took place at a large state university, with participants who were in either Masters level or Ph.D. students in education programs requiring portfolios. The Master level portfolio was an e-portfolio for a semester long course. The Ph.D. students could elect either paper or electronic forms for their program portfolio. This portfolio is sustained through the whole program, presented to and reviewed by the student's faculty committee at three key points, with the last formal review constituting the culminating exam for advancement to proposal development status. This is a high stakes program requirement.

A total of seven participants, four from Ph.D. level and three from the Master level, were in the study, covering a period of three semesters. During the study period, most students took an elective 2 credit e-portfolio course.

## Research Questions

Two central questions framed this project:

1. What is the thinking process students go through as they develop e-portfolios?
2. How can we assess the learning that occurs during this thinking process?

We selected these questions in order to find out what the students are thinking and to discover if application of Bloom's Taxonomy can assist in indication of any patterns. Student thinking processes were documented thorough use of Thinking Sheets adapted from a math teaching project. Students completed a set of questions designed to elicit what they did, why they did it, levels of difficulty and how they solved any issues. The sheet we developed is attached to this report. In addition, students were interviewed and asked to demonstrate their portfolios.

## Major Findings

The following diagram summarizes our findings.

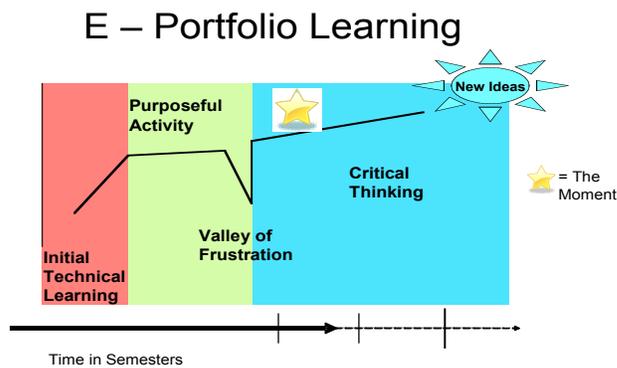


Figure 1. Learning progression model

NVivo software was used to analyze the material from interviews and Thinking Sheets. The following themes emerged:

1. Technology Issues
2. Design Elements
3. Following Guidelines
4. Personalization
5. Accessing the Portfolio

Students began with technical frustrations, and gradually moved to purposeful activity- that is following directions on *what* to include, and developing some formatting- but very focused on applying skills. All students met another level of frustration, as they thought of things they wanted to do but needed to stretch or add to skills to do so. It was usually soon after that students changed their outlook to a wider, more complex horizon. At this time, which we have dubbed **The Moment**, they began to show evidence of using higher order thinking skills- critically thinking about content, design, multiple purposes and multiple audiences. The affordances of the 'e' nature of what they were

doing began to intrigue them. It was at this juncture that students began to go beyond the explicit directions. For the Master level students, this turn was at the end of their one semester – if it happened at all. For the Ph.D. students, *The Moment* emerged during the time of preparation for one of the reviews, or shortly thereafter. These students then have time on their side for continuing to expand their thoughts. Although all programs required reflective pieces as artifacts in the portfolios, these were not the subject of study here, and were not based on the processes of portfolio-making. Students began to see that the portfolio might be useful for other reasons than the course/program requirement. Family, friends, potential employers were ideas of other audiences for their work. As the idea of audience expanded, other ideas for extending the portfolio beyond the boundary of requirements grew.

Answers to our research questions provide some solid information, and open the door to many further ideas.

1. What is the thinking process students go through as they develop e-portfolios?

Our potential model of Learning Progression that we derived from the case study supplies some answers. The interviews, demonstrations and thinking sheets provided evidence of student thinking, and trial, tribulations and triumphs of work on e-portfolios used in course and program evaluation of students. It is important to recall that these are high stakes portfolios, particularly for the Ph.D. students. Because there were not as many sheets provided as we hoped for (no one student provided more than six), some answers to questions like why was technology such a long barrier, what was the real influence of the directions and how important is the time frame for portfolio work are not fully answered from this set of data.

2. How can we assess the learning that occurs during this thinking process?  
One answer to “how” is the use of Thinking Sheets. We do think that the Thinking Sheets are a good, portable, and effective method- provided subjects complete them. Bloom’s Taxonomy was a very useful tool for organizing our results. and provided a second answer as far as assessing what kinds of thinking are taking place. It is a widely understood way of thinking about student learning that allows a common language for discussion and further investigations. Thirdly, although use of NVivo was new to both of us, it served well as a tool for discovery and organization of data to lead to our findings. These methods deserve further use in e-portfolio research.

#### Evidence

Because this is a case study, the evidence is primarily participant statements or examples from interviews and demonstrations. Some of that material is presented below.

One Master level student spent three hours fixing links because “images are not appearing” and “ all links need to be re-done for CD as source designations changed” (Subject #5). These technology concerns can serve as a distraction from the creation of the e-portfolio which is intended to demonstrate competencies that go beyond technical skills.

The design elements were also mentioned throughout the interviews (16 references). However, by the time of the second interview, students were moving away from the technical aspects of the design, and reflecting more on the meaning behind the

structure they were creating. “I wanted clean lines and for it to look professional, not personal” (Subject #1). “I wanted the background to be soft, the design related to my undergraduate degree in agriculture studies” (Subject # 2).

Deciding what to include indicated some movement from application to analysis and integration. “I included course artifacts that were required (by the program), ones that represent my best effort. I chose what I was most proud of for each class” (Subject # 3). “I included final papers from each course as these were more complete. I did not include other papers as I felt the work was incomplete. I did not want to put in the working/thinking parts of the courses” (Subject #2).

Students also mentioned the portfolio class as a source for influencing the decisions they made (six references). These decisions were not only in terms of the design components, but also in terms of the artifacts chosen. “My portfolio is very linear at this time; I followed the Ph.D. directions for elements to include” (Subject #2). “I followed Ph.D., it is not creative, but based on directions” (Subject #3). “Included major themes, followed Ph.D. directions” (Subject #4). “The files are in PDF because it is more secure than Word files. This was discussed in the portfolio class” (Subject #2).

As students worked on portfolios and reached *The Moment*, they began to connect course studies to other aspects of their lives. “Artifacts have yet to be uploaded. I want to include artifacts from my profession, not just focused on my Ph.D. coursework. I feel the Ph.D. will enhance what I am already doing in my professional career” (Subject #1). “I included my testimony to Congress with video. This related to personal and professional aspects, what I care about, my story” (Subject #4).

Expansion of audience is reflected by three students who discussed using the portfolio to help potential employers know them, while two mentioned allowing family members, friends, and fellow students to access their portfolio. “I could see sharing the portfolio for a prospective job- employer could browse before the interview. It can also supplement a face-to-face or over the phone interview” (Subject #1). “It could be sent to potential employers, a cover letter will invite them to the URL”(Subject #2). “Perhaps fellow Doc students and friends” (Subject#3). “I could take to conferences to show what I am doing” (Subject #4).

Clear evidence of moving toward higher order thinking came from Subjects #2 and #6. “I liked this session because it gave us a chance to think *sic.* about our reflections as we design our portfolio” and “I can understand, or view my portfolio from the ‘Helicopter’ perspective”. One student included the comment that “it looks basic” so that it is accessible” (Subject #4). This was the only e-portfolio that was certified for accessibility, and is strong evidence of solid critical thinking about integrating personal aims and program requirements.

Possible influential factors on this progression are implied from this case study. It is clear that students consider the directions they are given extremely important and, after issues of technology learning, are the next consideration. Time for development of the e-portfolio when used as student evaluation of achievement in a total program may be an influence. The Master level students have a semester to create and present their work, while the Ph.D. students not only work on the portfolio multiples times and present three times, but the times are spaced throughout the program, and encourage recursive work and thought.

## Application of Results

Implications for program use of e- portfolios from this case study include:

1. The learning curve for technical skills appears to temporarily increase the focus on developing technical skills and deflect the focus on the larger learning purposes of the programs.
2. Most students initially view e-portfolios linearly, although some branched into more complex structures later in the project. Length of time to develop and work on e-portfolios is an important factor for moving into more complex thinking and structure.
3. Directions currently supplied to these students developing e-portfolios do not differentiate between e-portfolios and paper versions. This may limit efforts of students' addressing wider affordances and potentialities of integration, for example, through more use of internal and external links.
4. Reflection on the process of creating e-portfolio should be encouraged. The inclusion of requirements for reflective artifacts related to the program does not encourage similar reflection on the portfolio itself.
5. If these e-portfolios are part of program summative or formative evaluations, then it may be valuable to have published standards for their evaluation and directions related to differences of using an e-portfolio instead of paper.
6. The nature of class support might be revised to include additional materials on the nature and affordances of the e-portfolio medium.
7. If we know that there is an initial technical anxiety phase, more can be done to shorten that time- for example provide easily used software that eliminated complex FTP.

## Future Research

Although we believe we have a useful methodology, any future research will require solving the issues of return of thinking sheet information. Ideally, we want to see a project among several institutions, and a wider variety of students. A revised research design could lead to more quantifiable results.

In order to see what institutional demand and use of e-portfolios exists, we are joining the Washington State University Survey of Faculty. The survey will take place in Fall 2007. This will be used to gauge interest as well as current use of e- portfolios, the need for additional technical supports, and how faculty see teaching and learning related to the potentials for expanding use of e-portfolios. The information the survey generates will inform university planning by the Instructional Technology unit, the Assessment Office, and the Center for Teaching Excellence. What we learned in our case study will support outreach and planning for this and other initiatives like faculty workshops and new faculty orientations.

We welcome interest in continuing this research.