The Relationship Between Electronic Portfolio Participation and Student Success

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Abstract

Electronic portfolios represent an assessment measure with strong potential for providing feedback about student performance to improve curricula and pedagogy, determining individual students' mastery of learning and providing feedback for improvement, and actively involving students in the assessment process. This study examined the relationship between e-portfolio participation and student success. Despite some limitations, the current study has demonstrated that, after background factors are controlled for, undergraduate students with e-portfolio artifacts had significantly higher grade point averages, credit hours earned, and retention rates than a matched set of students without e-portfolio artifacts. Also, there were significant positive relationships between various measures of e-portfolio utilization and grade point average and credit hours earned among undergraduates, although these results were mixed for graduate students. There were no statistically significant group differences in any of the National Survey of Student Engagement or New Student Transition Questionnaire scales, which serve as measures of student academic engagement.

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Many criticisms exist of contemporary American higher education. Some fear that students are not developing competencies such as communication, critical thinking, and a developed sense of social responsibility. There has been increasing skepticism concerning the quality and utility of a liberal arts education. Members of the public, employers, and legislators are concerned with the perceived lack of attention that faculty give to undergraduate learning. Colleges and universities must respond to these criticisms at the same time that students come to campus with an increasingly diverse array of experiences, preparation, and expectations.

Several longitudinal studies carried out in recent years and across a wide variety of institutions have highlighted problems affecting the state of undergraduate learning in the United States. Such problems include a discontinuity between K-12 schools and colleges, institutional confusion over purposes and goals, the tension between the liberal arts and professional curricula, faculty feeling split between their loyalty to their institutions vs. their disciplines and between their interests in teaching and research, and the divisions between academic and student affairs on campuses. These studies highlight the need to draw more explicit connections between the classes students take as well as between their in- and out-of-class experiences, the need to become more student-centered, the need to promote student-faculty and student-student interaction and collaborative and active learning activities, the need to improve and make explicit student engagement, high expectations, and assessment, and the need to emphasize competency over content and collaboration over competition (Astin, 1993; Boyer, 1987; Gamson & Chickering, 1987; Joint Task Force, 1998; Kellogg Commission, 1997; Kuh, Schuh, & Whitt, 1991; National Institute of Education, 1984; Pascarella & Terenzini, 1991; Schneider & Schoenberg, 1998).

Assessment has been suggested by many as a means of addressing these problems. The "assessment movement" that began in the mid-1980s has been traced to both an extant scholarship of student learning and success (e.g., Astin, 1977; Bowen, 1977; Feldman and Newcomb, 1969; Learned and Wood, 1938; Pace, 1977; Tinto, 1975) and especially to a series of calls from outside of the academy to improve accountability (e.g., National Governors' Association, 1986; U.S. Department of Education, 1983). While 98% of institutions reported having an assessment program by 1993 (American Council on Education, 1993), many scholars and practitioners have noted that assessment has not substantially improved student learning at most institutions. Ewell (2002) notes that this lack of success mat be a result of disagreement about the underlying purposes of assessment; is it for benchmarking institutional performance in the name of accountability as in K-12 education, is it intended to provide feedback about student performance to improve curricula and pedagogy, or is its goal to determine an individual student's mastery of learning and to provide feedback for improvement? Ewell (2002) suggests that for assessment to move from its current state of "broad but not deep," fundamental changes must occur. The assessment paradigm must shift from "a largely top-down, management-oriented" evaluation and passive checking of results to one of "active and collective responsibility for fostering student attainment" that resides at the level of the individual faculty member and academic program (p. 24).

Student portfolios have become an increasingly popular assessment method throughout the 1990s (Ewell, 2002). Banta (1999) has termed them "the instrument of choice for assessment on a growing number of campuses" (p. 3). Love, McKean, and Gathercoal (2004) say that they "may have the most significant effect on education since the introduction of formal schooling." Portfolios hold a high degree of promise for accomplishing the last two purposes of assessment noted by Ewell (2002): providing feedback about student performance to improve curricula and pedagogy as well as determining individual students' mastery of learning and providing feedback for improvement. Additionally, they provide students with a planning and goal-setting tool that assists them on making connections between learning experiences, faculty with a vehicle for more authentic discussions about teaching and learning, and institutions with a tool to establish a more permanent role in the lives of learners (Siemens, 2004). Also, portfolios achieve a goal that many other assessment methods can not; they change the student role in assessment from passive research subject to active participant as students are called upon to select samples of their classroom and co-curricular work products for the portfolio and (perhaps most importantly) to reflect upon why these artifacts were selected and how they demonstrate learning (Palomba, (2002). Portfolios are not without

their challenges as an assessment method; they require a great deal of faculty and student time to be used successfully and require clear guidelines about their purposes and the way in which their contents are to be evaluated and feedback is to be provided.

In addition to the features associated with paper and pencil portfolios, electronic (web-based) portfolios offer the advantages of accessibility and portability of artifacts, faculty/advisor assessments, and student reflections. Also, artifact formats such as video and sound recordings that are difficult to include in traditional portfolios are easily included in e-portfolios. Finally, many e-portfolio software packages allow students to control who is able to view each artifact; they allow reflection and assessment; and they permit both developmental/assessment and showcase (for prospective employers, graduate/professional schools, etc.) formats to be presented. (Cambridge, 2001; Yancey, 2001).

Bowling Green State University (BGSU), a state-assisted, residential, doctoral-research intensive university in northwest Ohio, has grappled with many of the assessment challenges noted above. While most academic programs have developed learning outcomes, created or acquired associated measures, and collected data, and some examples of improvements to curricula and pedagogy are evident, assessment has not led to profound changes in student learning or to a widespread "culture of evidence." Many faculty and nearly all students are not aware of assessment efforts and a bureaucratic compliance mentality still permeates many annual assessment reports. At the same time, the University has articulated as its vision a desire to be "the premier learning community in Ohio and one of the best in the Nation," developed a wide slate of learning communities and other student academic enrichment programs, identified a set of University learning outcomes, redesigned its general education program from one that emphasizes fulfilling curricular breadth requirements to one that emphasizes master of learning competence, substantially upgraded its technology infrastructure, and improved its institutional research capacity.

BGSU joined the ePortConsortium in 2002 and acquired the Epsilen electronic portfolio software in 2003. As noted above, students can place a variety of artifacts (e.g., papers, spreadsheets, presentations, video and audio recordings) and accompanying reflections into both a year-by-year matrix for assessment purposes and also into a "showcase" version of the portfolio that might be viewed, for example, by potential employers or graduate/professional schools. Additional information about the BGSU electronic portfolios can be found at http://epsilen.with.bgsu.edu.

The first widespread use of e-portfolios by students occurred in the 2003-2004 academic year, as they were adopted on a voluntary basis by many of the first year student programs on campus and also by the College Student Personnel master's degree program. The University joined the National Coalition for Electronic Portfolio Research, sponsored by the American Association for Higher Education, in 2004 in order to facilitate research on the effects of e-portfolio participation on student learning and success.

A pilot study was carried out in Summer 2004 that compared retention rates, grade point averages, and credit hours earned between the population of 75 BGSU students (34 graduate students and 41 undergraduates) who had e-portfolio artifacts and a matching sample of 75 students who did not have e-portfolios. Graduate students with portfolio artifacts had significantly greater credit hours earned than graduate students without e-portfolio artifacts, while undergraduate students with e-portfolio artifacts had both significantly greater cumulative grade point averages and credit hours earned than undergraduates without e-portfolio artifacts. There was no significant difference in retention rates between undergraduate students with and without e-portfolio artifacts. After demographic and educational background factors were controlled, no significant differences were found concerning retention or grade point average, although significantly greater credit hours earned remained for students with e-portfolio artifacts. Finally, number of e-portfolio artifacts was not significantly related to retention, grade point average, or credit hours earned.

This paper describes of a second research study with a much larger number of participants, which was designed to investigate the following research questions:

1. What are the characteristics of students who have electronic portfolio artifacts and how are such students different than others at BGSU?

2. What significant differences exist in retention rates, grade point averages, and credit hours earned for BGSU students who have electronic portfolio artifacts, those who have portfolio accounts but no artifacts, and a control group of students who did not create e-portfolios?

3. What significant differences exist in students' self-reported academic engagement for BGSU students who have electronic portfolio artifacts, those who have portfolio accounts but no artifacts, and a control group of students who did not create e-portfolios?

4. Are there significant relationships between various artifact measures (number of showcase artifacts, number of matrix artifacts, number of artifact-specific reflections, number of general reflections, total number of files uploaded to the e-portfolio, number of events posted to students' e-portfolio calendars, number of bookmarks created in the portfolio, number of number of resumes uploaded to the e-portfolio, and number of times resumes were viewed) and retention rates, grade point averages, and credit hours earned for students who have electronic portfolio artifacts?

5. Does having electronic portfolio artifacts significantly predict retention, grade point average, and credit hours earned after student background factors (gender, race, age, high school grade point average, living arrangements, and college for undergraduate students and gender, race, age, and GRE scores for graduate students) are controlled for?

Method

Data from all 2004-2005 student e-portfolio accounts were extracted from the portfolio database in July 2005. While 1,494 accounts existed, an inspection of the contents of each revealed that 935 actually contained one or more artifacts (this is why the research questions listed above are phrased to indicate "students with e-portfolio artifacts" rather than simply "students with e-portfolios"). The number of showcase artifacts, number of matrix artifacts, number of artifact-specific reflections, number of general reflections, total number of files uploaded to the e-portfolio, number of events posted to students' e-portfolio calendars, number of bookmarks created in the e-portfolio, number of resumes uploaded to the e-portfolio, and number of times resumes were viewed were recorded for each portfolio. Demographic (sex, race, age, college, class rank, academic status, living arrangements [on- or off-campus], high school grade point average, ACT composite score, and GRE verbal, math, and analytical scores) and educational outcome (retention from Spring 2004 to Fall 2005, cumulative grade point average and student credit hours earned as of the conclusion of the Spring 2005 semester) data were collected for a) the students with e-portfolio artifacts, b) the students who had created e-portfolio accounts but had no artifacts in their e-portfolios, and c) a random sample of 935 students who had no e-portfolio accounts (control group).

Graduate students with e-portfolios were similar to all BGSU graduate students except for their distribution by major, therefore graduate students in the control group were matched by major to graduate students in the e-portfolio groups. Undergraduate students with e-portfolios were similar to all BGSU graduate students except for their distribution by college, class rank, and gender; therefore undergraduate students in the control group were matched by college, class rank, and gender to undergraduate students in the e-portfolio groups. Scale scores from the Fall 2004 administration of the BGSU New Student Transition Questionnaire (NSTQ, one indicator of student academic engagement) to new freshmen were also included in the database; NSTQ scores were available for 236 (55%) of the freshmen in the-portfolio groups and 151 (35%) of the control group freshmen. Data from the National Survey of Student Engagement were available for 83 (19%) of the freshmen in the-portfolio groups and 69 (10%) of the control group freshmen. Descriptive, univariate, and multivariate statistical analyses were used to address the remaining research questions.

Results

Table 1 describes the population of BGSU students with e-portfolio artifacts. Among graduate students, those with portfolio artifacts were significantly more likely than students without e-portfolio artifacts to be students of color ($\chi^2 = 19.5$, df = 10, $p < .05$), masters rather than doctoral students ($\chi^2 = 31.9$, df = 3, $p <$

.001), and to be concentrated in the College Student Personnel, Industrial-Organizational Psychology and Music Education majors. Those with portfolio artifacts were also significantly more likely to be younger (t = 4.3, df =3146, P < .001) and to have higher GRE verbal (t = 5.9, df = 3146, p < .001) and mathematics (t = 6.3, df = 3146, p < .001) scores. Among undergraduate students, those with portfolio artifacts were significantly more likely than students without e-portfolio artifacts to be female (χ^2 = 79.1, df = 1, p < .001), students of color (χ^2 = 38.8, df = 8, p < .001), freshmen and sophomores, (χ^2 = 266.1, df = 4, p < .001), in the College of Education and Human Development as well as undeclared (χ^2 = 330.6, df = 8, p < .001), and live on campus (χ^2 = 388.6, df = 1, p < .001). Those with portfolio artifacts were also significantly more likely to be younger (t = 11.5, df = 17825, p , .001), and to have higher ACT scores (t = 7.5, df = 17825, p , .001) and high school grade point averages (t = 5.3, df = 17825, p , .001).

Retention rates to Fall 2005 were not significantly different by e-portfolio group for graduate students, as displayed in Table 2, but they were for undergraduates; those with e-portfolio artifacts had higher retention rates than those with e-portfolio accounts but no artifacts, who had higher retention rates that those in the control group. Please note that the sum of students retained and not retained does not equal the total number of students by group because 330 of the students graduated in May or August 2005.

As noted in Table 3, there were no significant differences among the three groups concerning grade point averages or credit hours earned for graduate students. Undergraduates who had e-portfolio artifacts showed significantly higher grade point averages than either those with e-portfolio accounts but no artifacts or the control group. Also, undergraduate students with portfolio artifacts had significantly greater credit hours earned as compared with the control group. Finally, undergraduates with portfolio accounts but with no artifacts had significantly higher credit hours earned than students in the control group.

Tables 4 and 5 indicate that there were no statistically significant group differences in any of the New Student Transition Questionnaire or National Survey of Student Engagement scales, which serve as measures of student academic engagement.

The majority of graduate students with some portfolio artifacts were missing matrix and showcase artifacts, artifact-specific and general reflections, events posted to calendars, bookmarks, and resumes. Therefore only the total number of files uploaded could be related to retention rates through logistic regression analysis. As shown in Table 6, this relationship was not statistically significant. Since the majority of undergraduate students with some portfolio artifacts were missing showcase artifacts, artifact-specific and general reflections, events posted to calendars, bookmarks, and resumes, only the number of matrix artifacts and total number of files uploaded were related to retention rates through logistic regression analysis. As shown in Table 7, neither of these relationships was statistically significant.

Table 8 highlights a significant negative correlation between number of showcase artifacts and grade point average and a significant positive correlation between number of times e-portfolio resumes were viewed and credit hours earned for graduate students. Among undergraduates, there were significant positive correlations between grade point average and number of showcase artifacts, total number of files uploaded, and number of resumes uploaded, and between credit hours earned and total number of files uploaded and number of resumes uploaded.

Table 9 reveals that there were no significant differences in retention rates for graduate students across e-portfolio groups once demographic variables and GRE scores were controlled. Table10, however, shows that undergraduates with e-portfolios were better retained after sex, race, age, high school grade point average, college, and living arrangements were controlled.

For graduate students, having e-portfolio artifacts had a significant negative effect upon student credit hours earned (even when date of entry into their graduate programs was controlled for) and no significant effect upon grade point average after background variables were controlled (see Tables 11 and 13). Among undergraduate students (see tables 12 and 14) having e-portfolio artifacts had significantly positive effects upon grade point average and credit hours earned after background factors were controlled.

Discussion

The population of students with e-portfolios, while considerably larger than the one used for the earlier pilot study still represents a relatively small proportion of all students at the University and is skewed in terms of several demographic and educational factors. More importantly, students' utilization of e-portfolios at BGSU remains a voluntary activity and there is no way to control for differences in motivation between students with e-portfolios and others as comparisons are made.

Despite these limitations, the current study has demonstrated that, after background factors are controlled for, undergraduate students with e-portfolio artifacts had significantly higher grade point averages, credit hours earned, and retention rates than a matched set of students without e-portfolio artifacts. Also, there were significant positive relationships between various measures of e-portfolio utilization and grade point average, credit hours earned, and retention rates among undergraduates, although these results were mixed for graduate students. Finally, there were no statistically significant group differences in any of the New Student Transition Questionnaire or National Survey of Student Engagement scales, which serve as measures of student academic engagement, although the small number of freshmen with NSTQ and NSSE data may have affected this outcome.

While the current study provides intriguing evidence about the efficacy of e-portfolios, another major milestone in BGSU's implementation of this tool has not yet occurred (although it is in development). We are currently developing rubrics for learning outcomes and student reflections that, when implemented, will allow reliable measurement across faculty and advisors in various disciplines of student learning as documented in e-portfolios. The next phase of our research efforts will follow this implementation.

Siemens (2004) lists the conditions necessary for e-portfolios to be successfully implemented :

- The portfolio is viewed as a personal, learner-in-control tool. It is treated as central to the learning and assessment process.
- Learners are introduced to the concept, and instructed on how to use the system (both from a technical and from a "how will this help you" perspective)
- The curriculum has been designed to require learners to use the portfolio in completing their course work and assignments
- The portfolio is used for assessment of learning objectives. Instructor feedback can be integrated back into the portfolio and treated as an artifact.
- Learners are provided staged advising sessions evaluating their effective use of portfolios (this is a meta-cognitive evaluation of portfolio use)
- An e-portfolio culture (Gathercoal, Love, Bryde, and McKean, 2002) exists, encouraging learners to include personal life experiences, awards, non-academic activities, and other character/learning revealing artifacts in their portfolio.
- Dialogue, debate, discussion, and examples of eportfolio use are common.
- Time is allotted for portfolio development
- Faculty understand and promote the value of e-portfolios
- Technical details are well managed, resulting in a simple, positive end user experience

At BGSU and across most colleges and universities we are only at the very beginning stage of creating such conditions. Time will tell whether e-portfolios will fully realize their potential to improve student learning.

References

Astin, A. W. (1977*). Four critical years*. San Francisco: Jossey-Bass.

Astin, A. W. (1993). *What matters in college?: Four Critical Years revisited*. San Francisco: Jossey-Bass.

Banta, T. W. (1999). What's new in assessment? *Assessment Update, 11* (5), 3, 11.

Bowen, H. R. (1977). *Investment in learning*. San Francisco: Jossey-Bass.

Boyer, E. L. (1987). *College: The undergraduate experience in America.* New York: Harper & Row.

Cambridge, B. (2001). Electronic portfolios as knowledge builders. In B. Cambridge, S. Kahn, D. P. Tompkins, and K. B. Yancey (Eds.). *Electronic portfolios: Emerging practices in student, faculty, and institutional learning* (pp. 1-11). Washington, DC: American Association for Higher Education.

El-Khawas, E. (1993). *Campus trends*. Washington, DC: American Council on Education.

Ewell, P. T. (2002). Am emerging scholarship: A brief history of assessment. In T. W. Banta and Associates (Eds.), *Building a scholarship of assessment* (pp. 3-25). San Francisco: Jossey-Bass.

Feldman, K. A., & Newcomb, T. M. (1969). The impact of college on students. San Francisco: Jossey-Bass.

Gamson, Z. F., & Chickering, A. W. (1987, March). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, 5-10.

Joint Task Force on Student Learning, American Association for Higher Education, American College Personnel Association, National Association of Student Personnel Administrators. (1998). *Powerful partnerships: A shared responsibility for learning*. Washington, DC: Author.

Kellogg Commission on the Future of State and Land Grant Universities. (1997). *Returning to our roots: The student experience*. Washington, DC: National Association of State Universities and Land Grant Colleges.

Kuh, G. D., Schuh, J. H., Whitt, E. J., & Associates. (1991). *Involving colleges: Successful approaches to fostering student learning and development outside of the classroom*. San Francisco: Jossey-Bass.

Learned, W. S., & Wood, B. D. (1938). *The student and his knowledge*. New York: Carnegie Foundation for the Advancement of Teaching.

Love, D., McKean, G., &Gathercoal, P. (2004). On implementing web-based portfolios. *Educause Quarterly, 25*(2): 29-37. Retrieved on July 22, 2005 from http://www.educause.edu/ir/library/pdf/eqm0224.pdf.

National Governors' Association. (1986). Time *for results: The Governors' report on education*. Washington, DC: Author.

National Institute of Education. (1984). *Involvement in learning: Realizing the potential of American higher education*. Washington, DC: United States Department of Education, National Institute of Education.

Pace, C. R. (1979). *Measuring the outcomes of college*. San Francisco: Jossey-Bass.

Palomba, C. A. (2002). Scholarly assessment of student learning in the major and general education. In T. W. Banta and Associates (Eds.), *Building a scholarship of assessment* (pp. 201-222). San Francisco: Jossey-Bass.

Pascarella, E. T., & Terenzini, P. T. (1991). *How college affects students*. San Francisco: Jossey-Bass.

Schneider, C. G., & Schoenberg, R. (1998). *The academy in transition: Contemporary understandings of liberal education*. Washington, DC: The Association of American Colleges and Universities.

Siemens, G. (2004). ePortfolios. elearningspace. Retrieved on July 22, 2005 from http://www.elearnspace.org/Articles/eportfolios.htm.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*, 89-125.

Yancey, K. B. (2001). Introduction: Digitized student portfolios. In B. Cambridge, S. Kahn, D. P. Tompkins, and K. B. Yancey (Eds.). *Electronic portfolios: Emerging practices in student, faculty, and institutional learning* (pp. 15-30). Washington, DC: American Association for Higher Education.