The Impact of ePortfolios on Students' Learning

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ABSTRACT

LeBow College of Business at Drexel University in Philadelphia, PA, a private higher educational institution with an emphasis on technology and co-operative education, first implemented an ePortfolio program to undergraduate business students during the academic year of 2006-2007, which occurred after a prior one-year development and pilot program. The introduction of the ePortfolio was in conjunction with a major curriculum revision across the College. Although electronic portfolios had been used in various academic disciplines such as education, nursing and graphic design for several years, its application with students of business was relatively new. A number of researchers have found a positive impact of portfolios (Campbell, 2000; Baume and Yorke, 2003; Reese and Levy, 2009) but few have researched the impact on learning, in particular the students' perceptions of learning, in a business curriculum. Based on five years of data, our study suggests that the use of ePortfolios across and through the business curriculum may have a positive effect on students' perception of learning.

Keywords: Electronic portfolios, student perceptions on learning, reflective practices, business curriculum

1. Introduction of LeBow College of Business' ePortfolio Program Across and Through the Curriculum

Founded in 1891, Drexel University is a comprehensive urban research university with a strong tradition of cooperative education. LeBow College of Business has 2500 undergraduate students, three degrees with eleven concentrations. The vast majority of students participate in three six-month co-operative educational experiences within the five-year quarter system curriculum.

In 2005, an Associate Dean, with strong interest in academic portfolios, inserted electronic portfolios into LeBow College's Strategic Plan. After a period of researching and reviewing literature on the

topic, discussions among stakeholders began regarding the use of ePortfolios in the College at the undergraduate level. Career advisors, administrators, faculty and employers then developed goals for ePortfolio use specific to the undergraduate business curriculum. An initial pilot program was conducted with a select volunteer group of engaged upper-class students. This group of students met weekly for a ten-week period, and together with the faculty and administrators facilitating the pilot program, designed a course model using ePortfolios to demonstrate academic, professional and personal achievement in order to plan for post graduation careers. This proposal then became the foundation for a senior level undergraduate capstone course on career planning that was built in to the curriculum.

One year later, ePortfolios were expanded into the entire business school student population. Beginning in the freshmen year, students were required to create electronic portfolios to support writing, career management, quantitative reasoning and business knowledge. Students uploaded selected, specific assignments and evidence of work and experience in order to both organize and reflect on their first year learning, as well as to begin to understand the value and application of their overall educational and personal development. Subsequently, mid-level core business courses, such as Accounting and Organizational Behavior, were identified, whereby the student could also use the ePortfolio within the specific course.

In addition to the use of ePortfolios through the business curriculum, LeBow students are also exposed to the ePortfolios across the curriculum, beginning in the Mathematics and English course sequences usually taken in the first year. Key assignments and lessons from these non-business courses, that can be directly used or referred to in subsequent business courses, are included in the ePortfolios. Additionally, students learn more about and practice the concept of reflective analysis in both introductory and advanced English courses. Within the mathematics sequence, students learn concepts critical to their study of business disciplines like economics and finance. As a part of the mathematics requirements, students post homework assignments, review sheets and exams to their ePortfolio. The posting of these artifacts coupled with a written reflective analysis challenges students to make connections between their mathematics work and their interest in the study of business. This process helps students see the interconnectedness of business and mathematics.

Students are introduced to electronic portfolio background and use in the Foundations of Business course sequence in their first year. A presentation is given from national expert and proponent, John Zubizarreta, to all new students about the process of developing an ePortfolio, the fundamental importance of critical reflection, and the value of ePortfolios for long-term career success. As a follow-up to John Zubizarreta's visit, all students then design and create their ePortfolios, accumulating evidence through several assignments, projects, and experiences; an introductory assignment on financial statement analysis in business is specifically included in this evidence.

After ePortfolio is launched in the first year, it continues to be integrated through the business curriculum in selected courses as well as with the experiential learning co-operative education component of Drexel University. The assignments used in the student's concentration specifically ask students to review past work that they completed in courses and highlight their expansion of knowledge on the subject in their reflective writing. A specific example of this integration would be in the Accounting Concentration. The Foundations of Business course sequence requires students to review a public company's financial statement and analyze the company using financial ratios. This assignment is expanded and continued from the Foundations of Business course sequence in to both the Foundations of Financial Accounting and then the Advanced Accounting courses. Other examples of this integration would be Law and Organizational Behavior (which apply a Personal Ethics assignment from the introductory business course sequence) and Marketing (which refers to a collaborative Business Plan and Presentation from a Simulator activity done in the introductory business course sequence). Each of the major Business College department developed opportunities for students to post assignments to their ePortfolios which would include a reflective writing component. The assignments selected have also been linked to the assessment goals required by the Association to Advance Collegiate Schools of Business (AACSB) to which LeBow College of Business belongs.

As stated earlier, during the end of students' academic programs, they use their academic ePortfolios as a basis for a Career ePortfolio that is a part of a required capstone course on Career Planning. This course was the direct result of the initial pilot program with the upper-level students and of recognition by faculty and administrators that guidance for the Career ePortfolio was critical. Currently, LeBow students in this course prepare for post graduate activities through writing resumes, researching for and constructing a 5 to 7-year Career Plan which includes overall reflection on their academic, personal and professional growth in college, and the development and presentation of a "personal pitch", which showcases their ePortfolio (accumulated evidence and reflection). The personal pitch is presented to a panel of faculty, administrators, alumni, employers and peers during the course. This course allows for the continuing use of ePortfolios through the business curriculum and guides students to foresee the application of the ePorfolio for their career. The objectives of this course are to reflect on past learning, to conduct self-assessment, and to determine future career goals which includes a career plan with detailed steps on how goals will be achieved. The value of the ePortfolio in this class is evident in the relationship of the reflections on their career goals.

2. Assessment of the ePortfolio Program's Effect on Students' Perceptions of Learning

In its development, execution, and continuous improvement of the ePortfolio strategy, LeBow has concentrated on each of the major stakeholders: students, faculty, administration and employers. In the Electronic Portfolio Student Perspective Instrument (EPSPI), the stakeholders were identified and connected to four domains: employment, visibility, assessment, and learning (Ritzhaupt, Singh, Seyferth and Dedrick, 2008). It is particular interest in the learning domain that prompted LeBow College of Business to conduct research and make observations.

In order to address possible student and faculty misperceptions of the ePortfolio as an unneeded repository of student artifacts, the College sought to gather evidence regarding the increase in learning with the use of the ePortfolios. This was a minor shift in the original strategy for the College. Initially, the primary focus of the ePortfolio was presented as a tool to support career planning and future employment. As the major stakeholder of the ePortfolio, the college felt that the students' learning may be the critical goal which would lead to the long term success and integration of the program. Acceptance by students and faculty of the ePortfolio program as a viable learning tool

would be made easier if evidence within the college could be ascertained that validated a significant increase in learning.

Research has suggested that student learning perspectives on course activities help educators to understand which activities will help produce specific learning outcomes (Karns, 2005), and student perspectives can be used to evaluate teaching innovations that prompt student achievement of course learning goals (Kuhn and Rundle-Thiele, 2009). The use of the ePortfolios across the business curriculum was an innovative teaching method that needed to be assessed.

In addition to the general question of learning, an additional element was considered in reviewing the ePortfolios across the curriculum: the reflective writing that is taught by the English department, reviewed and supported in the foundation of business course, and required in upper-level course assignments that are to be saved on a student's ePortfolio. Research suggests that reflective writing does foster a deep approach to learning, which results in high quality learning outcomes (Trigwell and Prosser 1991). Research has also suggested that academic portfolios are able to change the student's role from a passive learner to an active participant when he or she is asked to reflect on the artifacts contained in the ePortfolio (Palomba, 2002). Consequently, two research questions were formulated:

- Does a student's perception of learning increase with the use of ePortfolios through the curriculum?
- Does a student's perception of learning increase more if the use of ePortfolios through the curriculum includes a reflective writing assignment?

Given this, exploration is done on whether or not students would have a stronger perception of learning when using the ePortfolios and whether there is a greater increase in the students' perceptions of learning when that learning uses and includes ePortfolios and the reflective writing assignment when compared with just the use of the ePortfolios. Research supports the prediction that active engagement of an academic portfolio, connection of assignments across courses, and the reflective writing associated with assignments, should allow a student to identify his or her increased knowledge.

This also led to another research question involving learning styles:

- Does the impact of ePortfolios on student perceptions of learning and confidence levels differ based on the learning style of the students?

3. Methodology and Data

During a ten-week term the authors compared the survey results of three Foundations of Financial Accounting sections with the same instructor. Each student was assigned a financial statement case study (described previously), which was a continuation project from the first year Foundations of Business course and which applied the new concepts taught during the Foundations of Financial Accounting course. A thirty-item survey was created to measure students' perception of learning, based on the learning outcomes of the Foundations of Financial Accounting, a required course in the LeBow curriculum. Students in the three sections were given the survey at the conclusion of the term. As mentioned, all sections were taught by the same instructor, but one section did not use ePortfolios (n=31), one used ePortfolios but did not require any specific student reflection (n=41), and a third section used ePortfolios and required student reflection on the financial statement case study, including a reflection back to the Foundations of Business course assignment posted previously in the ePortfolio.

Ten three-item scales were created as outcome measures based on the responses to the survey.

A. Knowledge of (1) the balance sheet, (2) the income statement, (3) retained earnings, (4) liquidity, (5) profitability, (6) financial statements, (7) internal controls, and
B. Confidence in (1) choice of a major, (2) selection of business as a career, and (3) interviewing skills.

The Index of Learning Styles (Solomon and Felder, 1991) was also included and completed by each student. The overall goal of this survey is to assist in understanding the various ways that students take in and process information in their learning to assist in better aligning teaching with those styles. This 44 item survey was used to be able to sort the learning styles of the students across four dimensions: (a) Active-Reflective, (b) Sensing-Intuitive, (c) Visual-Verbal, and (d) Sequential-Global. Additional analysis is intended subsequent to this one to study any correlation and relationship impact the learning styles may have on the students' perceptions of learning among the three groups. Table 1 lists the thirty statements from the survey given to all students, three for each of the outcome measures stated above. It details the results of the univariate linear tests that were conducted for each individual statement used for the ten outcome measures. A MANOVA (multiple analyses of variance) was also run using all thirty items as the dependent variables at once. The independent variable in this analysis (group membership) was significant. Individually, the means were significantly different for the eleven of the thirty items (see table below-using a $p < .10$ significance level test) and all in the expected direction. The highest scores were for the section that used a reflection in the portfolio and the lowest for those that did not use portfolios.

Tables 2 and 3 show the general F ratios and ANOVAs of the three section groups, for the item scales that were measured in the analysis, for the accounting specific knowledge and the confidence areas respectively. ANOVAs (analysis of variances) were run, testing for mean differences across the three conditions, the sections (1) without ePortfolios, (2) with ePortfolios but no reflection, and (3) with both ePortfolios and reflections.

4. Analysis and Observations

As seen in Tables 2 and 3, the increase in learning is demonstrated for every one of the items when comparing the section that was only required to do the financial statement case study (CS) and the section that was required to complete the case study and post it to the ePortfolio with no reflection (CSP). The table also shows an additional increase of the student's perception of learning for every one of the items when combining the case study and ePortfolio with the reflective assignment (CSPR). Statistically significant differences in the means were found for two of the six knowledge outcomes (the balance sheet and retained earnings), and two of the three confidence measures (the selection of business as a career and interviewing skills), as demonstrated by the F-ratios.

ANOVA's were also conducted on each of the nine, three item scales to determine if the there was a mean difference across the groups and across students who identified themselves as reflective learners, more than active learners. The interaction term Group membership X Learning Style was significant for four of the five knowledge outcomes and none of the three confidence outcomes. Most significantly, the means were higher in all four outcomes for students who were in the section with the reflections and who had identified themselves as reflective learners. A representative sample of these results is seen in Table 4. Table 4 provides a detail for the dependent variable *retained earnings*, and uses Activelearn levels of 0.00 and 1.00 for each of the three sections groups (Case

Study and ePortfolio, Case Study with ePorfolio and reflection, and Case Study only). A 95% confidence level is shown.

It is interesting to note that the increase in the perception of learning is less than expected by the authors. However, many hypotheses could be made about why the difference is less than expected, such as that reflections are not always required in written form, specific and detailed instructions must be part of the reflective writing, or the reflective writing does not add much additional value.

There are some limitations to the survey and the results that should be addressed. First, the students surveyed may include non-business students and therefore are not involved in the curriculum integration that is sponsored by LeBow. This number should be relatively small in each section and should not have inflated the results.

5. Conclusion

The results of the survey have given the authors many additional opportunities for establishing empirical evidence of student learning with the use of ePortfolios. The research has prompted new insights and questions such as a better understanding of the type of learning supported by ePortfolios and whether it is high-level learning versus surface learning, whether reflections should be guided or freely written by the student, and whether the continuation of the program in the upper-level courses will have significant and positive effects on student learning and on the success of LeBow graduates. This additional research would allow greater sharing of continued evidence with faculty and students. The results may provide empirical support for continued use of ePortfolios and reflective writing across and through the business curriculum. The research has allowed the ePortfolio program and LeBow faculty to focus more on deep as well as practical learning goals for students. This vision is a shift from the original intent five years ago, but with the empirical evidence collected so far, the College hopes that acceptance of the program by faculty and students will increase, and that ePortfolios will play an increasingly important role in enhancing students' experiences at LeBow and beyond.

Table 1 Univariate Tests

Dependent Variable		Sum of Squares	df	Mean Square	F	Sig.
I am certain that I can accurately explain a bank reconciliation.	Contrast	2.310	2	1.155	.518	.597
	Error	236.277	106	2.229		
I am certain that I can accurately explain an industry's competitive environment.	Contrast	.827	2	.414	.235	.791
	Error	186.457	106	1.759		
I am certain that I can accurately explain how profit is determined by a business.	Contrast	1.413	2	.707	.438	.647
	Error	171.192	106	1.615		
I am certain that I can accurately explain my career options in my intended major.	Contrast	.097	2	.048	.022	.978
	Error	234.839	106	2.215		
I am certain that I can accurately explain my reason for studying business.	Contrast	1.768	2	.884	.460	.632
	Error	203.499	106	1.920		
I am certain that I can accurately explain the basic Accounting Equation.	Contrast	25.649	2	12.825	14.147	.000
	Error	96.094	106	.907		
I am certain that I can accurately explain the Current Ratio.	Contrast	12.998	2	6.499	3.187	.045
	Error	216.140	106	2.039		
I am certain that I can accurately explain the importance of accounting in a firm.	Contrast	8.065	2	4.033	2.407	.095
	Error	177.605	106	1.676		
I am certain that I can accurately explain the profit margin.	Contrast	8.303	2	4.151	2.763	.068
	Error	159.257	106	1.502		
I am certain that I can accurately explain the recording of undistributed profit.	Contrast	2.776	2	1.388	.691	.503
	Error	212.912	106	2.009		
I am more confident in either my choice of a concentration or my ability to choose one.	Contrast	10.485	2	5.242	2.254	.110
	Error	246.580	106	2.326		
I am more confident in my ability to compare financial statements.	Contrast	8.645	2	4.323	3.086	.050
	Error	148.492	106	1.401		
I am more confident in my ability to interview with an organization for a position.	Contrast	14.698	2	7.349	3.774	.026
	Error	206.439	106	1.948		
I am more confident in my interest in business as part of my career goals.	Contrast	27.504	2	13.752	5.711	.004
	Error	255.249	106	2.408		
I am secure in my decision to	Contrast	21.727	2	10.863	2.907	.059

be a student of business.	Error	396.090	106	3.737		
I am sure of my understanding of the impact of dividends on retained earnings.	Contrast Error	18.698 209.339	2 106	9.349 1.975	4.734	.011
I am sure that I can explain the effect of short term assets on cash flow.	Contrast Error	2.283 219.956	2 106	1.142 2.075	.550	.579
I believe that I can benchmark a firm's market position within an industry.	Contrast Error	8.183 156.845	2 106	4.091 1.480	2.765	.068
I believe that I can calculate net income for a firm.	Contrast Error	.605 186.679	2 106	.303 1.761	.172	.842
I believe that I can demonstrate my business knowledge to potential employers.	Contrast Error	4.774 158.474	2 106	2.387 1.495	1.596	.207
I believe that I can explain management's reliance on accounting controls.	Contrast Error	2.847 201.116	2 106	1.424 1.897	.750	.475
I believe that I have a clear understanding of the accounting profession.	Contrast Error	6.315 207.098	2 106	3.158 1.954	1.616	.204
I believe that I have complete understanding of liquidity.	Contrast Error	1.254 155.664	2 106	.627 1.469	.427	.654
I believe that I have complete understanding of retained earnings.	Contrast Error	6.070 158.260	2 106	3.035 1.493	2.033	.136
I believe that I have complete understanding of the balance the balance sheet.	Contrast Error	7.875 161.355	2 106	3.937 1.522	2.587	.080
I believe that I have complete understanding of the difference between gross profit and net profit.	Contrast Error	.913 235.527	2 106	.457 2.222	.206	.815
I believe that I have complete understanding of the impact of internal controls on financial statements.	Contrast Error	.156 274.046	2 106	.078 2.585	.030	.970
I believe that I have complete understanding of the income statement.	Contrast Error	4.663 176.401	2 106	2.332 1.664	1.401	.251
I feel confident that I would be able to identify the financial position of a company.	Contrast Error	1.679 150.560	2 106	.839 1.420	.591	.556
I feel that I would be able to identify the financial statement that will show the operating income of the firm.	Contrast Error	4.312 190.826	2 106	2.156 1.800	1.197	.306

Note: The F tests the effect of Group. This test is based on the linearly independent pair-wise comparisons among the estimated marginal means

Table 2

Knowledge of:	***F ratio***	**CS Only**	**CSP**	**CSPR**
Balance Sheet (α=.74)	5.79**	5.29 $_{a}$	5.81 $_{b}$	6.00 $_{b}$
Income statement (α=.78)	1.21 $_{ns}$	5.34 $_{a}$	5.65 $_{a}$	5.74 $_{a}$
Retained earnings (α=.75)	3.28*	4.94 $_{a}$	5.42 $_{ab}$	5.60 $_{b}$
Liquidity (α=.71)	.91$_{ns}$	5.14$_{a}$	5.37$_{a}$	5.50$_{a}$
Profit (α=.80)	.82$_{ns}$	5.56$_{a}$	5.70$_{a}$	5.91$_{a}$
Financial statements (α=.78)	1.95$_{ns}$	4.96$_{a}$	5.18$_{a}$	5.46$_{a}$

Table 3

Confidence in:	***F ratio***	**CS Only**	**CSP**	**CSPR**
Major (α=.78)	1.17 $_{ns}$	5.32 $_{a}$	5.40 $_{a}$	5.74 $_{a}$
Business as a career (α=.78)	3.62*	5.23 $_{a}$	5.46 $_{ab}$	6.07 $_{b}$
Interview (α=.81)	3.27*	5.30 $_{a}$	5.59 $_{ab}$	5.98 $_{b}$

CS only = Case study only
CSP = Case study and ePortfolio
CSPR = Case study, ePortfolio and reflection

Table 4 Activelearn * Group

Dependent Variable: RETAINED EARNINGS

Activelearn		Group	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
dimension	.00	Case and ePortfolio	5.018	.235	4.551	5.484
		Case, ePortfolio & reflection	6.282	.284	5.719	6.846
		Case only	4.444	.296	3.858	5.031
	1.00	Case and ePortfolio	5.773	.218	5.340	6.206
		Case, ePortfolio & reflection	5.236	.209	4.821	5.651
		Case only	5.246	.235	4.780	5.712

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REFERENCES

Baume D, Yorke M, 2002. The reliability of assessment by portfolio on a course to develop and accredit teachers in higher education. Studies in Higher Education, 27(1): 7–25.

Campbell D M, Melenyzer B J, Nettles DH, Wyman RM, 2000. Portfolio and performance assessment in teacher education. Boston: Allyn and Bacon.

Karns GL, 2005. An update of marketing student perceptions of learning activities: structure, preferences and effectiveness. Journal of Higher Education, 12(3): 64-71.

Kuhn KL, Rundle-Thiele SR, 2009. Curriculum alignment: exploring student perception of learning achievement measures. International Journal of Teaching and Learning in Higher Education, 21(3): 351-361.

Palomba CA, 2002. Scholarly assessment of student learning in the major and general education. In Building a Scholarship of Assessment. Edited by TW Banta & Associates. San Francisco: Jossey-Bass, 201-222.

Pratt DD, 1997. Reconceptualizing the evaluation of teaching in higher education. Journal of Higher Education, 34(1): 23-44.

Reese M, Levy R, 2009. Assessing the Future: E-Portfolio Trends, Uses and Options in Higher Education. Research Bulletin, Issue 4. Boulder: EDUCAUSE Center for Applied Research.

Ritzhaupt, AD, Singh O, Seyferth T, Dedrick RF, 2008. Development of the Electronic Portfolio Student Perspectives Instrument: An ePortfolio Integration Initiative. Journal of Computing in Higher Education, 19(2): 47-71.

Soloman RA, Felder RM, 2008. Index of Learning Styles Questionnaire [http://www.engr.ncsu.edu /learningstyles/ilsweb.html]

Trigwell K, Prosser M, 1991. Improving the quality of student learning: the learning context and student approaches to learning on learning outcomes. Journal of Higher Education, 22: 251-266.

Zubizarreta, J, 2009. The learning portfolio: Reflective practice for improving student learning. 2nd edition. San Francisco: Jossey-Bass.