

Pilot Study of the Effectiveness of an Enterprise Instructor-Driven Student Intervention System on Student Retention

Patricia Goedl
University of Cincinnati Clermont

This paper reports the results of a pilot study to explore the utility of Beacon, a technological student retention tool. The quantitative study examined the efficacy of sending notifications through Beacon in addition to emailing grade progress reports to at-risk students, students performing below average (<70%) after the first exam, on course pass rates (>60%). While accounting courses were studied, the implications are multidisciplinary. The findings did not detect a statistically significant difference in course pass rates among the student population in which Beacon early warning alerts were sent to at-risk students in addition to progress reports. Further studies across disciplines are recommended.

Student retention, also commonly referred to as student persistence, is an important topic in higher education. While clearly a social issue, retention is becoming an increasingly important financial issue as well. This is particularly true in the more than a dozen states that have adopted some form of performance-based funding in which a portion of the federal and state funding available to public universities is allocated based on performance measures¹. Although performance-based funding systems vary from state to state, student retention or completion is a shared performance metric in these funding models. Beyond public funding, retention also has a significant effect on traditional tuition revenues. For example, a baccalaureate freshman who withdraws results in multiple years of lost tuition revenue, not just one (Bean, 1992).

Arguably, tethering student performance and retention to finances and funding acutely raises the importance of student retention at an institutional level. Although anecdotal, it is encouraging to note that the seven-year trends in full-time and part-time retention rates in postsecondary institutions have improved slightly. The U.S. Department of Education (2016) reports that from 2007 to 2014, full-time retention improved from 71.1% to 73.8%, and part-time retention improved from 43.1% to 45%. According to these figures, retention still appears a more problematic issue among the part-time student population, who have a particular set of educational needs and challenges (Fletcher, 2012; Hudson, 2006; Tinto, 2007). Improvement aside, 30% and 55% attrition rates remain concerning.

Of course, student retention is not a new topic. Retention is widely studied in higher education (see Tinto, 2007, for a comprehensive review of the study and practice of retention). An extensive body of research—including dedicated journals replete with theoretical debate and to a lesser degree empirical research—contributes to the current understanding of the complex matter of student retention or persistence. Furthermore, recent financial incentives at the institutional level have bolstered a whole new for-profit retention industry, selling consulting and various other retention tools. However, as Tinto stated, “but for all that, substantial gains in student retention have been hard to come by” (p. 2).

Funding pressures are further committing institutions to identify the causes of student attrition and to adopt effective countermeasures geared toward the student retention. The first step is likely to explore current research. Research indicates that many students often leave for reasons

beyond the institution's control, such as pressures associated with work, family, finances, or other outside obligations. Moreover, existing research suggests that community college students have a lower persistence rate than four-year university students because they are more likely to have work and family responsibilities and are less likely to be connected to the institution (Cohen & Brawer, 2008). And finally, some research has found that the long-held notion that retention is reliant on student characteristics is not necessarily the case; a significant percentage of "better students," ones considered more academically prepared, also fail to obtain a degree (Tinto, 2007). Nonetheless, the research does point to the importance of faculty intervention in retention efforts. Fletcher (2012) goes as far as to say, "faculty information can be a highly important or even the most important part of at-risk student identification" (p. 3).

One method of instructor-driven retention efforts is direct early intervention with at-risk students. Research on various types of instructor-driven early alert or intervention activities report conflicting degrees of success. For example, Fletcher (2012) found mixed results in a national study of the effects of instructor intervention on retention. Hudson (2006) found that in cases of excessive absenteeism, an instructor-driven early alert system helped with student retention. And faculty interventions were shown as a significant retention tool for students identified as at-risk by Jackson (2015). Yet, Green (2015) studied the use of early alert programs in a developmental English course and found no statistically significant differences in course completion or persistence rates.

A common second step in the progression to improve retention at the university level is exploring the rapidly expanding marketplace of

enterprise technology systems. Enterprise systems are large-scale application software packages that offer technological retention solutions. These solutions, while sophisticated, are also typically expensive. Furthermore, there is little peer-reviewed data, beyond anecdotal testimonials, to support the actual effectiveness of these enterprise tools. In many cases, administrators are faced with the decision to commit valuable university resources to expensive enterprise tools without much supporting evidence, while considering claims they are unable to decipher or substantiate in a usable way to develop a retention plan that is both effective and affordable (Fletcher, 2012; Tinto, 2007).

In 2015, University of Cincinnati Clermont College conducted a pilot study of one of these enterprise solution, instructor-driven, early intervention retention systems. The CampusLabs Beacon student success/early alert platform was designed for early intervention with students exhibiting at-risk behaviors that could compromise their academic success. Given the lack of empirical data on enterprise retention solutions, the purpose of this study was to investigate the effectiveness of adding Beacon, in addition to current instructor-driven retention efforts, on the course pass rates of at-risk college students taking introductory financial accounting and introductory managerial accounting courses. Beacon, like most enterprise solutions, is an expensive tool, so another goal was to statistically explore the potential for return on investment.

As mentioned above, research on the effectiveness of instructor-driven early intervention efforts on student retention is mixed. To this point, the efficacy of instructor-driven early intervention, in general, is beyond the scope of the present work². Prior to piloting the Beacon system, the author

utilized the existing learning management enterprise tool to email progress reports directly to students. The instructor emailed periodic grade reports to all students, which are considered a form of instructor-driven early intervention. The gradebook feature in Blackboard, the university's online learning management system, was used consistently across all semesters and all sections of all courses in this study. In particular, grade reports were emailed four times via Blackboard: after Exam 1, Exam 2, Exam 3, and Exam 4. The Blackboard gradebook was set up to calculate the students' course grade to date and only considered the work submitted at each point. Once grades were entered in the gradebook, students were emailed by the instructor and notified that their grades were available there. Effectively, all students enrolled in the courses in the study received progress reports from the instructor at the following points: one-quarter, midterm, three-quarters, and final.

This study is not about the efficacy of instructor-driven intervention on student retention rates but rather an investigation of the effectiveness of adding Beacon in addition to current instructor-driven retention efforts on the course pass rates of at-risk college students taking introductory financial accounting and introductory managerial accounting courses. This study also contributes to the discussion about the return on investment of purchasing additional enterprise tools and the resulting impact on student retention. Specifically, the study examined the efficacy of the instructor sending student success/early alerts via the Beacon platform in addition to emailing progress reports via the existing learning management system on course pass rates of students performing below average after the first exam. In addition, student grade data for the 2012-2015 fall semesters was

examined. This analysis did not detect a statistically significant difference in the course pass rates of the at-risk student population that received the Beacon notifications and the at-risk student population that only received emailed progress reports from the course learning management system. In the following sections, the research methods, results, and conclusions are discussed in detail.

Method

The Beacon student success/early alert platform was piloted in one section of introductory financial accounting (n=34) and one section of introductory managerial accounting (n=30) in the 2015 fall semester. The mode of instruction for both courses was a hybrid design that included both a face-to-face lecture component in a traditional classroom and an online component. Introductory financial accounting is traditionally taken by freshmen business majors and is the first accounting course that students complete. The next course in the accounting series is an introductory managerial accounting course, which is typically taken after the introductory financial accounting course. Financial accounting is a prerequisite for managerial accounting. Managerial accounting is commonly taken by freshmen or sophomore business majors. These two accounting classes are required for all accounting majors and also meet the accounting requirements for most standard, non-accounting business associate or baccalaureate curriculums.

During the fall 2015 semester, students were sent academic alerts within the Beacon student success/early alert platform. Progress reports were also emailed to students using the existing learning management

system. Student data was collected and the following hypothesis was tested.

Hypothesis: There is a difference in the course pass rates of students performing below average after Exam 1 between the student groups that received the Beacon early alert intervention and the student groups that did not.

Class rosters for the fall 2015 sections of financial accounting and managerial accounting were uploaded into the Beacon system by the institution. Within Beacon, students were connected to their academic “network,” which included current course instructors, advisers, and specific institutional administrative personnel. Instructors could log into the system and send academic alerts; encouragements; notifications of academic excellence; and referrals to others within the network. The following notice was included in the fall 2015 syllabi for both courses:

All students should have a network of people who will support them in their educational journey. For that reason, Clermont College uses a system known as Beacon, whereby your instructors and coaches, if applicable, can post notices about observable behavior. For instance, if you are absent repeatedly from a class or are not completing assignments, your instructor may post a notice on Beacon. That information may be shared with your other instructors and/or your athletic coach. Advisors will be monitoring notices posted on Beacon so that we may address any issues before they

become obstacles to your academic success (Personal communication, 2015).

While the content in financial accounting and managerial accounting are different, the courses have nearly identical structures. Both the financial accounting and managerial accounting courses have four exams spaced evenly throughout the semester. The exams are typically administered to both classes on the same dates. Moreover, the content delivery pace, number of chapters covered, homework requirements, and course grading structures are nearly identical. For these reasons, combining the financial accounting and managerial accounting courses for the purposes of this analysis was seamless.

Students in all courses and across all semesters were emailed progress grade reports using the gradebook feature in Blackboard. Progress grade reports were emailed four times via Blackboard, after Exam 1, Exam 2, Exam 3, and Exam 4. The Blackboard gradebook was set up to calculate the students' course grades to date and only considered the work submitted at each point. Once grades were entered in the Blackboard gradebook, students were emailed by the instructor and notified that their grades were available in Blackboard. Students could then log into the Blackboard system and see their course grade as a percentage after each exam. All students enrolled in the courses studied received grade progress reports from the instructor at the following points: one-fourth, midterm, three-fourths, and final.

In the fall 2015 semester only, early warning alerts were also sent, using the Beacon system, to students who were performing below average

(<70%) in the financial and managerial accounting courses after Exam 1 (September 15), Exam 2 (October 13), and Exam 3 (November 10). Students earning above 70% after Exam 1 did not receive a Beacon notification; only students earning below 70% after Exam 1 were alerted. The Beacon notifications triggered an email directly to the student and the student's advisor. The student's advisor then contacted the student by phone or email to determine the best course of action for the student, e.g. contact the instructor, course withdrawal, or referral to supplemental academic services such as tutoring or counseling support.

All students alerted after Exam 1 received another Beacon alert if they were still performing below average after Exam 2. If the student was performing significantly better or passing at Exam 2, they received encouragement or a notification of academic excellence through Beacon. Students failing (<60%) after Exam 3 received a final Beacon alert with a recommendation to withdraw from the course and a referral to their academic adviser. Passing students, at this point, received another Beacon encouragement. An example of actual Beacon notifications from the financial accounting course, with names removed, for two students—one who was passing and one was failing the course—are shown in Table 1 below. The alerts for the other 17 students—a total of 19 students received alerts—were nearly identical. A total of 57 instructor-driven Beacon notifications were sent to these 19 students in the fall 2015 semester. Although all students received the emailed grade progress reports, only at-risk students performing below average after Exam 1—defined as <70% course grade—received Beacon alerts. Therefore, the study population was defined as students earning <70% after Exam 1.

Table 1: Example of Actual Beacon Student Alerts

Student	Date	Notification Type	Notification
Student A	Sept. 15	Academic	I am concerned about Student A's academic progress in accounting. At this point, she is earning a 60.54% in the course. She can see her grade details in Blackboard. Her grade is due to a combination of missing homework assignments and poor performance on the first exam today. She has the ability to bring up her grade and pass the course so I want to encourage her to 1.) start working on the extra credit assignment 2.) attend class, and 3.) work with the tutor to complete the homework.
Student A	Oct. 13	Quality of Effort	Student A's performance in accounting has significantly improved the last 3 weeks. She earned 85% on Exam 2 and completed all the assignments for the last 3 weeks. Keep up the excellent work!!!
Student A	Nov. 10	Academic Excellence	Keep up the great work Student A!
Student B	Sept. 15	Academic	I am concerned about Student B's academic progress in accounting. At this point, she is earning a 56.93% in the course. She can see her grade details in Blackboard. Her grade is due to a combination of missing homework assignments and poor performance on the first exam today. She has the ability to bring up her grade and pass the course so I want to encourage her to 1.) start working on the extra credit assignment 2.) attend class, and 3.) work with the tutor to complete the homework.
Student B	Oct. 13	Academic	Since the last alert on 9/15 Student B's grade in accounting has decreased. She earned a 65% on Exam 2 today and did not complete any of the homework/assessments for the last 3 weeks. Her course grade at this point is 41.47%. If her performance in my class does not drastically improve from this point forward she will not pass this course.
Student B	Nov. 10	Academic	Student B missed the exam today and has not completed any of the work. At this point she cannot pass ACCT2081 and should withdraw asap.

Student grade data for the 2012 through 2015 fall semesters for the same sections of the two courses were analyzed. Progress reports were e-mailed quarterly in all four-semester studied while Beacon alerts were only sent in the fall 2015 semester. The course design, grading criteria, number of assignments, lecture content, contact hours, and course points were consistent across the four-year period. Other student demographic factors were not collected or considered for the student. Only the student grade

data was analyzed. First, the student population performing below average after Exam 1 (<70%) was extracted from the original grade data for both courses for the fall semesters of 2012, 2013, 2014, and 2015. A total of 321 students received a grade in these courses. The total study population extracted from the grade data was 105 students. Interestingly, nearly one-third of the total student population were considered at-risk after Exam 1.

Next, the extracted data was converted into categorical data in which at-risk students performing below average at Exam 1 either passed or failed the course. Successfully passing the course was defined as an overall course grade of >60%. The University of Cincinnati awards credit for grades of >60%, corresponding with a letter grade of D, so this criterion was also considered as passing in the current study. Given the focus on student retention, students who officially withdrew from the course were considered unsuccessful and categorized as failing if they were still enrolled at Exam 1 and received a Beacon early warning notification. Students who withdrew prior to Exam 1 were not notified and were not included in the study population.

A chi-squared test was applied to the data to analyze group differences because the dependent variable is measured at a nominal level and the sample sizes of the student populations across semesters were uneven. In addition, this test was selected because it does not require homoscedasticity in the study data (McHugh, 2013).

Results

The results are presented in Table 2 below. The expected frequencies were calculated as:

$$E = O * \frac{C}{S}$$

Where:

E = Expected frequency

O = Observed frequency

C = Observed column total for each semester group

S = Observed row total for corresponding course success variable

Table 2: Chi-square frequency results of course success rates for students >70% at Exam 1

Actual Course Success Rates of Students Earning <70%					
Course Success	Fall12	Fall13	Fall14	Fall15	Total
Yes	16.00	4.00	11.00	7.00	38.00
No	26.00	15.00	14.00	12.00	67.00
Total	42.00	19.00	25.00	19.00	105.00
	0.38	0.21	0.44	0.37	

Expected Course Success Rates of Students Earning <70%					
Course Success	Fall12	Fall13	Fall14	Fall15	Total
Yes	15.20	6.88	9.05	6.88	38.00
No	26.80	12.12	15.95	12.12	67.00
Total	42.00	19.00	25.00	19.00	105.00

p-value	0.4548
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As shown in Table 2 above, the resulting p-value is 0.4548, substantially greater than the study significance level of p=0.05. This indicates that the sample results cannot reject the null hypothesis. Accordingly, this analysis fails to reject the null hypothesis, which posits no difference between the course passing rate of students performing below average at Exam 1 by using or not using the Beacon student success/early alert platform for early intervention in addition to emailing grade process reports. In other words, there is no difference in the course pass rates of

students performing below average after Exam 1 between the student group that received the early alert interventions from Beacon and the student groups that did not.

One notable limitation of the above results is sample size. The chi-squared test is not recommended for sample sizes less than 50. The sample herein of 105 is double the minimum, but still small. Further, a chi-square is sensitive to small expected frequencies in the cells. Therefore, caution in interpretation must be exercised when more than 20% of the expected frequencies are less than five. All of the expected frequencies are greater than five; however, two of the expected frequencies are 6.88. While these limitations certainly don't disqualify the statistical validity of the present results, there is a need for additional studies with larger sample sizes to substantiate the results herein.

Conclusion

This analysis did not detect a statistically significant difference in the course pass rates of the at-risk student population that received the Beacon notifications in addition to emailed grade progress reports in the fall 2015 semester and the at-risk student population that only received emailed grade progress reports in the three previous fall semesters. Although this is an interesting and important result, caution should be exercised in generalizing these findings. These results are for an exploratory pilot study. Additional studies are recommended to build on the preliminary results of the pilot study reported herein. For example, it would be interesting to study the effects of implementing Beacon in situations where no other form of instructor-driven early alerts, e.g. progress reports, were issued to

students. Another potential for future research is to study the effectiveness of only sending progress reports with the existing student learning management system. Or, a larger study exploring the effectiveness of intervention by multiple members of the student's academic network would also be a valuable contribution to retention literature. It could follow that one particular system of instructor early alert or invention is sufficient and that a second formal system, like Beacon, does not have incremental student retention value. On the other hand, a larger study of a commercial academic network approach may detect an overall effectiveness not detectable at the individual instructor level. To this point, an argument can be made that further empirical evidence is needed to determine if university resources are better allocated to technologies with a proven impact on student learning or retention.

Although a statistically significant relationship was not detected, there are anecdotal benefits from the author's personal experience with early intervention, and further research is certainly recommended. Moreover, a couple of at-risk students expressed genuine appreciation for the personal contact from the Beacon system and ultimately performed well in the course. Further, as Asby (2015) found, early alert systems serve as conduits between students, faculty, and the institution, affecting students' educational satisfaction, motivation to seek resources, communication with campus officials, and overall sense of belonging.

Recommendations for further research on instructor-driven retention efforts are two-fold. First, due to the limited number of studies on instructor-driven early intervention systems as well as conflicting findings, further studies across disciplines are necessary. For all the theoretical

contributions in the area of student persistence and retention, proportionally empirical contributions are lacking. Second, the effectiveness of non-commercial instructor-driven efforts, such as periodically emailing progress grade reports, warrants further study (Fletcher, 2012; Tinto, 2007).

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¹ States include, but are not limited to, Arizona, Arkansas, Illinois, Indiana, Louisiana, Michigan, Minnesota, New Mexico, North Dakota, Ohio, Oklahoma, Pennsylvania, South Dakota, Tennessee, Utah, Virginia, and Washington.

¹ The author's personal experiences with instructor-driven student intervention and student retention, although anecdotal, are consistently positive. Accordingly, the author has distributed quarter semester progress grade reports for a number of years.