Early alert system pilot in a microeconomics principles course

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ABSTRACT

Faced with shrinking state funds and pressure to raise graduation rates, California State University, Northridge piloted an early alert system in courses with high failure rates. One section of introductory microeconomics was selected for participation in the campus pilot. The early alert system is intended to flag at-risk students and provide them with support services prior to failure. Its success is reliant on good information flows between faculty, academic advisors, and students; and effective intervention strategies. An examination of the pilot process shows poor information flows and low-key interventions. Faculty collect and prepare data to generate an alert but receive no feedback about resulting interventions for at-risk students. Nearly half of students who receive an early alert could not be reached by an academic advisor. When contacted, advisors typically direct at-risk students to speak with their instructor or seek tutoring. Students rarely meet academic advisors face-to-face and there is no tracking to ensure students act on their recommendations. Descriptive statistics suggest the pilot correctly identified students at risk of failing microeconomics principles. A student satisfaction survey indicates the pilot made students more aware of campus resources; and encouraged them to study and attend class more often. However, regression analysis suggests that participation in the early alert pilot does not improve student performance in microeconomics principles.

Keywords: early alert system, retention, at-risk students

INTRODUCTION

An early alert system is a formal and proactive system that provides "alerts" about problematic student behavior or performance to academic advisors and campus administrators. The system is designed to identify "at-risk" students and offer them timely support to bolster their current academic performance and thereby increase retention and graduation rates (NCEAI, 2010). Early alert systems have been around since 2003 and have recently enjoyed adoption rates of over 90 percent by four-year institutions (Hanover Research, 2014). Widespread adoption of early alert systems has been driven by several factors, including improved information technology, reduced budgets of public institutions, changing demographics of college students, and rising demand for higher education.

The mega-state of California offers a stark example of rising demand for higher education coupled with falling state expenditure and demographic shifts. Since the 1980s, the state's college-age population increased by 57 percent while California's spending on higher education (as a fraction of personal income) fell by 40 percent (Bady and Konczal, 2012 and Douglass, 2011). California's population changed dramatically between 1980 and 2018, from majority white to majority non-white. Currently, two-thirds of students enrolled in the state's public colleges and universities are minorities (Bustillos et al., 2018). These demographic shifts suggest a need for greater state funding of higher education (Garcia and Serrata, 2016). A recent Public Policy Institute of California study predicts the state will fall 1.1 million college graduates short of economic demand by 2030 (Jackson and Johnson, 2018).

The California State University System (CSU) is a massive, broad-access institution with 484,297 enrolled students across 23 campuses in 2017. Nearly half of California's Bachelor's degrees are awarded by the CSU. More than half of CSU students are students of color. One-third of its undergraduates are the first in their families to attend college. And 49 percent of CSU undergraduates are Pell Grant recipients (CSUCO, 2018). The system has responded to reduced state funding by increasing tuition, raising class sizes, and cutting programs. It turned away 31,000 qualified applicants in 2017 and is under pressure to increase graduation rates (to make space for new high school graduates). CSU administrators are currently fighting for greater state funding of its ambitious, Graduation Initiative 2025. This Initiative is expected to cost a total of $450 million. It seeks to double the four-year graduation rate (to 40 percent) by 2025 and eliminate achievement gaps by improving student support services and removing all non-credit, remedial coursework (Asimov, 2018).

This environment spurred CSU Northridge to purchase an early alert system from the vendor, EAB, in spring 2018. Campus administrators hope the system will raise graduation rates by improving information flows between faculty, advisors, and students to bolster the usage and efficacy of academic support services. This paper discusses a pilot of the EAB system in a large, microeconomics principles class in fall 2018. Specifically, it examines student satisfaction with the pilot and whether the pilot improved exam scores.

PILOT DESIGN

The Office of Undergraduate Studies is responsible for oversight of the early alert system. Administrators selected high DWF courses for inclusion in the system pilot rather than selecting specific populations of students (e.g., first-year, athletes, or enrolled in developmental courses). Figure 1 illustrates the process and information flows in the early alert pilot. At weeks

2, 5, and 10 of the semester, participating faculty are asked to submit an electronic form for all students at risk of earning a grade below C-. The form includes possible reasons for poor performance (e.g., frequent absences, lack of participation, and missing or low scores on assignments, quizzes, or exams); along with suggestions of how the student could improve. Academic advisors receive this data and at-risk students receive an "early alert" email generated by the system. Academic advisors then contact at-risk students by phone or email to offer them advice or refer them to campus support services (e.g., tutoring or mentoring). Finally, faculty receive a "case closed" notification from the Office of Undergraduate Studies. Unfortunately, the notification does not state if a student was successfully contacted and what, if any, intervention took place.

Five courses (two in anthropology; one in economics; one in religious studies; and one in chemistry) were selected for the fall 2018 pilot but only two courses participated (one in anthropology and one in economics). Microeconomics principles (ECON 160) was selected because it has the highest failure rates on the entire campus. Between fall 2011 and spring 2016, 34 percent of 6,160 students enrolled in ECON 160 earned a grade of D, W, or F. This is problematic as ECON 160 is a required, lower-division course for all business majors. If an early alert system can lower failure rates, then more business students can complete microeconomics principles and thereby progress toward their degrees.

One section of ECON 160 participated in the early alert system pilot. It had 151 students which represents 19 percent of all students enrolled in microeconomics principles in fall 2018. All course sections cover the same material and are taught in a large-lecture format. The participating section of ECON 160 is a "flipped" hybrid. The class is ½ online and ½ "live." There are no in-class lectures and the class meets face-to-face once per week, for 1.25 hours. Students watch captured lectures online (in canvas) and class time is spent working on real-world problems and applications of the material. Weekly, graded, online quizzes (in Aplia) encourage students to keep up with course content and provide immediate feedback about where they are having difficulty. Baumol and Blinder's (2016) textbook is required and paired with Aplia. The midterm and final exams are held in class.

Campus administrators purposely selected the "flipped" hybrid section of microeconomics principles for inclusion in the pilot because it has the lowest DWF rates among all course formats. Over the past six years, 36 percent of all students enrolled in traditional or fully online sections of ECON 160 earned a grade of D, W, or F versus only 27 percent of all students enrolled in the hybrid section. Regardless, a 27 percent DWF rate is high enough to provide an opportunity to improve student performance with an early alert system.

Students were informed of their participation in the pilot, on the ECON 160 syllabus and during the first day of class. Two academic advisors attended the first class to introduce themselves and describe the early alert system. They were extremely welcoming and emphasized that early alerts are an attempt to reach out and support students with campus services to improve their grades. Both advisors frequently posted announcements (in canvas) to remind students to attend class, speak with the instructor, and seek out tutoring. They also posted guides to improve study habits and succeed in college courses.

Table 1 illustrates the type of data collected and the timing of alerts prior to the ECON 160 midterm. Low scores on the weekly Aplia quizzes provide the students with an "early alert" of their class performance without any formal system. However, quiz scores (alone) are reliant on the student correcting their own behavior and seeking appropriate support services. By contrast, a formal "early alert" is intended to connect course-level warnings to broader support services offered by the university (Karp, 2014). Early alerts can bolster student success if they are acted on by faculty, advisors, and students. Regression techniques are used in this paper to determine whether a formal, early alert system has a significant impact on student success in a microeconomics principles class.

LITERATURE REVIEW

Very few studies have investigated the efficacy of early alert systems. Several studies show early alert systems are able to correctly identify at-risk students but none offer strong evidence that such systems improve graduation and retention rates. Many papers discuss reasons why early alert systems may fail and why faculty become frustrated by their usage. A few studies speculate about student perceptions of early alert systems but none offer results of student satisfaction surveys.

Villano et al. (2018) used survival analysis to examine the relationship between retention and an early alert system after controlling for student and institutional characteristics. They conclude that an early alert system successfully identified students with the highest risk of discontinuing from their studies. However, correctly identifying at-risk students is necessary but not sufficient to raise graduation and retention rates. As stressed by Karp (2014), improvements in technology have allowed institutions to quickly flag and contact at-risk students. However, that technology will only be effective if end users (i.e., students, faculty, and advisors) are able to change behaviors and actions that raise student retention and graduation.

One study by Arnold and Pistilli (2012) estimated that Purdue University's early alert system (called Signals) raised six-year graduation rates by 21.5 percent after students completed two Signals courses. These results were questioned by Caufield (2013) who argued that Purdue administrators are simply counting the number of courses that students complete; and confusing correlation with causation. In other words, Purdue students are taking more Signals courses because they persist, rather than persisting because they are taking more Signals courses.

A related study by Oreopoulos et al. (2018) examined whether educational technology could "nudge" students to study more and thereby raise their grades. Over 9,000 students, across three campuses, were randomly assigned to various online activities, including working through a module about successful study habits; preparing a weekly study plan; and receiving (text message) reminders to study. They found high participation and student engagement but no real change in behavior. The average student spent 15 hours a week studying outside of class regardless of the technology intervention. Oreopoulos et al. conclude that technology alone cannot change student behavior unless students are convinced that the future benefit of good grades outweighs the current cost of studying.

Many papers discuss why learning technology, including early alerts, may fail to improve student outcomes. Taylor (2015) describes how poor information flows and real-time communication between faculty, advisors, students, and service providers can hinder the efficacy of early alert systems. It is critical to correctly identify at-risk students and quickly connect them with appropriate services and interventions to help them before failure. Carmean and Frankfort (2018) discuss the importance of offering an intervention that meets the actual student challenge; one that may not show up in an early alert system. Students may be unable to study because of a temporary crisis and therefore need the university to help connect them with food pantries, housing aid, and child care.

Several papers mention faculty frustration with early alert systems that raise their workload and offer them scant feedback (e.g., McKenzie, 2018 and Johnson, 2018). Faculty are largely responsible for collecting data and placing it into the early alert system. This often means that faculty are taking attendance in large, lecture-hall classes and entering data at multiple points during the semester. However, faculty are not given feedback about the resulting process. Faculty are unaware of whether the student was successfully contacted by or met with an academic advisor; whether the advisor could determine the underlying issue; or if any support services were offered to or received by the student. For faculty to be engaged in the data collection process, they need feedback that their early alert reports matter and are being acted upon.

The study reported in this paper considers whether student learning in a microeconomics principles class is improved by an early alert system. It also describes student perceptions of how the system influenced them. Such research is relevant given the increased adoption of early alert systems on college campuses and growing concern over retention and graduation rates. The Economics Department at CSU Northridge does not have random assignment of students to classes, nor a common final exam across class sections. However, students were unaware of their participation in the early alert system until the first day of class. While selection bias cannot be addressed, this study holds pedagogical factors constant (e.g., instructor, class size, day/time of class, physical classroom, exam questions, and topic coverage) and it accounts for student characteristics that impact success in college courses (e.g., number of developmental courses and SAT scores).

METHODOLOGY

This project samples students from a large, public university in Southern California, California State University, Northridge (CSUN). CSUN has close to 37,000 undergraduates and nearly 7,000 business majors. It is a racially and ethnically diverse campus with less than 25 percent of students who identify as white. This project analyzes course outcomes for students enrolled in a microeconomics principles course (ECON 160) over two semesters, fall 2014 and fall 2018. It also describes student responses to an anonymous survey of their participation in the fall 2018 pilot of CSUN's early alert system.

ECON 160 is a three-unit, semester course that is required for all business majors. It is designed to increase students' understanding of how consumers and firms make decisions and how those decisions are impacted by market structure. The fall 2014 and fall 2018 sections were designed to be identical. Both sections were taught by the same instructor, using the same textbook chapters, and the same exam questions, and timing of the exams. Both sections met at 11:00 a.m. on Tuesdays, in the same, large, lecture-hall classroom that seats 155 students. Unfortunately, the format of the final exam was different between the two sections. The fall 2018 final exam was held online (versus face-to-face in fall 2014) because the campus faced two threats of a mass shooting during finals week (Fry, 2018). Fortunately, the fall 2018 midterm was given one month before the mass shooting in Thousand Oaks and the Woolsey Fire. Given these traumatic events, only midterm exams are comparable across the two sections.

Data describing CSUN's experience with the pilot program are given in Tables 2 through 7. The information in Table 2 comes from the Office of Undergraduate Studies. It describes the type of intervention taken during spring 2018, in one freshman, anthropology course. This data was released in fall 2018, after the course had ended. Student perceptions of the early alert pilot come from an anonymous survey given in ECON 160, at the end of the 2018 fall semester. Survey responses are summarized in Table 3. Student outcomes data is from 306 students who completed ECON 160 with the participating instructor in fall 2014 or fall 2018. Data was collected on student characteristics prior to entering the course, while midterm scores were collected during the semester. An ordinary least squares model is estimated to determine the impact of the early alert pilot. Variable definitions and descriptive statistics are summarized in Tables 4 and 5, with regression analysis reported in Tables 6 and 7.

RESULTS

The Office of Undergraduate Studies has yet to release data for the early alert pilot in ECON 160, in fall 2018. Consequently, data from the spring 2018 pilot in an anthropology course (with 120 enrolled students) is reported in Table 2 to provide an idea of interventions undertaken by CSUN's academic advisors. Alarmingly, almost half of all students who received an early alert could not be reached by an academic advisor, after multiple attempts. This low rate of student response to an early alert is common among universities (Hanover Research, 2014). Perhaps students have already disconnected from the course or the university; or they are avoiding negative feedback from an advisor.

Interventions in Table 2 are vaguely described and unobtrusive. It is unclear if students met with an academic advisor to discuss their circumstances; or if they simply received an email or phone call. When reached, students are often advised to speak with their instructor (15 percent) or referred to campus resources (like tutoring or peer mentoring, 14 percent). However, there is no follow up with participating faculty or students. Faculty are unaware of what happens after they submit an early alert form and students are not tracked by advisors to determine whether they obtained recommended services. Academic advisors appear to act as middlemen; echoing faculty remarks (provided on the early alert form) to students and then directing students to a campus service provider (e.g., tutoring).

Roughly 76 percent of ECON 160 students responded to an anonymous, online, satisfaction survey in week 15 of the 2018 fall semester. Table 3 provides the responses to several statements grouped by all 115 respondents and by 53 respondents who received an early alert. All student responses are displayed in Table 3 because two academic advisors gave a talk on the first day of class and regularly posted advice in online, class announcements. Among those respondents who received an early alert, only six (or 11 percent) indicated they had met with an academic advisor.

Responses suggest that students, particularly those who received an early alert, are made more aware of campus resources. For example, 74 percent of respondents with an early alert "strongly agree" or "agree" with the statement, "the early alert system made me more aware of tutoring resources on campus." The strongest impact of the pilot on student perceptions is in encouraging them to attend class more often or to study more. For example, some 70 percent of all respondents "strongly agree" or "agree" with the statement, "the early alert system encouraged me to attend class more often." And 85 percent of respondents who received an early alert "strongly agree" or "agree" with the statement, "the early alert system encouraged me to study for ECON 160 more often." Further, among those respondents who received an early alert, 74 percent felt they had been given; "good suggestions of how to improve my study skills" or "good suggestions of how to improve my grade in ECON 160."

Nearly 60 percent of respondents who received an early alert "strongly agree" or "agree" with the statement, "the early alert system helped me improve my grade in ECON 160." Unfortunately, the early alert pilot does not appear to raise exam performance. Table 5 presents midterm scores for various student groups in ECON 160.

Early alerts (in fall 2018) correctly target students who are struggling in ECON 160. See columns 5 and 6. On average, students who receive an early alert earn midterm scores that are 7.1 points lower than students who do not receive alerts. Further, students with early alerts have lower CSUN GPAs; take more developmental math courses; and have lower math SAT scores. Receipt of an early alert does not appear to help students who are struggling in ECON 160. See columns 4 and 5. Students who received an early alert in fall 2018 earned similar midterm scores (1.7 points higher) compared with fall 2014 students whose average, Aplia quiz scores were equally low, prior to the midterm. With the exception of total units completed and verbal SAT scores, both groups of struggling students have similar characteristics. Lastly, there is no difference in midterm scores when comparing all students in fall 2018 with all students in fall 2014 (i.e., columns 2 and 3). However, fall 2018 students have slightly higher verbal SAT scores.

An ordinary least squares model is estimated to determine whether students' exam performance improves with participation in the early alert pilot. The model accounts for the student's gender; CSUN GPA; number of college units completed; number of developmental math and English courses; and math and verbal SAT scores. Regressions (1) and (2) in Tables 6 and 7 present the analysis for all students and for struggling students respectively. Specifically, all fall 2014 students are compared with all fall 2018 students in Table 6. Fall 2014 students with low Aplia scores are compared with fall 2018 students who received an early alert in Table 7.

Regression (1) in each table uses the number of developmental math and English courses taken at CSUN, while regression (2) uses math and verbal SAT scores as proxies for student skills. SAT scores may be a better measure of college readiness and developed reasoning than the number of developmental courses. However, both measures are used as the sample size falls by roughly 12 percent when including SAT scores as an explanatory variable. CSUN does not require submission of SAT scores for students who place in the top 10 percent of their high school graduating class, or transfer from local community colleges.

Table 6 indicates that students who participated in the early alert pilot earned nearly identical scores to students that did not. For example, students enrolled in the fall 2018 class earned midterm scores that were 0.9 points lower than students enrolled in the fall 2014 class, after controlling for math and verbal SAT scores. Similarly, Table 7 indicates that students who received an early alert earned similar scores to at-risk students who did not receive an alert. Regression 1 suggests that after controlling for the number of developmental math and English courses, students who received an early alert in fall 2018 earned 1.5 more points on their midterm than did students with comparably low Aplia quiz scores. This tiny difference is not statistically significant.

CONCLUSION

The California State University System adopted a Graduation Initiative 2025 which seeks to raise graduation rates (in part) by improving student support services. An EAB, early alert system was piloted at the Northridge campus in a microeconomics principles course with the highest DWF rates on campus. The participating instructor submitted an electronic form, at three points during the 2018 fall semester, to flag students at risk of earning a grade below C-. The form provided reasons for poor performance along with advice of how the student could raise his grade. At-risk students received an alert email generated by the EAB system. Academic advisors contacted at-risk students by phone or email to reiterate the instructor's advice and refer them to tutoring. Face-to-face meetings between advisors and students were rare and there was no tracking to determine whether the student received tutoring. The early alert process ended with a "case closed" email to the instructor that contained no information about the at-risk student.

Student satisfaction survey responses suggest the early alert pilot made students more aware of campus services and encouraged them to study more. Among respondents who received an early alert, 68 percent became more aware of academic advising and 74 percent became more aware of tutoring resources. Over 83 percent were encouraged to attend class and study more often. Some 74 percent thought they were given good suggestions to improve their study skills and their course grade. Further, 57 percent believed the early alert helped to improve their grade in microeconomics principles. Unfortunately, regression analysis suggests that participation in the early alert pilot did not improve student performance in microeconomics principles. Students with an early alert in fall 2018 earn similar exam scores to otherwise comparable at-risk students in fall 2014.

These results are not surprising. As currently implemented, the early alert system suffers from poor communication among end users and inadequate interventions for students. An ideal system quickly identifies at-risk students and offers an appropriate intervention to help them remediate their situation prior to failing a course. Yet, the best interventions are predicated on understanding an at-risk student's individual circumstances and challenges. Instructors can indicate that a student is missing class or performing poorly on quizzes but this does not reveal the underlying reasons for academic difficulties. A face-to-face meeting with an advisor could help uncover underlying challenges and thereby connect the student to appropriate services. Under the current system, almost all students are directed toward tutoring services. However, tutoring is inappropriate for a student who is in the midst of a financial crisis. Tutoring is also inadequate for a student who struggles with college-level math or reading.

Nearly one quarter of all students take two developmental English classes prior to their enrollment into the microeconomics course. This indicates a severe skills deficit upon admission to the University and a challenge to comprehend the required Baumol and Blinder (2016) textbook. These students need more guidance and support in the classroom. However, all sections of microeconomics principles contain 150 students. This makes it impossible for a single faculty member to connect with, monitor, or help individual students. In fact, numerous studies (e.g., Allgood et al., 2015) conclude that larger class size has a significant negative impact on students taking economics principles.

Microeconomics principles has the highest failure rates on the Northridge campus and administrators were right to target it for the early alert pilot. The University must now work to improve its early alert process. However, the early alert system can only be one component of CSUN's graduation and retention strategy. High DWF courses demand more resources including, smaller class sizes; tutoring; peer mentors; computer-assisted instruction; supplemental instruction; intensive advising; and co-requisite, college-level courses (e.g., Barshay, 2018; McCann, 2017; and Rutschow and Schneider, 2011).

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APPENDIX

Figure 1. Early Alert Pilot Process and Information Flows

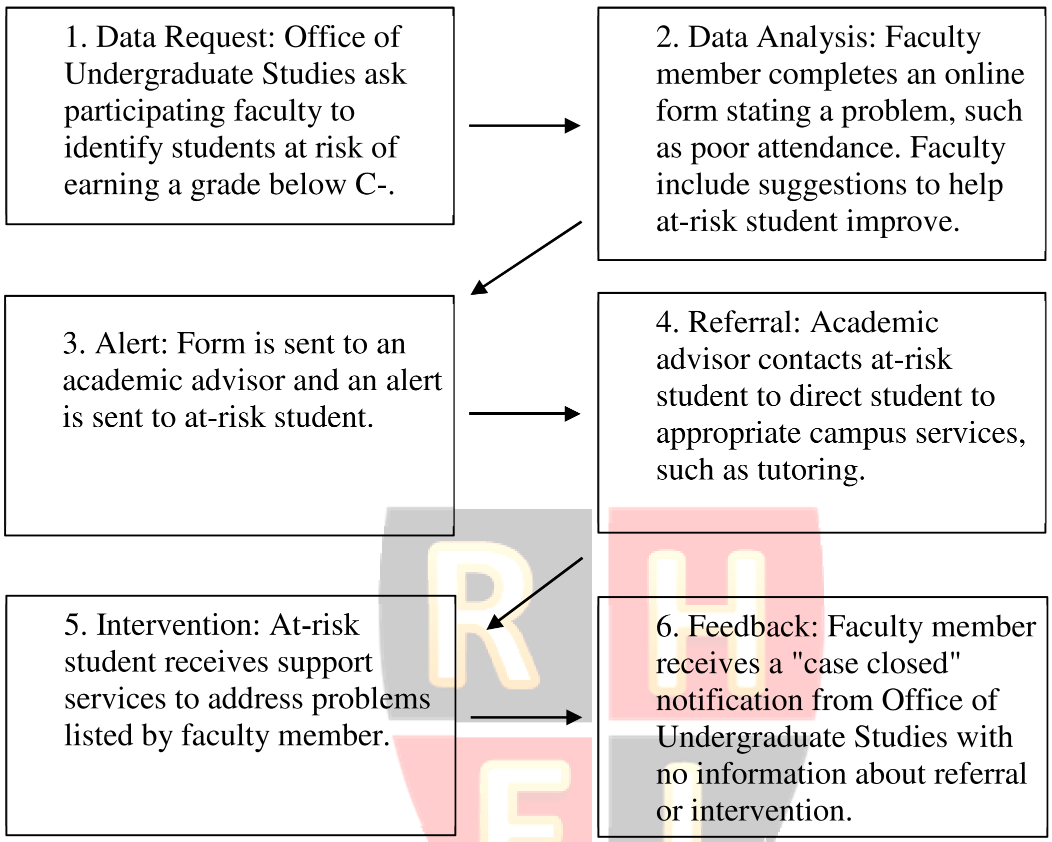

Table 1. Timeline in ECON 160 Prior to Midterm

Week	Data collected and alert timing
1	Attendance and Quiz 1: How to use Aplia
2	Attendance and Quiz 2: Scarcity and choice
ALERT	
3	Quiz #3: Supply and demand
4	Quiz #4: Consumer choice
5	Quiz #5: Price elasticity of demand
ALERT	
6	Quiz #6: Production and cost
7	Quiz #7: Output, price, and profit
8	Midterm exam

Table 2. Process Outcomes in Spring 2018 Early Alert Pilot	
Type of referral or intervention*	Percent
Student could not be reached after multiple attempts	45
Advisor connected with student and issue is resolved	18
Student advised to speak with his or her instructor	15
Student referred to campus resources	14
Student is receiving ongoing support	6
Student was reached but issue could not be resolved	2
*CSUN Office of Undergraduate Studies data for 42 students who received an early alert in a freshman anthropology class with 120 students.	

Table 3. Student Perceptions of Early Alert Pilot in ECON 160 by Respondent Type				
Respondent type	Enrolled in pilot class		Received an early alert	
Statement about early alert pilot	Agree*	Disagree	Agree	Disagree
More aware of academic advising	51	17	68	11
More aware of tutoring resources	56	17	74	13
More aware of special programs	41	23	47	15
Encouraged me to meet with instructor	41	16	60	8
Encouraged me to meet with advisor	39	18	53	10
Encouraged me to get tutoring	54	16	76	9
Encouraged me to attend class more	70	13	83	6
Encouraged me to study more	65	8	85	4
Given timely feedback about my grade	44	18	70	6
Given suggestions to improve study skills	53	19	74	8
Given suggestions to improve my grade	53	16	74	6
Helped to improve my ECON 160 grade	41	20	57	13
Sample size	115		53	
*All statistics are percentages. Likert scale is collapsed from five to two categories above by omitting "neither agree nor disagree" and combining "strongly agree" and "agree" into one category; and "disagree" and "strongly disagree" into one category.				

Table 4. Variable Definitions	
Variable	Definition
Midterm	Score (out of 100) on ECON 160 midterm exam
Female	Student is a female
CSUNGPA	Student's CSUN grade point average prior to enrollment in ECON 160
Total units	Number of college units completed prior to enrollment in ECON 160
DEVMATH	Number of developmental math courses
DEVENG	Number of developmental English courses
SATMATH	Student's math SAT score
SATVERB	Student's verbal SAT score
Pilot	Student participated in fall 2018 pilot of early alert system
Alert	Student received an early alert in weeks 2 or 5 of pilot
Control	Student in fall 2014 class and did not participate in fall 2018 pilot

Table 5. Exam Scores and Measures of College Preparation and Success, by Student Group

1. Variable	2. Control	3. Pilot	4. Control, at risk	5. Alert	6. In Pilot, No alert
Midterm	54.4 (15.2)	54.5 (16.2)	48.6 (12.7)	50.3 (14.9)	57.4* (16.5)
Female	51%	54%	54%	57%	52%
CSUNGPA	2.95 (0.5)	2.91 (0.6)	2.66 (0.4)	2.64 (0.6)	3.09* (0.6)
Total units	50.9 (15.8)	54.1 (19.8)	48.6* (17.2)	57.9 (16.7)	51.4* (14.9)
DEVMATH	0.28 (0.59)	0.34 (0.58)	0.35 (0.64)	0.49 (0.69)	0.23* (0.45)
DEVENG	0.59 (0.87)	0.43 (0.76)	0.62 (0.88)	0.53 (0.79)	0.35 (0.73)
SATMATH	503.6 (72.6)	502.5 (80.9)	486.6 (73.3)	475.9 (78.7)	521.6* (77.6)
SATVERB	473.1 (73.4)	502.4* (75.9)	457.9* (63.5)	492.6 (83.5)	509.5 (69.8)
Sample size	155	151	68	63	88

Except for female, statistics are means with standard deviation in parentheses. *Indicates p value is less than 0.05. Differences in means are considered for all variables between the following groups: control vs. pilot; control, at risk vs. alert; alert vs. in pilot, no alert.

Table 6. Least Squares Analysis of Participation in Early Alert Pilot				
	Dependent variable = Midterm exam score			
Variable	Coefficient	Std. Error	Coefficient	Std. Error
Constant	12.3*	4.4	-19.8*	6.3
Female	-5.5*	1.4	-4.4*	1.5
CSUNGPA	14.9*	1.3	15.1*	1.4
Total units	0.08	0.04	0.01	0.05
DEVMATH	-3.0*	1.3	Regression (2)	
DEVENG	-3.7*	0.9		
SATMATH	Regression (1)		0.03*	0.01
SATVERB			0.04*	0.01
Pilot	0.1	1.4	-0.9	1.5
Sample size	297		259	
F-statistic	38.3*		36.9*	
Adjusted R-square	0.44		0.47	
*Indicates p value is less than 0.05.				

Table 7. Least Squares Analysis of Receiving an Early Alert				
	Dependent variable = Midterm exam score			
Variable	Coefficient	Std. Error	Coefficient	Std. Error
Constant	19.8*	6.4	-23.4*	8.5
Female	-5.4*	2.0	-4.3*	1.9
CSUNGPA	11.3*	2.1	11.1*	1.9
Total units	0.09	0.06	-0.02	0.06
DEVMATH	-1.9	1.7	Regression (2)	
DEVENG	-4.1*	1.3		
SATMATH	Regression (1)		0.03*	0.15
SATVERB			0.07*	0.16
Alert	1.5	2.1	0.34	2.05
Sample size	125		110	
F-statistic	11.4*		16.4*	
Adjusted R-square	0.37		0.49	
*Indicates p value is less than 0.05.				