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Learning Analytics and Gateway Courses: Keys to Student Success

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Summary

Franklin University is midway through a five-year federal grant to increase undergraduate retention and graduation by implementing a learning analytics tool and revising gateway courses, among other activities. Initial analysis of grade trends in gateway courses for more than 8,000 undergraduates during a five-year period showed an increase in withdrawal and failure rates by an average of 4 percent and resulted in context and focus for a smaller study. Student outcomes were then assessed in 11 gateway courses over three terms, and results suggest that course redesign alone is insufficient to result in major gains in student success. Instructors were shown to increase the probability of passing a gateway course by up to 37% or decrease the probability of passing a gateway course by up to 57%. Follow-up focus group interviews with instructors yielded themes around engaging and motivating learners, engaging the affective domain, and improving minority self-efficacy. Therefore, a holistic approach that accounts for course delivery, faculty readiness, and student readiness may play a larger role in ensuring student retention and graduation than gateway course revisions.

Study Background

Participants in the first phase of this analysis included 8,618 undergraduate students enrolled in 11 gateway courses between 2015 and 2019. Gateway courses are foundational to a program of study and typically have high enrollment and high failure and withdraw rates (Koch, 2017). Nationally, the impact of failing a gateway course is problematic for a student's GPA, motivation, and academic progress (Koch & Pistilli, 2012). The gateway courses under study are in the fields of English, mathematics, accounting, business administration, finance, and management.

Learning analytics is increasingly prevalent in higher education as the sheer volume of data has increased (Lester et al., 2017). Through statistical analysis and prediction, learning analytics can lead to improved pedagogy, course design, and student outcomes (Zilvinskis et al., 2017; Society of Learning Analytics Research, 2012). Using learning analytics to gain insight into gateway courses can identify areas of improvement that will spur successful degree completion (Pistilli & Heileman, 2017). To provide context and focus for this inquiry, grade trends in gateway courses were analyzed for a five-year period from 2015 through 2019. An analysis of 12,277 records in 11 gateway courses showed that withdrawals and failing grades increased by 4 percent during the five-year period. The rate of withdrawals in math courses increased by 6 percentage points, which represents the largest increase of all the gateway courses under study.

Because gateway courses are typically completed during a student's first year and because outcomes affect academic progress, a predictive analysis was completed for first-year undergraduate students. Results indicated that predicted retention for current first-year students was 67%, 9 percentage points lower than for the student body as a whole.

This initial work led to an exploration of the factors involved in student success as defined by a passing grade. Multiple factors, including age, race, major, Pell grant recipient, GPA, instructor, course, number of weeks in course, and more, were refined through logistic regression analyses, which resulted in the following research question, How does the probability of passing a gateway course change for every additional point in GPA, individual instructor, and individual course? This phase of the study included 2,668 undergraduate students who completed 11 gateway courses between summer 2018 and spring 2019.

Findings

Initial analysis determined that demographic factors had no influence on the probability of passing the course. For the final analysis, the independent variables were GPA, instructor name, course code. The dependent variable was course pass/fail. The model's baseline odds of passing gateway courses equaled 31.68 percent. Taking no other variable into account, a student who enrolled in a gateway course had about a 31 percent chance of passing it. Adding GPA to the baseline and controlling for all other factors (instructor and course) increased the probability of passing the course by 22.6 percent per one-point increase in the GPA. Continuing to build on the model and controlling for other variables, individual instructors can increase the probability of passing a gateway course by up to 37% or decrease the probability of passing a gateway course by up to 57%. Finally, adding the course itself to the equation did not contribute significantly to the probability of passing a gateway course.

The importance of GPA and initial knowledge as predictors of academic success are prevalent in the literature (Foster, 2010; Hepworth et al., 2018) and were not surprising. In addition, the effect of instructors on learning is well documented (Bye et al., 2007; Farr-Wharton et al., 2017; Martin et al., 2014). What was unanticipated was the extent and variation of the influence instructors had on academic success in gateway courses. This led to follow-up focus groups to identify good pedagogical practices to inform faculty development.

Qualitative Study Background

Although it is a common practice for institutions of higher education to collect information on instructors' credentials and experience, there have been limited insights into teacher cognition; that is, what they think, know, and believe (Borg, 2003), all of which have important impacts on their pedagogical approaches and instructional practices. This phase of the study, therefore, addressed the following research questions: What do instructors of gateway courses think, know, believe, and do to engage and motivate learners? What do instructors think about engaging learners' affective domains; i.e., learner attitudes, values, beliefs, and opinions? What do instructors think about improving self-efficacy of underrepresented minority (URM) learners?

Participants in this phase included three math faculty and two English faculty whose teaching experience ranged from 19 to 31 years. They were white women in middle age.

Qualitative Findings

Three themes emerged from a thematic analysis of the transcripts: engaging and motivating learners, engaging the affective domain, and improving minority self-efficacy. Instructors acknowledged that their learners were busy working adults with career goals. To engage them, they communicated their expectations and created connections with and among students. They humanized their instructional practices by way of authentic topics and constructive feedback. To engage the affective domain, they observed their students' needs, feelings, and actions and interacted with them through the course activities, feedback, and appropriate use of humor. They were sensitive to their students' needs, thoughtful, reflective, and attentive. Regarding minority self-efficacy, instructors were aware of ESL student needs but were generally unaware of underrepresented minorities in online sections of their courses. Therefore, their teaching approach was geared toward individual students rather than underrepresented groups. These results revealed a gap in the instructors' perception of the needs of underrepresented minorities.

Conclusions

Keys to student success involve going beyond gateway course redesigns to reflect a holistic approach that accounts for course delivery, faculty readiness, and student readiness. Readiness—being willing and able to teach or learn (Grow, 1991)—may play a larger role in ensuring student retention and graduation than gateway course revisions alone. Yang (2004) advocates a theory of learning that involves cognitive, behavioral, and affective facets. Being ready to teach acknowledges that the instructor is skilled in all three of those facets to promote student learning. Research is under way to gain faculty perceptions of the extent to which they feel ready to support student success and their perceptions of their students' readiness to learn. In addition, the study will gain student perceptions of the extent to which they feel ready to learn and of their instructors' readiness to teach gateway courses. Results will inform a holistic approach to learning and support, an intentional design that maximizes resources around the student and integrates institutional support buttressed by faculty who are specially prepared to teach gateway courses.

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About the Presenter

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