The Impact of Frequent Interaction on Repeater Students

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Abstract: Data show that half of all students who have dropped/failed Survey of Calculus or Finite Mathematics at the University of Arkansas will drop/fail again. These students face a lack of motivation and a fair amount of anxiety toward mathematics. To make connections and create an environment in which they are comfortable discussing any issues with the professor, repeater students were asked to meet with the professor to complete a personalized academic improvement plan. This plan establishes the need for regular contact with the instructor and should increase the student's level of comfort with the instructor. Utilizing the "Academic Improvement Plan" serves as a catalyst for students to meet face to face with their professor and provides a roadmap for continuing that contact on a consistent and regular basis, regardless of the course. We believe that frequent and regular faculty/student interactions will result in increased academic success for this group of at-risk students while allowing these students to develop a deeper understanding of course materials, improve mathematical self-efficacy, and cultivate skills applicable to other courses/situations.

Keywords: *Mathematics*, Retention, Immediacy.

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Introduction

Much research has been done regarding the relationship between instructors and students and the influence that this relationship has on student learning. While content knowledge and presentation are important to college teaching, the connection between students and the professor is equally important. In fact, in a 1997 study, researchers found that there were two main components of effective instruction: the instructional role and the personal role. The instructional role, of course, refers to the ability to clearly present content while the personal role is concerned with the interactions between professor and student (Abrami, d'Apollina, & Rosenfield, 1997). This is in line with the two-dimensional model of effective teaching as described by Lowman with the first dimension being "intellectual excitement" and the second being "interpersonal rapport" (Lowman, 1984). Establishing a positive relationship between instructors and students has been connected to an increase in class participation and enjoyment of course material by the students (Benson, Cohen, & Buskist, 2005). It has been

shown that perceived rapport between faculty and students has been a consistent predictor participation and learning (Frisby, 2010). It has also been indicated that value placed on personal faculty-student interactions by instructors is a more prevalent indicator of instructor accessibility than simply being present during regularly scheduled office hours (Wilson, Wood, & Gaff, 1974) . Based on our own review of the existing literature and finding strong results indicating that the faculty-student relationship is the most predictive of student retention and success, we decided to focus on a very specific, and at-risk, demographic of students in our courses.

At an SEC research institution with 30,000+ student enrollment, we teach two courses which have been considered "historically difficult". From Fall 2016 through Spring 2018, our Finite Mathematics course had an average enrollment of 1148 students per semester and a DFW rate of 28%. Our Survey of Calculus course had an average enrollment of 478 students and a DFW rate of 31%. Among students who were enrolled in the same course for at least the second time, population average per semester of 132 and 73, these rates increased to 52% and 49% respectively. These repeating students, who were taking these courses for at least the second time, were much more likely to drop or fail the course again.

While we know that students can withdraw from classes for a variety of reasons, this population of students was easy to identify and target for outreach at the very beginning of each semester. We also noted that, based on our own personal experience, students who were failing seemed to be less likely to reach out with questions or to talk with us before making the decision to withdraw. Based on findings which indicate that student-faculty rapport formed early in the semester predicts academic success (Lammers 2017), we hypothesized that a focused and proactive attempt to establish positive relationships with these specific students early in the semester would be of great advantage to them and to us.

The Academic Improvement Plan

To make connections with these repeater students (students enrolled in a course for at least the second time), and to help create an environment in which they would be comfortable discussing any issues with us, this population of students were asked to meet with us to complete a personalized Academic Improvement Plan (AIP). This plan established the need for regular contact and was intended to increase the student's level of comfort in reaching out for help or discussing any issues that may arise during the semester.

Over the course of three semesters (Fall 2018, Spring 2019, and Fall 2019), repeater students from 7 sections of MATH 2043 Survey of Calculus and 6 sections of MATH 2053 Finite Mathematics at the University of Arkansas were randomly selected to participate in this study. All selected sections of MATH 2043 were taught by the same instructor as were all sections of MATH 2053. In total, there were 101 repeater students with 50 in the AIP group and 51 in the control group.

Repeater students were identified during the second week of classes each semester. Students in the AIP group

were asked via email to meet with the instructor to discuss strategies for being successful in the course. To avoid any stigma associated with repeating a course, students were never called out or identified in class. Students who did not respond to the initial email were send a second email the following week. Students who did not respond by the end of week 3 were sent an email every day until a meeting was scheduled.

In the initial meeting, students were asked to complete a customizable academic improvement plan. It was made clear to students that this participation was optional. However, in this initial meeting, no student declined to complete the plan.

The AIP itself consisted of two sections. In the first section, students were asked to give any possible reasons for poor academic performance in the course in the most recent previous attempt. A list of common responses was provided, but students could list, and discuss with us, any other contributing factors they thought were significant. This list could be edited as needed each semester to include common themes or to reflect the needs of different courses. Having students self-reflect and thoughtfully consider their past experience in the course gave us an individualized framework for more personalized discussion. These initial AIP discussions were always conducted as face-to-face conversations and, in general, made it much easier for us to establish plans of good practice for students and sometimes to help connect them with helpful campus resources they were often unaware of.

The second section of the AIP listed several strategies for improving academic performance. Here, again, these options could be edited based on the course and could be individualized for each individual student. Students were asked to choose three of the available options we offered and complete any blanks according to their schedule or needs. For example, a student could offer to spend a certain number of minutes each week working in our (free) tutoring lab or spend a certain number of minutes each day working on homework/coursework.

Some students indicated that they would meet with us at least once before each exam, while some felt it would be more advantageous to meet with us after each exam to review it. After the initial meeting, students were contacted by the instructor at least once each week to follow up on course performance. While it did seem that these students were more likely to attend office hours by choice and to talk with us before/after class meetings, no additional face-to-face meetings were required.

Results

At the end of three semesters of using this plan with a randomly selected group of repeater students, we saw a great improvement in the DFW rate among these students. For Finite Mathematics, the DFW rate for repeater students who completed the AIP was 27% versus 76% for those who did not complete the plan. For repeater students in Survey of Calculus, the AIP DFW rate was 13% versus 60% for the non-AIP group.

Finite		AIP treatment		Non-AIP control	
		Total	DFW	Total	DFW
Fall 2019					
	n	8	1	11	11
	%		13%		100%
Spring 2019					
	n	9	3	18	10
	%		33%		56%
Fall 2018					
	n	9	3	7	5
	%		33%		71%
Total					
	n	26	7	36	27
	%		27%		76%

Survey of Calculus		AIP treatment		Non-AIP control	
		Total	DFW	Total	DFW
Fall 2019					
	n	7	2	7	5
	%		29%		71%
Spring 2019					
	n	11	1	0	n/a
	%		9%		n/a
Fall 2018					
	n	6	2	8	4
	%		33%		50%
Total					
	n	24	5	15	9
	%		13%		60%

Discussion

Admittedly, many students did not follow through with the selections made on this section of the plan.

However, we believe that it was the personal contact initiated by the plan that made the difference and not the individual selections. Establishing a relationship with these students early in the semester, we feel, made us more approachable throughout the semester and increased their feelings of "connectedness". This resulted in better-than-expected attendance, retention, and success rates for these students. A phrase we have heard many times before goes something like: "I don't need to come to this class, I took it last semester, so I've heard all of this already". While the fallacy of this is likely obvious to most faculty, we've found this to be a common belief within this population of repeater students. The AIP provides an early-in-the-semester opportunity to dissuade this reasoning.

Utilizing the AIP in our classes provided an individualized framework and served as a catalyst for students to meet with us to have a real conversation about their previous experiences in our courses. This initial conversation opened the door for students to continue that contact on a consistent and regular basis, regardless of the course. The results of these frequent and regular interactions resulted in significantly increased academic success for this group of at-risk students regardless of the individual strategies selected on the plan. Even though these students often did not completely follow through with "plan" as discussed in that initial meeting, we believe, and have results that strongly indicate, that establishing an early connection with these students made an impactful difference.

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