Increasing Student Success through a Cocktail of Cognitive Interventions

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Abstract: We extended a series of interventions developed in modern cognitive psychology to a group of students who had been academically dismissed and were at high risk to not complete college. Students learned how to respond adaptively to academic failure, how to embrace challenge, how to set realistic goals, and how to persist until their goals are achieved. The interventions were delivered within a sophomore seminar course. Within the class, students learned about, considered and practiced aspects of growth mindset, goal orientation, grit, stereotype threat, and belongingness. Before beginning the class, the 68 students had a mean cumulative GPA of 1.45, a course completion rate of 60%, and it was expected that over half would drop out of college within the next year. Following the intervention, students earned a mean semester GPA of 2.39, a course completion rate of 73%, 72% were retained for the next semester, and 58% were still enrolled one year later. These findings provide support for the benefits of these techniques used together to afford student success in a population of students that have previously struggled academically.

Keywords: Re-imagining the First Year (RFY), sophomore seminar, at-risk, persistence, retention, cognitive interventions

A vitally important question facing higher education has been how to promote successful learning in students who may not have particularly good preparation for college. In recent years, a series of effective evidence-based pedagogical techniques, methods, and strategies have been developed and published (Hatch, 2005). The ultimate goal of this endeavor is the improvement of learning, motivation, and student success. Following good research methodology, the techniques have largely been examined in isolation. Also, they have typically been studied as an examination of theories and techniques. An alternative approach could include attempting to extend techniques in an explicit effort to alter student success. This serves as the starting point of this project, which was inspired by our participation in the American Association of State Colleges and Universities (AASCU) Re-imagining the First Year (RFY) initiative. RFY is grounded in the belief that Colleges and Universities can do a better job of meeting the needs of our students and of responding to the current societal and academic mandates (McBride & Kanekar, 2015). RFY suggests that many models exist that point to better ways of reaching the needs of our students. Therefore, we deployed a set of pedagogical techniques developed in modern cognitive psychology. These techniques have each been individually demonstrated to improve measures of student learning with the goal of improving learning and student success in a population of continuing students who have not enjoyed academic success and

who have been academically dismissed. We embedded interventions based on growth mindset, goal orientation theory, grit, stereotype threat, and belongingness into a sophomore seminar-style student success course.

The course met twice per week for one semester. The instructor presented information about the various interventions and led classroom discussions concerning the content of the interventions and the students' experiences with them. They provided learning models of how to use these concepts appropriately and how to identify thoughts and actions that violate the concepts. They also discussed how to practically apply the concepts to the students own lives. Writing was an important component of every class meeting. Students had daily writing activities that reinforced the content of the interventions, helped them develop appropriate models of adaptive thoughts, attitudes, and behaviors, and practice the techniques introduced.

The Techniques Used

The class embedded a series of exercises to develop a sense of belongingness. A sense of belongingness refers to whether the students feel welcomed in their specific contexts. In colleges, belongingness has been shown to be related to engagement, persistence, grades, and academic motivation (Hurtado & Carter, 1997; Strayhorn, 2012; Walton & Cohen, 2007). Students who have experienced lower levels of success often are troubled by thoughts that they are the only ones who are failing and doubt their ability in this situation and wonder if they should be in college. Within the intervention class, students learned about belongingness and considered their own belongingness thoughts. The students interviewed and wrote about friends of theirs who exemplified the ends of the belongingness spectrum. They also developed a person library. This was a list of people who have interesting and illustrative life experiences and stories that illustrate principles from the class. The library can be accessed by future students who can check out and learn from the individuals archived in the library. Most importantly, they worked towards developing evidence that they are competent, valued, accepted and that they matter.

The students also worked on developing a growth-mindset approach. Growth-mindset is concerned with beliefs about intelligence (Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013, Dweck, 2006). It suggests that students may pursue fixed- and growth-mindsets. Students who pursue a fixed-mindset believe that intelligence is innate and unmalleable. They believe that talent, or intelligence alone, is responsible for success. Students who pursue a growth-mindset believe that dedication and practice can lead to improvements in intelligence. Students who pursue a growth-mindset learn more, faster, more thoroughly, will embrace challenge and exhibit more perseverance (Dweck, 2006). Within the intervention class, students learned about fixed- and growth-mindset, considered their own mindset thoughts, and wrote about models of students who adopt growth-mindset and students who pursue fixed-mindset thoughts. Most importantly, they worked towards developing the belief that intelligence is malleable and that practice and hard work are instrumental in becoming more intelligent.

Students also learned about goal orientation theory. This intervention is similar to growth mindset. The theories underpinning goal orientation and growth mindset are variations of the same theory. The growth mindset interventions were inspired by Carol Dweck's 2006 book and the goal orientation intervention was inspired by Dweck and Leggett's 1988 journal article. Goal Orientation theory posits that students may pursue either of two goals, mastery goals and performance goals. Students who pursue mastery goals seek to develop competence and learn information. Students who pursue performance goals want to obtain evidence of competence. One feature of goal orientation theory is the meaning of feedback. For students pursuing learning goals, feedback provides information about their progress towards mastery. For students pursuing performance goals, feedback

is a judgement of their competence (Elliott, A.J., 1999; Hoyert, O'Dell, & Hendrickson,, 2012). In the intervention, students learned about mastery and performance goals, considered their own goals, and wrote about models of students who pursue learning and performance goals. Most importantly, they worked towards developing the pursuit of learning goals, and worked on learning about how to respond adaptively to negative feedback.

Throughout the course, students were asked to consider their futures as college graduates. They completed a series of [Indiana University EDGE](#) modules in which students set goals over both the near term and the long-term. They focus on developing career awareness in students, and help them explore values, strengths, and interests in relation to degrees and careers. Using EDGE Modules, students learned about Grit. Grit is associated with perseverance and passion that can help individuals work diligently towards a goal even if confronted with obstacles, set-backs, and distractions (Duckworth, Peterson, Matthews, & Kelly, 2007). In the intervention, students were asked to envision and practice alternative techniques that could help overcome challenges such as developing study and support groups, how to build optimism, and how to find purpose.

The final intervention explored Stereotype threat which is a situational predicament in which people may experience decreased performance as the result of conforming to stereotypes about their social group (Aronson, Fried, & Good, 2002; Cohen & Garcia, 2008; Johns, Schmader, & Martens, 2005; Koch, Muller, & Sieverding, 2008). Stereotype threat can cause individuals to attribute failures to their own ability. The intervention asked students to be aware of sources of stress and helped them develop techniques to re-evaluate stress. Further, students were provided with the message that diversity is valuable. The theory suggests that allowing individuals to feel as though they are welcomed into a desirable group makes them more likely to ignore stereotypes and be less susceptible to stereotype threat. As a result, the students in the intervention class worked to develop a realization that they were beginning their careers in the General Studies Program, a classic liberal arts program that follows the curriculum of prestigious programs similar to what the great presidents and intellectuals of the past have enjoyed.

These multiple interventions across the course of the semester should support each other and provide concrete ways for students to re-envision their college career in self-affirming and academically useful ways.

The Students Involved (Academic Success before the Class)

The basic opportunity explored in this study is how to help students who have not enjoyed high levels of academic success. The students in this study had been academically dismissed as a result of poor academic success and were assigned to General Studies as a recovery program. In many respects, these students were like the overall student body as shown in Table 1. The university is a comprehensive regional state university with a diverse student body and offers Associate, Baccalaureate and Master's degrees in a variety of undergraduate and graduate programs. Over the past 5 years, the 6-year graduation rate has ranged from 24 to 27% and first to second year retention rate ranges from 64 to 67 percent. The students in this study had a mean cumulative GPA (on a 4-point scale where 4 is an A) of 1.45. The average number of credits attempted per semester was 10.5. The completion rate for those credits was 59.6%. The mean number of semesters completed before entering the General Studies program was 5.7. The one semester retention rate for General Studies' students with a 1.45 GPA is 66% and the one-year retention rate is 53%.

Table 1. Student Demographics		
	Students in Sophomore Student Success Course	General Student Population
N	68	3800
% underrepresented minority	65%	46%
% female	75%	70%
% full-time	72%	67%
Combined SAT mean	901	910

Academic Success after the Course

Not all students were able to take advantage of the variety of interventions; 18.5% of the enrolled students failed to attend, failed to engage with the activities, and failed the class. Overall, the DFW rate for the intervention course was 33.3%. However, most of the class attended and participated. They seemed to be especially receptive to the concepts of growth mindset and tried to compare other interventions to growth mindset. Overall, the mean grade earned in the class was 2.58. Students earned slightly higher grades in the intervention course than in the rest of their courses (M=2.58 vs M=2.37, post-hoc t(53)=-2,34, p=.023).

Most importantly, students in the intervention class earned higher grades in all their classes during the semester in which they enrolled in the class than they had during previous semesters, F(3,60)=7.54, p<.001. These results are displayed in Table 2. The improvement continued in the semester after the intervention and persisted further to the semester one year after the intervention. Completion Rates (the number of credits with a passing grade/the number of enrolled credits) as well as the number of credits completed were significantly higher after the intervention (F(3,60)=10.66, p<.001; F(3,60)=23.93, p<.001) and remained higher one semester and one year after the intervention. Students also enrolled in more credits during and after the intervention, rising from 10.6 credits to 13.1 credits, which should facilitate individual student completion goals (F(3,60)=8.85, p<.001).

Table 2: Academic Success Before and After the Intervention					
	Before the Class	Semester of the Class	One Semester after the Class	One Year after the Class	Significance
GPA	1.45	2.39	2.20	2.38	p<.001
Completion Rate	60%	73%	74%	80%	p<.001
# of Credits Completed	6.4	11.3	10.8	9.8	p<.001
Retention Rate	53%	Na	73%	58%	p=.084

Finally, retention rates were examined. A baseline retention rate was estimated by drawing a semi-random sample, matched for GPA of General Studies students enrolled in the Fall 2014 semester and following their enrollment during the next semester and the next year; 66% of the students in the sample returned during the next semester and 53% returned one-year later. For the students who

enrolled in the intervention course, 73% returned one semester later and 58% returned one year later. The differences are in the predicted direction, but are not significant ($X^2=4.948$, p=.08).

Discussion

One of the primary objectives of the study was to determine if modern cognitive pedagogical techniques could be effective in helping students who are extremely at risk for not completing a degree get back on track academically. For two-thirds of the students who attended the class, multiple measures of student success improved significantly over the duration of the semester in which they enrolled as well as each of the next two semesters. In fact, students earned more As and Bs during the intervention semester than they had cumulatively during the semesters leading up to academic dismissal. In informal conversations with the students, they frequently mentioned recognizing the need to overcome obstacles, expressed a confidence in meeting these challenges, endorsed a desire to finish their degrees, and reported a belief in self-improvement and growth achieved through concentrated study. Further, it appeared that they were on the path towards graduation.

Another way to evaluate change in possible outcomes in these students is to estimate their probability to be retained or to graduate. In general, students who earn high grades are more likely to return and to graduate than students with low grades (Gifford, Briceno-Perriott, & Mianzo2006; Pascarella & Terenzini, 2005; Stewart, Lim, & Kim, 2015). That relationship is often very robust and serves as the starting point for studies seeking the underlying conditions that drive grades and then retention and graduation. For instance, 61 (89%) of the students who registered for the intervention class had GPAs less than 2.0. Based on historical data from our school, only 35% of students with GPAs that low return for the next year and less than 10% of those students graduate. At the end of the intervention semester, 22 (32%) students had earned a semester GPA between 2.0 and 3.0. Historically, the probability of returning for students with this GPA is 70% and the chance of graduating is 40%; 19 (28%) students had earned a GPA between 3.0 and 4.0. Students with GPA's that high return for the next year 90% of the time and have a 70% chance of graduating.

The intervention was primarily concerned with helping students develop more adaptive patterns of thoughts, beliefs, and actions. The interventions did not include any components addressing content within any of their other classes. Those other classes used the pedagogies their teachers considered to be most appropriate. No effort was made to arrange for academic assistance, tutoring, supplemental instruction, or to change advising. Despite this, grades in the students' other classes were significantly higher by the end of the intervention semester.

The study effects relied upon the combined influence of five different interventions. The study did not use a design that would enable an internal comparison between the various interventions employed. Each of the interventions has previously been demonstrated to provide robust improvements in measures of student success. It would be interesting to learn if it was a combined, sole, or underlying effect. Future directions could include considering the distinctions between the interventions to improve the content and outcomes for this course as well as provide support for other student success courses on campus. We could also consider expanding the interventions to try to reach the third of the students who were not responsive to the current set of interventions. We will continue to offer this sophomore seminar for General Studies students as we believe it has proven very successful in assisting struggling students to find a successful path forward towards completion.

Journal of the Scholarship of Teaching and Learning, Vol. 19, No. 1, February 2019.
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