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The Impact of a Metacognitive Intervention on Student Experiences and Success in an Academic Probation Program for First-Year Students

ABSTRACT

First-year students often struggle with self-regulated learning, particularly in monitoring and accurately assessing their level of understanding and translating that into appropriate preparation for rigorous post-secondary coursework. When their academic struggles become extreme, they can be placed in probationary programs. An intervention involving weekly reflective surveys focused on study strategies and metacognitive skill development was integrated into one such probationary program for first-year students. During the intervention, a slightly higher rate of successful completion of the program was observed compared to previous years. The self-reported experiences and patterns of engagement of the students suggested that the intervention positively impacted metacognitive skill development and additionally provided evidence of the importance of motivation at various points throughout the process. Identifying appropriate timepoints for intervention can better prepare stakeholders to support those students who may not be retained.

KEYWORDS

metacognition, academic probation, reflective writing, intervention, self-regulated learning

INTRODUCTION

Students who are ill-prepared for the rigorous coursework and independent nature of learning in higher education continues to be a problem (Duncheon 2018; Salehi, Cotner, and Ballen 2020). This results in students taking remedial courses, often adding to the time it takes them to complete their degrees (Aiken et al. 2020). Additionally, several psychosocial external factors potentially make adjusting even more difficult for students from certain backgrounds (Stephens et al. 2015). For these students, it becomes critical for them to learn how to regulate their own learning, including time management and making accurate judgements of their understanding of content prior to course assessments. While higher education cannot control student preparedness or other externalities, it can provide opportunities for students to develop self-regulated learning skills. We designed an intervention that provides opportunities for students to develop their metacognition, or the self-awareness, and to engage in reflective processes related to self-regulated learning and

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improving academic performance (Swanson, Ojutiku, and Dewsbury 2024). However, when implemented as a campus-wide intervention, it possibly promoted inequity in that students from all demographic backgrounds saw an improvement (Swanson, Ojutiku, and Dewsbury 2024). While a collective improvement is not necessarily detrimental, the intervention did not reduce outcome gaps for marginalized groups and was possibly reinforcing the current standards of inequality present in higher education across and between diverse groups of students. Based on the evidence that the intervention was academically impactful for a variety of students, we focused on supporting metacognitive skill development in a context where students were experiencing extraordinary academic struggles. First, let us briefly review our understanding of metacognition.

Metacognition: Conceptual framework and interventions

Metacognition, or the ability to accurately assess one's level of understanding, is an important skill developed during one's educational career. Lower performing students often overestimate their abilities (Gezer-Templeton et al. 2017). With minimal feedback, it is difficult for them to develop this skill (Miller and Geraci 2011). Providing reflective metacognitive opportunities for these students can allow them to make judgments more accurately about themselves as learners and about which strategies are most appropriate based on the difficulty of the task. These reflective opportunities have been shown to improve academic performance (Casselman and Atwood 2017; Cromley et al. 2020; Hoskins et al. 2017; Mutambuki et al. 2020; Swanson, Ojutiku, and Dewsbury 2024), as well as retention and graduation rates (Bail, Zhang, and Tachiyama 2008; Cambridge-Williams et al. 2013).

Metacognition has been explained as a big brain outside of an individual's brain that is asking it questions about how it is learning (McGuire and McGuire 2015). Originally, metacognition had two main subcomponents: metacognitive knowledge and metacognitive experiences (Flavell 1979). Metacognitive knowledge includes being aware of the factors that affect one's understanding, like knowledge of oneself as a learner, including one's strengths and weaknesses. Additional factors include knowledge about the task and what strategies will be more effective to complete it. Pintrich (2002) reframed Flavell's metacognitive knowledge as self-knowledge, strategic knowledge, and knowledge about cognitive tasks. Self-knowledge additionally includes one's motivation for completing various tasks. Strategic knowledge refers to knowing which cognitive strategies are applicable across multiple disciplines, and knowledge about cognitive tasks involves learners knowing when and why to use specific strategies for specific tasks.

Metacognitive experiences are the second sub-component of metacognition (Flavell 1979). These events result in the learner monitoring their learning and adjusting strategies based on cognitive or affective reactions. These adjustments are then applied to future cognitive tasks. Interventions designed around metacognitive skill development include providing and/or scaffolding these experiences for students. Some examples include exam wrappers, study skills courses, and workshops. These interventions are more impactful on student motivation and learning when they include information regarding the intervention's

usefulness and possible benefits and provide prolonged practice (Belzer, Miller, and Shoemake 2003).

Exam wrappers are surveys administered before and after an exam that ask students to reflect on exam preparation strategies; exam wrappers have shown positive gains in student success (Gezer-Templeton et al. 2017). Sebesta and Bray Speth (2017) found that while students in introductory biology courses had limited knowledge of self-regulated learning strategies, including metacognition, those who adapted their strategies as a result of their reflections on exam wrappers had higher rates of As and Bs and lower rates of Ds and Fs when compared to those who did not make changes to their study strategies. Some students choose to continue using maladaptive ones, regardless of the evidence of strategies' ineffectiveness, even after explicit instruction, exposure to more effective study strategies, and opportunities to reflect (Dangremond Stanton et al. 2015). There is also evidence of the impact of exam wrappers on student motivation; students were motivated to complete future exam wrappers due to the perceived effects of being helpful for exam preparation and improving scores (Gezer-Templeton et al. 2017). For studies that found no improvement in student performance with the use of exam wrappers (Soicher and Gurung 2017), it is important to note that there was no follow-up discussion between instructors and students.

Additional metacognitive interventions include study skills courses and workshops. These alternatives have produced improvements in self-efficacy and metacognition (Cambridge-Williams et al. 2013), exam scores (Hoskins et al. 2017), GPA (Bail, Zhang, and Tachiyama 2008), and retention and graduation rates (Bail, Zhang, and Tachiyama 2008; Cambridge-Williams et al. 2013; McGrath and Burd 2012). College success courses for first-year students resulted in higher GPAs and an improvement in retention and graduation rates for students with initial academic difficulties (Tuckman and Kennedy 2011). Study skills workshops have also had positive results (Cook, Kennedy, and McGuire 2013; Zhao et al. 2014) and can reach larger numbers of students compared to courses. However, Mutambuki and colleagues (2020) suggest it takes time to develop metacognitive skills and that these workshops often lack the necessary follow-up activities that allow students to develop their metacognitive skills through repeated practice (Zohar and Barzilai 2013). Metacognitive instruction is more impactful on academic performance when it is integrated throughout a course (Cromley et al. 2020; Zimmerman et al. 2011), with repeated exposure, opportunities for practice (Mutambuki et al. 2020; Swanson, Ojutiku, and Dewsbury 2024), and feedback (Casselman and Atwood 2017). The intervention was designed to provide reflective opportunities following a metacognition and study skills workshop.

At-risk students: Students on academic probation

Goal setting is important for academic achievement (Schlenker, Schlenker, and Schlenker 2013) as is time management, which is impacted by self-efficacy and intrinsic motivation (Steel 2007). Both goal setting and time management are significant aspects of self-regulated learning and metacognition. Students on academic probation, generally defined as consistently earning low grades, have been shown to have lower levels of self-regulation, including higher rates of procrastination and lower goal setting and prioritization

skills (Hensley et al. 2018). McGrath and Burd (2012) found that a mandatory success course for students on academic probation improved retention. This course covered topics that included metacognitive knowledge development, engagement with faculty, and a review of university policies and procedures. They also found that mandatory reactionary programs may be more effective than elective preventive ones (McGrath and Burd 2012). A failure to reach at-risk students preemptively through voluntary recruitment could be due to the stigma of enrolling in courses perceived as remedial (Hoskins et al. 2017).

The purpose of this study is to describe how first-year students in a probation program experience a series of reflective surveys as part of a metacognitive intervention. This study also seeks to determine if inclusion of these surveys improves the rates at which students successfully complete the probation program and if it can provide additional indicators to be used for more accurate predictions of student trajectories through the probation program.

METHODS

Sample, probation program, and context for the intervention

This study was conducted at a large, predominantly White, public university in the northeastern United States. According to institutional data, the undergraduate student demographics were 72% White, 10% Hispanic, and 5% Black during the semester this study was conducted. The intervention was conducted as part of a probation program offered through the university for students who have earned less than a 1.0 grade point average during the fall semester of their first year of college and, as a result, have been officially dismissed from the university. Through this program, these students can appeal their dismissal and are readmitted to the university for the spring semester only after accepting a cadre of conditions. These conditions include: a) obtaining a 2.0 GPA for their returning semester; b) attending a program orientation day with their guardian/s; c) waiving their FERPA rights[1]; d) meeting with their academic advisors at least twice during the semester; e) attending weekly meetings with program mentors who are primarily graduate students (trained through two days of workshops prior to the start of the spring semester); and f) completing three additional academic support meetings with one or more of the support services offered at the university. These services include academic coaches in the academic center, student disability services, faculty members, and small group tutoring or walk-in tutoring sessions in the academic center or the writing center.

While all students are in the program due to poor academic performance, students can find themselves in poor academic standing for diverse reasons. These range from ill-preparation for the rigorous coursework of college, issues with handling newfound independence, extraordinary life events like illness or death in the family, or being overwhelmed by responsibilities like working multiple jobs or longer hours compared to their peers. This is why FERPA rights are waived; students' guardians are an integral component of the support network students have access to during this time of transitioning to higher education. Of the students who begin the probation program, 50% achieve readmittance to the university on average. Many reasons contribute to this low rate, including students deciding that now is not the right time for college or that they may have a better fit at an alternative institution.

The intervention began with a general hour-long workshop on metacognition and effective study strategies. The workshop was held during the probation program's orientation and prior to the start of the semester. It was presented by two individuals from the campus teaching and learning office and included several data-supported study strategies, including teaching content to someone else, Bloom's taxonomy, the study cycle (adapted from Frank Christ's PLRS system, 2015, Louisiana State University, Center for Academic Success), and completing homework like it is a test (McGuire and McGuire 2015). The workshop messaging followed guidance provided by McGuire (McGuire and McGuire 2015) and focused on two important concepts to motivate students: (1) previous academic performance is not a measure of ability but of previous behaviors, and (2) small changes in behavior can have large impacts on learning for all types of students. This intervention iteration was similar in design to Swanson, Ojutiku, and Dewsbury's (2024) earlier study. Following the workshop, students were sent a survey each week with opportunities to reflect on the study strategies they used and any observed improvements or outcomes in their learning. These reflective prompts were written to help students' develop their metacognition through self-observation and self-judgment. Students were informed that whoever completed all surveys would be entered into a raffle for one of three $100 gift cards to the campus bookstore.

However, there were three key differences in the implementation for this study compared to previous iterations (Swanson, Ojutiku, and Dewsbury 2024). First, it occurred at the start of the spring semester, not after the first exams. Students had received their dismissal letters from the university prior to the start of the semester and therefore were primed for this intervention well before their first round of exams in the spring semester. Second, this intervention included six weeks of reflections instead of the four weeks used previously. This iteration was designed to have the reflections extend through and beyond students' first exams in the spring semester as well. Lastly, through the probation program, students completed the reflective surveys with support through weekly conversations with their program mentors. This allowed additional guidance in their metacognitive skill development versus the ultimately self-evaluative nature of the original implementation.

Informed consent was collected during the final two weeks of the semester (IRBNet 1175614, HU1718-102). Once consent was collected, additional student information was collected from program administration and the office of Institutional Research (IR). Student demographics including ethnicity, sex, and familial college (first-generation) status were collected from IR. Spring semester GPA, cumulative GPA, number of spring credits, and program status were collected from the program administrators.

Content analysis

Descriptive coding of the six weeks of survey reflections was conducted for all open response items. Strategies were coded for the first five weeks of surveys because they were not asked for on the final survey. Outcomes were coded for all six weeks. Codes determined from the original implementation of the intervention (Swanson, Ojutiku, and Dewsbury 2024; see Table 1 and Table 2) were thematized based on Bandura's social cognitive theory (SCT 1986) and used as a framework for this study. Additional codes were determined as necessary

and are discussed in further detail. Student data (survey reflections codes, demographics, and program details) were analyzed to determine possible patterns observed for those students who successfully finished the program. Students who finished with less than a 2.0 GPA for the semester were dismissed from the university and are considered "unsuccessful" in this study. To be "successful," students had to finish with a GPA of 2.0 or higher for the semester. If their overall cumulative GPA was lower than a 2.0 for the academic year, they would remain on academic probation but if it was higher than a 2.0, they were considered a student in good academic standing. Those students enrolled in the probation program who accepted a final dismissal and left the institution prior to the end of the semester were not included in analyses.

RESULTS

Of the 65 students in the probation program, 44 (68%) signed consent forms to participate in this study. Of the study participants, there were more males than females (61% males) and approximately 40% of participants were first-generation and/or on financial assistance. Ethnicity was predominantly White (44%), followed by Hispanic (27%), and Black (17%). They ranged in age from 18–21 years old. Three students left the program prior to the end of the semester (early dismissal) and an additional 16 students were dismissed from the institution at the end of the spring semester. Of the students dismissed, 31% were White, 31% Hispanic, and 31% Black. On average, the forty-one students completed four of the six surveys. Students were offered two additional weeks of surveys at the completion of the intervention to extend their reflective opportunities, but they were not required for the program. Of the 16 students who were ultimately dismissed, five (31%) utilized this opportunity by completing one or both surveys while eleven did not. For the 25 students who were successful in the program, 16 (64%) completed at least one of the extra surveys while nine did not.

Strategy descriptions were coded for the first five weeks of surveys. The codes and their frequencies are listed in Table 1 and include three new codes in addition to those described by Swanson, Ojutiku, and Dewsbury (2024).

Table 1. Classification of strategy codes and the frequency of the 41 students who responded during the first five weeks of surveys at least once

Strategies	**Frequency (%)**	
	Unsuccessful (n = 16)	**Successful (n = 25)**
Main workshop strategies		
Complete homework like a test	56	48
Teach the material	38	52
Study cycle (full cycle)	25	40
Preview and review	13	28
Preview only	56	36
Review only	69	52
Attend class*	0	16

Bloom's Taxonomy (ask higher-level questions)	13	20
Additional strategies mentioned in workshop		
Plan to avoid procrastination	25	40
Spend more time or spend time every day	44	64
Do more problems	44	32
Seek additional help	31	8
Non-workshop strategies		
Flashcards	6	4
Create a distraction-free environment	0	0
Create and complete study guides	0	0
Application of content outside courses (work environment, internship, etc.)	6	0
Reading strategy or more thorough reading	6	4
Note-taking strategy*	0	4
Be attentive and focused*	6	0

Note. Some students replied with multiple codes hence the total frequency is greater than 100%. *Codes in addition to those described in Swanson, Ojutiku, and Dewsbury (2024).

While new codes were unique to this study, they were not described by high frequencies of students. Student responses about what they observed as changes in their learning were coded across all surveys completed over the six weeks. The codes and their frequencies are listed in Table 2 and include ten new codes compared to those from the Swanson, Ojutiku, and Dewsbury (2024).

Table 2. Classification of outcome codes and the frequency of the forty-one students who responded during the six weeks of surveys at least once

	Frequency (%)	
Codes	**Unsuccessful (n = 16)**	**Successful (n = 25)**
Positive		
Changes in skills (adjectives), "I am . . ."		
More focused	25	36
More prepared	31	44
More organized*	31	12
Managing time better*	25	32
More efficient	25	40
More motivated	6	12
Attending class*	0	16
More invested*	13	24
More excited*	6	12
More confident	19	28
Proud*	0	4
More comfortable	0	0
Less anxious	0	4
More consistent*	13	4

More studious (better habits, better mindset, better student, more matured, and more patient)*	13	16
Taking better notes*	13	12
Changes in tasks (verbs), "I can . . ."		
Retain, remember, recall more content	44	40
Understand more content	50	52
Absorb more content*	13	12
Learn content more deeply (metacognitive growth)	31	24
Perform better on assessments	69	72
Apply knowledge more	6	4
Engage more in class	38	36
Negative (intimidated, anxious, less confident)	0	0
Lack of evidence, "I haven't seen any improvements yet."	44	24

Note. Some students replied with multiple codes hence the total frequency is greater than 100%. *Codes in addition to those described in Swanson, Ojutiku, and Dewsbury (2024).

The new codes were noted often as more specific descriptions of the original codes. For example, being more organized and better at managing time are further detailed descriptions of being better prepared as a student.

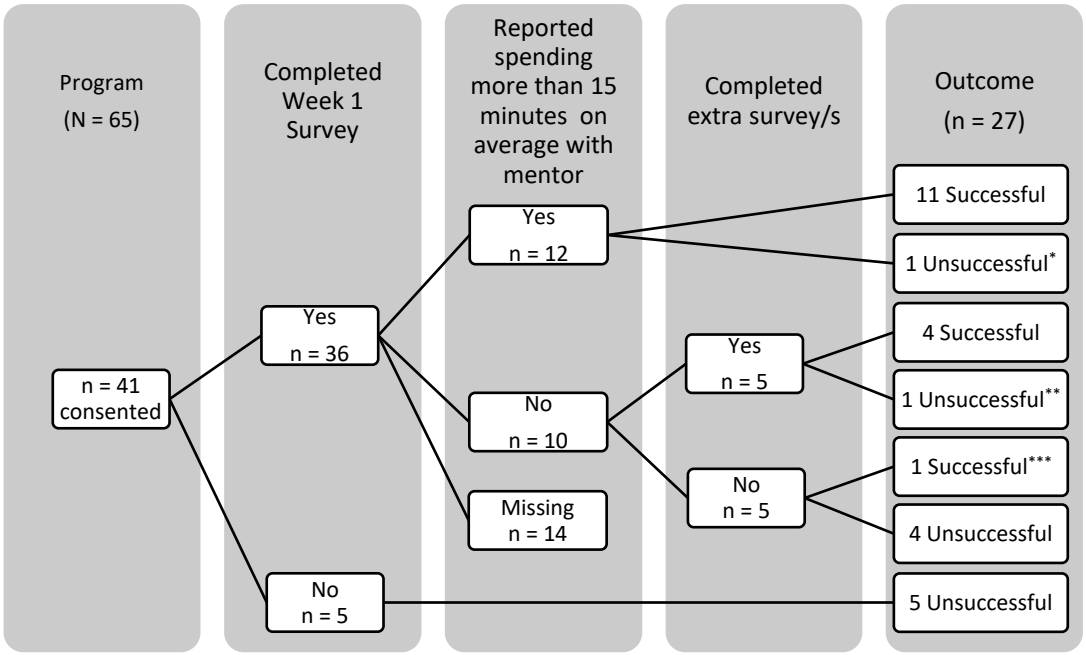
The top study strategies described by students who were unsuccessful were review, complete homework like a test, preview, spending time, and completing more problems. The strategies described most frequently by those who successfully completed the probation program were spending time, teaching the material, review, and completing homework like a test. For outcomes, both groups described having better assessment scores, understanding more course content, and retaining more information. Those that were unsuccessful also frequently described not seeing any improvement in their learning, or a "lack of evidence," while those that completed the program more frequently described themselves as being more prepared.

During the first two weeks of the semester, students described an initial increase in motivation and excitement. One student wrote, "I'm already more excited about learning and school because I know how to approach the material now." Another added how they were "excited to go to class knowing my assignments are complete and done well." In the middle of the intervention, students expressed more substantial changes in their attitudes toward learning. One student noticed that they were "more willing to study and don't see it as a chore or a boring task, now I am enjoying my studies because I am understanding the material." At the end, students described metacognitive skill development. One student explained, "I know now consequences of unpreparedness and not reading material before class, so I can use what I've learned to work towards success." Another explained how their "learning improved greatly over the past few weeks because now I am able to understand my weaknesses and learn from them." One student even described how they developed a growth

mindset and how they felt "as though I can actually do the math problems, helping change my mindset that I can't do them and with practice and understanding I can."

Forty-one students enrolled in the program finished the semester. Five of those students did not complete the first survey, which was sent to students during the first week of classes. Unfortunately, these five students were ultimately unsuccessful in the program and left the university. Of the remaining 36 students who completed the first survey, 22 (61%) completed the final survey. Of those 22 students, 12 of them reported spending more than 15 minutes each week on average with their program mentor discussing learning strategies. Of these 12 students, only one was not successful. For the 10 students who spent less than 15 minutes discussing learning strategies with their program mentors each week, five of them completed the additional two surveys provided after the completion of the intervention. Four (80%) of those five students were successful. For the five students who spent less than 15 minutes with program mentors and did not complete the additional surveys, four (80%) of them were unsuccessful. Overall, if students completed the first survey and spent, on average, 15 minutes or more each week discussing strategies with their program mentor or completed at least one of the additional surveys, they were successful. This pattern is summarized in Figure 1. While most students followed the pattern presented in Figure 1, three individuals were outliers to this trend.

Figure 1. Pattern of students' program outcomes based on engagement in the intervention



Note. Outliers to the pattern are marked with an *.

DISCUSSION

Institutions of higher education are committed to providing quality education with equitable outcomes for all students, including degree attainment that leads to eventual successful job placement. However, there are at-risk students who struggle academically

during their first semester, due to an assortment of life circumstances, including some that are out of their control. These circumstances are unique for each student; therefore, it is important that implemented interventions for at-risk students are designed with an awareness of students' needs based on differing backgrounds.

Results suggest some relationship between level of engagement in the intervention and student motivation. There is also a relationship between students' engagement and their ultimate success in the probation program. However, additional research is needed to analyze the possible causalities of these relationships. While the intervention was designed to aid students in their metacognitive skill development, how that development is specifically impacted by their level of engagement in the workshop and subsequent reflective surveys could not be directly measured. Inferences are drawn based on extrinsic and intrinsic motivation. Intrinsic motivation can lead to a desire to learn content at a level deeper than simple memorization and recall, and this level of learning requires metacognitive skill development.

Differences in strategy use

There were several differences observed in the experiences of students who were unsuccessful in the probation program and those who were successful and ultimately allowed to remain at the institution. Among the most frequently described strategies, the group of students who completed the program used deeper learning strategies, such as "teaching the material." Peer instruction has been shown to positively impact learning (Balta et al. 2017), deepen understanding, and improve metacognition (Stigmar 2016). Using deeper learning strategies may indicate a more intrinsic motivation for learning, which has been shown to be important for academic success (Linnenbrink-Garcia et al. 2018). This group of students also described behavioral changes from their first semester at the institution, including attending more classes, indicating students' refreshed commitment and motivation to learn. The other two new strategy codes added to those from the original implementation (Swanson, Ojutiku, and Dewsbury 2024) also speak to the possible difficulties some students experienced during their first semester (better note taking and being more attentive/focused). One of the important motivational messages in the workshop speaks to how behaviors dictate prior success or a lack thereof, not intelligence or ability. Even small changes in behaviors, such as those described here, can have large impacts on learning.

For the students who did not successfully complete the program, they described using external resources more frequently. These sources included emailing and meeting with professors and attending tutor sessions. Help-seeking is a trait of self-regulated learning and has been shown to improve academic performance (Ryan, Patrick, and Shim 2005). It is also encouraged in the probation program as evident in the program's requirements. However, students could have possibly used these aids to continue to deflect their self-observation and reflection to someone else, therefore not developing metacognition for themselves. Or they simply sought help to get answers for assignments instead of searching for a deeper understanding of the material, suggesting a more extrinsic motivation. This is referred to as expedient help-seeking and has been shown to negatively impact performance (Ryan,

Patrick, and Shim 2005). Won, Hensley, and Wolters (2019) found that a lack of utility value, or a sense of personal relevance to course content, was predictive of higher usage of expedient help-seeking. This could suggest that the students who were ultimately not successful in the program may have used expedient help-seeking strategies and placed a lower value on the course material. An alternate explanation is a reflection on the systemic structures in place in higher education. While these students come with a wealth of resilience capital (Yosso 2005), the help provided could be in a manner that expects them to assimilate the "model student" identity that higher education was originally designed to serve. It could also be due to a lack of sense of belonging in that the students do not see themselves reflected in those that are trying to support them. Mentorship plays an important role in academic self-efficacy and sense of belonging (Apriceno, Levy, and London 2020). Future research could further investigate the roles that the student and the instructor play in this help-seeking interaction and determine if instructors could aid in developing the student's metacognition and intrinsic motivation through supportive mentorship.

While review was one of the top strategies for both groups of students, the other strategies that were often used by the students in combination with review differed between the two groups. For students who successfully completed the program, review was reported by students who also often reported preview and teaching others. Preview and review, together, are an initial start to using the study cycle as a deeper learning strategy. As for students who were ultimately unsuccessful, teaching others was also reported but at a much lower occurrence. Using flashcards was also reported in combination with review for students who were unsuccessful. Flashcards are often referred to as a surface-level strategy. This comparison between the two groups suggests that it may not be the use of a particular strategy, but more the combination of deeper-learning strategies that result in successful completion of the program. Utilizing previously successful study strategies is an example of students utilizing navigational capital or a way to navigate an unsupportive educational context (Yosso 2005). Exposure to more effective strategies and the opportunities to practice and reflect on using those strategies may not be enough to help students overcome the need to navigate an unsupportive environment.

Differences in outcomes

In addition to differences in strategies, differences in the outcomes were described by students who were successful in the program and those who were not. Successful students described feeling more prepared for class and assessments. This was also found with students who completed the original implementation (Swanson, Ojutiku, and Dewsbury 2024). Preparing for class was also a top strategy reported in a study of introductory biology students and the impacts of a study strategy workshop (Nordell 2009). One of the top outcomes coded for students who were not successful in the program was a lack of evidence to support their improved learning. This could include an absence of any assessment grades but could also indicate how these students were unable to recognize or verbalize other more intrinsic improvements to their learning, such as engaging more during lectures. This finding was also observed in students who did not complete the original implementation of the

intervention (Swanson, Ojutiku, and Dewsbury 2024). It is known that brief interventions can promote a repetitive process, which may provide long-term impacts and increase resilience in students if they encounter possible future setbacks (Stephens et al. 2015). However, it is important that these interventions are paired with regular, meaningful feedback to develop a growth mindset (Lee, Sechler, and Smart 2017). This allows students to see any setbacks as part of the learning process and not as indicators of their intelligence (Lee, Sechler, and Smart 2017). Engaging with feedback is influenced by students' previous experiences with engagement and the subsequent level of academic success from that engagement (Cai et al. 2019). In the absence of any evidence or feedback of success from their previous efforts, students may have chosen not to engage as whole-heartedly in the remainder of the intervention.

The top response in the programmatic implementation, for both groups of students, was an improvement in grades or their "performance on assessments." This was not observed in the original implementation (Swanson, Ojutiku, and Dewsbury 2024). However, it is understandable since one of the conditions of students' continuation at the institution was to earn a 2.0 GPA for the semester, therefore reinforcing higher grades as an important extrinsic motivator. This group of students had a semester of academic struggles and, while having concrete criteria for readmittance is important, it is equally important to reinforce the adoption of a growth-mindset and intrinsic motivation for learning.

This adoption and the subsequent transformation in the students as learners were expressed in the outcomes of both groups of students. However, the intervention was completed during the first six weeks of the semester. While students were still required to meet with their mentors for the remaining weeks, there were no reflective opportunities to continue their metacognitive development through the end of the semester. Six weeks may not have provided enough opportunities for students to make permanent behavior changes in their learning, and without the continued support and prompting, there may have been a fade-out effect (Bailey et al. 2020). That is to say, students may not have continued their metacognitive skill development on their own at the conclusion of the intervention, which could have possibly impacted their final program outcomes. Future research should conduct additional surveys or interviews with students at multiple points throughout the semester to evaluate the long-term effects.

Possible indicators

The other study objective was to determine if the intervention could provide additional indicators for successful completion of the probation program based on behavior patterns observed in the students. The noteworthy indicators observed involved students' motivation at various points. The earliest indicator of unsuccessful completion of the program was failure to complete the first reflective survey. This suggests a possible lack of initial motivation to change prior behaviors or a lack of commitment to that change. It also suggests that these students may have external commitments that hold a higher priority or personal value for them. Early engagement has been shown to be predictive of future behaviors (Summers, Higson, and Moores 2020). Canning and colleagues (2018) found that

interventions impacting motivation improved grades and retention but, more importantly, students with a history of poor performance had a greater improvement when the intervention was earlier in the semester. In the literature on students' use of feedback, this early engagement has been referred to as a "readiness to engage" (Handley, Price, and Millar 2011). Immediate actions should be taken by administrators for those students who fail to complete the first activity of any program or intervention. Similar actions can be taken by instructors through early alert systems and have had positive impacts on semester GPA and persistence (Villano et. al 2018).

Both Aragón, Dovidio, and Graham's (2017) study on instructor adoption of active learning pedagogies and Cavanagh et al.'s (2016) study on student adoption of active learning activities discuss the process of adoption's stages (exposure, persuasion, identification, and commitment). Both research groups' findings supported a path model indicating that, following initial exposure to a concept, persuasion of program effectiveness is required. Once persuaded, personal identification is required. In this stage, personal value in the concept needs to be identified. After this step, commitment to implementation of the concept can be observed.

The first indicator, or an initial motivation to complete the first survey, may suggest that some students in the probation program experienced difficulty progressing through the identification and commitments stages of process adoption. While they may have been persuaded during the workshop, they either did not find personal value in the strategies or were unable to commit initially to trying them because they did not complete the first reflective survey. This may be especially true for students with external commitments that compete for their time. If the strategies did not align with their identity and values for each of their identities (e.g. student, provider, ethnicity, first-in-family, sibling), the perceived additional effort may not have outweighed the costs, and these students may have alternatively engaged in maladaptive behaviors (Perez et al. 2019).

The second indicator speaks to the amount of continued motivation and commitment to behavior change. This was determined by the level of engagement with the metacognitive process students undertook with their program mentors. The opportunity for students to work on metacognitive skill development with their mentors was unique to this iteration of the intervention. Prior studies on metacognitive interventions have found that mere exposure to strategies is not enough to impact academic performance but exposure needs to be followed up with additional instruction or feedback (Dangremond Stanton et al. 2015; Mutambuki et al. 2020; Soicher and Gurung 2017). Engaging with and utilizing feedback is more effective if students understand the pedagogical importance of it, which can be developed through conversations with instructors, tutors, and mentors (Ajjawi and Boud 2018; Price, Handley, and Millar 2011). Without these important conversations with program mentors, students may have failed to identify and understand how the learning strategies they were exposed to in the workshop directly improved their learning. By not making this personal connection, it would be difficult for them to commit to a continued change. This could also explain the final indicator, which provides an alternative measure for students' level of engagement and commitment to a change in behavior. By completing additional,

nonrequired surveys, students were actively extending their engagement in their metacognitive skill development and illustrating a continued commitment to their growth as a student. Additionally, if students failed to identify improvements in their learning, they would be less motivated to commit to adopting the strategies throughout the remainder of the semester.

It is important to acknowledge the inherent limitation in generalizing a pattern of behaviors. There was missing data in this study and an additional three students who did not fit the pattern. Of special note is one outlier, a first-generation, Black female student. The student completed all surveys and spent adequate time discussing learning strategies with their program mentor. Yet, they were still unsuccessful in completing the program and thus were unable to remain at the institution. This could be an example of how stereotype threat may influence marginalized students' experiences in interventions. These students could complete the reflective surveys with more socially appropriate responses instead of describing the actual strategies and outcomes they are experiencing. They may be choosing to answer in this manner to avoid confirming stereotypes. Or this could be indicative of a larger systemic problem.

It is important to note the overrepresentation of Black and Hispanic students in the program to begin with. There is approximately three times the number of students in the program that are Black (17%) when compared to the ethnic demographics of the student body as a whole (5%). Even more discouraging is the extreme overrepresentation of Black students not successfully completing the program (71% of Black students in the program were unsuccessful compared to 26% of White students). Possibly, these students could have additional hardships they must overcome as previously discussed, but it could also be evidence of the institution's misalignment with the needs of students from diverse backgrounds and the reinforcement of systemic racism preventing equal opportunities for success. It has been shown that Black students persist from their first to second year of higher education at a rate of 67% compared to the national average of 74% (National Student Clearinghouse Research Center 2018) and are two times more likely to drop out their first year (Berzenski 2019).

CONCLUSION

The different levels of motivation, assortments of life circumstances, and possible lack of college-readiness for students in this group makes studying their academic needs extremely important but difficult due to the large number of confounding variables. The addition of the intervention to the probation program corresponded with an increase in the frequency of first-year students who successfully completed the program and remained at the institution. More importantly, there was insight gained into the motivations of this group of students. Each student has their own life situation that impacts their experience at a higher education institution, and these experiences can be vastly different. To this end, there are potential indicators that could prompt additional support, even in a probation program. These indicators may include: the lack of motivation to change behaviors at the immediate start of the semester; the lack of continued motivation due to a lack of observable

improvements in learning; and the decrease in motivation resulting in not utilizing additional opportunities provided. These all tended to result in students not successfully completing the probation program and could be used to identify the most at-risk students in probation programs.

Several conclusions are also broadly applicable beyond a probation program. Providing a support structure that promotes discussion and eventual long-term implementation of deeper learning strategies can aid in identifying positive impacts on student learning and could further improve the impact of the metacognitive intervention. In addition, integrating student motivation into the metacognitive experiences provided by the weekly reflective surveys would allow students the opportunity to reflect on their motivation and what that means for them as a learner. This integration could help students in identifying what their motivation is or how they can develop and better use their motivation as an asset to their learning.

NOTES

1.) FERPA rights: Family Educational Rights and Privacy Act is a federal law in the United States that prevents parental/guardian access to post-secondary academic records of students.

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ETHICS

Research was approved through the University of Rhode Island ethical review processes.

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