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Promoting Positive Student Outcomes: The Use of Reflection and Planning Activities with a Growth-Mindset Focus and SMART Goals

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Abstract

The growth-mindset was examined to determine student perception of success by incorporating goal-setting activities into the course curriculum. Faculty at three universities conducted a mixed methods study to examine the extent to which reflection and planning activities designed to engage a growth-mindset focus through setting SMART (Specific, Measurable, Achievable, Relevant, and Timebound) goals resulted in perceived positive outcomes for students. Students engaged in these activities throughout the semester completed a voluntary survey at the end of each course. The survey focused on students' perceptions regarding the activities relative to their overall course progress. Students' favorable results revealed that students favorably perceived that the growth mindset planning and

reflection assignments increased their learning. Details of the study along with conclusions and directions for future research are provided.

Keywords: reflection, planning, student learning, growth mindset, SMART goals, Agile

1. INTRODUCTION

A primary goal at the heart of educational efforts is to prepare students for ongoing success in life. In addition to developing subject matter knowledge, research has shown that developing lifelong learning habits are equally important. One example of this is Dweck's (2016) work on growth and fixed mindsets. This study assesses the addition of class activities designed to promote and support a growth mindset. These activities require students to use reflection and planning techniques to promote success in the learning environment. Success, if achieved, is purported to be related to the existence of a growth vs. fixed mindset. Specifically, this research aims to answer the question - do reflection and planning activities, designed to engage a growth-mindset focus through setting SMART (Specific, Measurable, Achievable, Relevant, and Timebound) goals, result in perceived positive outcomes for students?

The initial focus of these efforts was to develop and implement the activities and determine if students and instructors saw value in the effort spent on the activities. Reflection and planning activities were implemented in select undergraduate and graduate-level courses at three universities. Voluntary end-of-semester surveys were used to measure student perceptions of the activities. Effectiveness of the reflection and planning activities was evaluated through student survey responses indicating their perceived value, effort, and enjoyment of completing these activities along with their perceptions of the efficacy of setting goals and making specific plans to accomplish their goals. Instructor perceptions on the value of the activities and the effort required to implement the activities were evaluated through self-reflection and peer discussions.

2. LITERATURE REVIEW

A growth-mindset represents a focus on associating performance with effort and process rather than through judgments on ability in a classroom setting (Woods, 2019; Dweck, 2016). Research has shown that educating students about mindset and providing growth-mindset motivated feedback has a positive impact on both student mindset and performance (Cutts et al., 2010). In this study, the reflection and planning

activities used were designed to support a growth mindset by asking students to reflect on their performance and then set specific SMART goals toward which to work for the purpose of improving performance in areas where they would like to make improvements (Woods, 2019).

The growth mindset shows an adaptability based upon continuous improvement when individuals focus on a predetermined set of goals. According to Moser (2011), individuals with a growth-mindset dedicate more resources to make corrective adjustments based upon feedback and show keen mindfulness to errors. Additional studies provide evidence of increased performance when economic or achievement-based incentives are provided. The competitive drive to excel, referred to as the achievement motivation, requires individuals to have a belief that their abilities can be changed or improved based upon their efforts (Manchi, 2017). The focus on mistakes is replaced by a desire to master a subject, demonstrating an outlook of confidence and optimism for success.

Additionally, in language learners, motivation plays a significant role in success and achievement. Researchers viewed the mastery of second language learning as a continuous process that demands students play an active role in learning (Crooks & Schmidt, 1991). Critical to success in language learning, an individual's self-definition has an impact on their motivational power and views of themselves in the future (Vijeh, 2014). The self-definition discussed by Vijeh (2014) is comparable to the drive to excel discussed by Manchi (2017) and can be applied to any subject matter of study. Likewise, in the business industry, the Agile project management methodology includes a focus on failing safe and continuous learning in an effort to change the mindset of workers and reward small successes and innovation (Beck, 2001).

Agile has existed in the software space since 2001, but it continues to emerge into additional industry sectors such as finance, professional services, education, healthcare, energy, telecommunications, government, and retail (VersionOne, 2019). Agile is emerging as the new leading organization model (Ahgina, De Smet, Lackey, Lurie, & Muraka, 2018). Organizations are shifting to an Agile philosophy as a response to the rapid changes in "competition, demand,

technology, and regulations" (McKinsey, 2017, p.1). For the purpose of this study, the researchers follow the ICAgile definition of Agile. According to ICAgile, "agile is not a process, methodology, or framework; it is a mindset that welcomes uncertainty, embraces challenges, empowers individuals, and views failure as a learning opportunity. Adopting an agile mindset unleashes the brilliance of people and teams, which enables rapid discovery and faster innovation" (ICA Agile, Mission, n.d.).

The Agile mindset allows teams to implement a set of practices that helps them to prioritize work, plan and execute the work in small increments, and organize as a self-managed team. This approach helps teams to complete the most important work first so that progress can be seen sooner rather than later. The Agile way of working encourages teams to work in iterative work cycles that have a steady cadence of feedback and reflection practices. Retrospectives are one reflective practice where teams discuss what is going well, what is not going well, and what needs to be changed. Agile retrospectives could be perceived as continuous improvement, which is reflective of a growth mindset. Agile teams continuously reflect on their work, adapt, and make improvements. This tool allows for teams to adapt to better meet project outcomes or customer expectations. Agile teams have higher quality outcomes and better meet their customers' needs compared to traditional project management models (Krehbiel et al., 2017). The same success of industry Agile teams has also been reported in postsecondary education group work (Woods & Hulshult, 2018; Hulshult & Krehbiel, 2019).

3. PROCESS

For this research project, class assignments designed to promote a growth mindset were added to courses at a regional campus of a large public university in the Midwest, a large public university in the southeastern US, and a private university in the mid-Atlantic region. The impact of these assignments was evaluated using an end-of-semester survey. Table 1 contains details of the courses and the number of students involved.

School 1 is a regional campus of a large public university in the Midwest, school 2 is a large public university in the southeastern US, and school 3 is a private university in the mid-Atlantic region.

School	Course	Semester	Enrollment
1	Intro. To IT	Fall 2019	15
1	Java Prog.	Fall 2019	18
1	Intro. To IT	Spring 2020	18
1	Java Prog.	Spring 2020	15
1	Agile: Business Value Analysis	Spring 2020	14
1	Capstone - Design	Spring 2020	9
2	C# Prog.	Spring 2020	19
2	Security Analytics (graduate)	Spring 2020	28
3	IT Security	Spring 2020	9

Table 1 - Details of courses used in the research.

Reflection and Planning Assignments

In each of the courses, a recurring reflection and planning assignment was added. For the assignment, students submitted a written reflection on their recent work in the class and set a goal for something to work on over the next few weeks. An example assignment can be found in Appendix 1.

For the reflection, the students were asked to use a format commonly used in Agile retrospectives by discussing what is going well and what isn't going as well. The initial goal setting assignment prompted students to set goals to either continue performing tasks that worked well or to set measurable goals for marked improvement. Students were directed to use the SMART goals (SMART Goals, n.d.) framework for the goal. This framework was discussed in class before the first reflection and planning assignment. Students were also provided content with an example of a SMART goal and links to information about the SMART Goal framework.

For the initial reflection and planning assignment, students were asked to reflect on their work since the start of the class. Subsequent reflection and planning assignments required students to reflect on the progress made since the previous reflection and planning assignment. The frequency of the reflection and planning assignments varied depending on the class but were typically done every three to four weeks or at the end of major course modules.

Courses

The reflection and planning assignments were used in a variety of IS/IT courses at the three participating universities. At the regional campus of a large public university in the Midwest, the assignments were used by two different professors in the Computer and Information Technology department. In the fall of 2019, the assignments were used in an Introduction to IT course that all new IT majors are required to take and in a Fundamentals of Programming and Problem Solving course that taught Java programming. The programming course is taken by some IT majors and by students majoring in Computer Science. In the spring 2020 semester that experienced a shift to remote learning due to the COVID-19 pandemic, the reflection and planning assignments were again used in the Introduction to IT and Fundamentals of Programming courses. The assignments were also used in an upper level Agile: Business Value Analysis course and a senior level course where IT students work on the requirements and design phase of their capstone projects.

Two faculty members participating in this study are based at a large public university in the southeastern United States. Each faculty member included the reflection and planning activities in their classrooms. One course was an undergraduate 2000-level introductory C# programming class. The second course was a graduate-level security analytics course. The undergraduate course had an enrollment of 19 students, and all students completed the activities. The graduate course had an enrollment of 28 students; 26 students completed the assigned activities.

The undergraduate course was offered in a 14-week semester; the graduate course was offered in a hybrid format in a 7-week term. For the undergraduate students, over the duration of the semester, there were a total of three planning and reflection activities each assigned at three-week intervals. The first activity was due during the fourth week of the course. The graduate course, due to its reduced time frame, included two reflection and planning activities offered in week three and week six.

In Spring 2020, the reflection and planning assignments were also used at a private university in the mid-Atlantic region in an IT Security course. This technical course focuses on the study of information security threats, prevention and response, and prepares students

for the CompTIA Security+ certification. Students created initial SMART goals as part of an initial growth mindset activity during the first two weeks of the course. They then completed the reflection and planning assignments every four weeks, for a total of three iterations.

The following research questions were raised:

1. Did students indicate that reflection and planning activities increased their ability to succeed in the course?
2. Did the reflection and planning activities add significant effort to the required coursework?

Research Methods

For quantitative analysis, a survey was performed for all students to collect student feedback on the reflection and planning assignments, the goals, and their perception of success aligned to the assignments. The survey was divided into two categories to measure the student perception of progress using the goals and the level of effort required to create goals and assess progress through the reflection and planning activities. The goal of the survey was to gather information about whether students saw the value of the assignments and how the assignments affected students' performance in the class. Additional survey questions also asked about the effort needed to complete the assignments, whether students enjoyed the assignments, and whether they would like to do similar assignments in future courses. The complete list of questions with the Likert scale can be found in Appendix 2.

The first category measuring student perception of progress included the following survey questions:

- I saw the value of the reflection activities to develop ideas for how to improve my work in the course.
- I saw the value of the planning activities to improve my future work in the course.
- I feel that completing the reflection and planning activities improved my performance in the class.

The second category measuring the level of effort included the following survey questions:

- How effortful was it for you to complete the reflection assignments?
- How effortful was it for you to complete the planning assignments?
- How much did you enjoy the reflection activities?

- How much did you enjoy the planning activities?
- How much did you learn about setting good goals for yourself?
- How much did these activities help you learn about a structured process for improving your work in a class or similar long term activity?
- How much would you like to do similar reflection and planning activities in future courses?

The survey used for the class at the private university in the mid-Atlantic region had an additional question that was added in response to the COVID-19 pandemic. The question used a 5-point Likert scale and stated:

- The reflection and planning activities helped me in my ability to succeed as the course moved to a distance learning format in the middle of the term.

The weekly reflection and planning assignments provided qualitative feedback on student progress. Instructors gained valuable input on the level of student dedication to goal setting, following their weekly goals, and personal issues that impacted their success, such as the change in course delivery format from traditional, in-person courses to virtual, online delivery.

4. RESULTS

Response averages to survey questions (Appendix 3) were evaluated for the sample of students who completed the survey at each participating university.

Perceived Value

Questions related to the perceived value of the reflection and planning activities include: (Q1) I saw the value of the reflection activities to develop ideas for how to improve my work in the course, (Q2) I saw the value of the planning activities to improve my future work in the course, and (Q3) I feel that completing the reflection and planning activities improved my performance in the class. On a 5.0 scale, the averages for the first two questions (Q1 and Q2), except for one class, were all above 4.0. The averages for Q3 were all above 4.0 except for two classes. Ranges over all three questions were from 3.4 to 4.5. Overall, the data suggests students do see value in completing the reflection and planning activities, and they, at least to some

degree, feel that the activities improve their performance.

Perceived Effort

Questions related to perceived effort include: (Q4) How effortful was it for you to complete the reflection assignments? and (Q5) How effortful was it for you to complete the planning assignments? Responses to these questions had a wider range of results compared to the first three questions, with averages from 3.4 to 5.9 on a 7.0 scale. For both Q4 and Q5, half of the classes averaged 4.0 or above. One possible explanation for the variability is that students may not have read the scale closely; both questions related to effort were anchored by 1=Not Very Much and 7=Very Much. Students may not have caught the wording of the anchors and inadvertently responded in reverse of their intentions. However, it is also possible that students did not feel like the activities required much effort.

The participating classes in this study were technical in nature, and when students responded to the survey questions, their frame of reference was relative to the activities required for the courses and, therefore, less effortful in comparison. The sample from the participating university in the southeastern United States consisted of both undergraduate and graduate students. Lower averages on the effort required for the reflection and planning assignments were indicated by non-traditional students versus traditional undergraduate students. Non-traditional students include students who were holding down full-time jobs and taking classes simultaneously. Students balancing the challenges of full-time employment may not perceive reflection and goal planning as challenging of a task when compared to the traditional students. Graduate students, also, typically enter the program with work experience and goal setting from either work or undergraduate coursework. Therefore, they may not feel the effort is as great as perceived by the undergraduate students. In general, the variability brings up additional questions related to why responses varied more for these survey items and calls for more investigation in future studies.

Enjoyment

Questions related to the perceived enjoyment of completing the reflection and planning activities include: (Q6) How much did you enjoy the reflection activities? and (Q7) How much did you

enjoy the planning activities? Except for one class, the averages for questions Q6 and Q7 were 4.0 or above, indicating that for the most part, students enjoyed participating in the reflection and planning activities.

Perceived Learning about Setting Goals and a Structured Process for Improvement

Questions related to perceived learning about setting goals and a structured process for improvement include: (Q8) How much did you learn about setting good goals for yourself? (Q9) How much did these activities help you learn about a structured process for improving your work in a class or similar long term activity? and (Q10) How much would you like to do similar reflection and planning activities in future courses? For question Q8 the averages for all classes were 4.5 or above, indicating that students felt that through completing these activities they did learn about setting good goals for themselves. Except for one class, the averages for questions Q9 and Q10 were 4.0 or above, leading to a general observation that students also perceived they learned about a structured process for improvement and would want to do similar reflection and planning activities in future courses.

Reflection Papers

Participating classes (except for two classes from Fall 2019) were impacted by the COVID-19 pandemic. Many students included in their reflection and planning papers aspects about COVID-19 that were affecting their lives, which ranged from adjusting to children and other family members being at home to job insecurities to, in some cases, increased demands on their jobs. Many students shared stresses and anxieties related to the pandemic in their papers. It is acknowledged that the pandemic may have also influenced responses on the survey.

From the instructors' perspective, the reflection and planning assignments offered information about circumstances affecting individual student performance in the class. Therefore, instructors were able to offer tailored feedback to support and encourage students. In addition to mentioning concerns related to the pandemic, students also included more general issues in their papers including time management, aspirations to understand specific complex course material, stress management in general, plans to take better care of themselves, and balancing job and/or family demands while keeping up with school. Overall, this gave instructors an

opportunity to build a broader connection with students, one that was not solely focused on the course content.

5. FUTURE RESEARCH

Future research in growth-mindset theory, as it relates to reflection and planning activities, warrants continued investigation and holds the potential of providing students with a valuable tool for setting and working towards SMART goals to improve their experience and performance in classes. Demographic questions could be added to the survey to determine if there is a significant difference between undergraduate and graduate students, as well as between traditional and non-traditional students. Other demographic questions may include major, class standing (Freshman, Sophomore, Junior, Senior), gender, and work experience. Continuing data collection in future semesters will not only benefit from including demographic information, but it will also be important to help determine if the data collected during Spring 2020 was significantly influenced by the COVID-19 pandemic.

Additionally, future research should examine the measures used in this study for an enhanced understanding of how they may operate independently as constructs representing concepts such as perceived value, effort, and enjoyment. It would be beneficial to test for relationships in the data such as evaluating if student perceptions of value, enjoyment, and effort in the reflection and planning activities predict how much students would like to do similar reflection and planning activities in the future (Q10). More data would need to be collected to perform structural equation modeling analysis to investigate these possibilities further. Therefore, collecting additional data to increase the sample size is also a focus for future research.

Another opportunity is to do a content analysis on the student submissions to identify the main topic areas mentioned by students, such as time management, stress management, work-life balance – and look for ways to provide resources that can help students with these topics.

6. CONCLUSIONS

Student responses indicated that reflection and planning activities did increase their ability to succeed in the course. Survey results demonstrated favorable student perceptions regarding the reflection and planning activities.

The positive impact of goal setting was evident based on the students' perceptions of success. The favorable student responses toward the reflection and planning activities provide the platform for future research to further investigate the role of such activities in growth-mindset theory. For educators, the reflection and planning activities are simple assignments that can be readily incorporated into a variety of IT-related classes and that are in general viewed by students to be enjoyable and beneficial.

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Appendix 1

Reflection and Planning 2

Submit Assignment

Due Apr 4 by 11:59pm Points 10 Submitting a website url or a file upload

A few weeks ago you completed the [Reflection and Planning 1](#) assignment.

Think about your work in the class since that assignment. What is going well? What isn't going as well? For that assignment you set a goal. Discuss what progress you have made. Try to provide clear measures of the work you have done on the goal and the progress you have made in reaching the goal. A reminder - this discussion isn't limited to course content, it should include things like time management, organization, learning the course content, getting enough sleep, staying healthy, etc.

Think about your goal. Do you need to keep working on this goal? Do you need to update this goal? Do you need to create a new goal to focus on something else?

Submit a document containing:

- A written reflection of what has gone well, what could be improved and the progress you have made on your goal. What have you been doing that helps you learn and complete course assignments? What could you be doing differently?
- A goal for something you will work on over the next few weeks. This could be a goal to continue doing something that is working well or a goal to improve something. Again it can be anything - time management, organization, study habits, staying healthy, etc. Use the SMART Goals framework we discussed in class - see [SMART Goals](#) for details and examples.

Feel free to talk to your instructor about this assignment, especially writing clear, measurable goals.

Length should be 1/2 - 1 page.

Reflection and Planning				
Criteria	Ratings			Pts
Reflection Reflection on what has worked well and what has not worked well over the past few weeks.	5.0 pts Complete and thoughtful Clear, detailed reflection on what has worked well and what has not worked well.	3.0 pts Limited or incomplete reflection Does not discuss both what has worked well and what has not worked well, or discusses both, but is incomplete.	0.0 pts No reflection	5.0 pts
Goal Clearly stated, measurable goal for acting to improve future work or sustain good practices.	5.0 pts Goal is clearly stated and measurable	3.0 pts Goal is incomplete Room for improvement in making the goal clearly stated and measurable.	0.0 pts No goal stated	5.0 pts
				Total Points: 10.0

Example of a reflection and planning assignment including assessment rubric.

Appendix 2

Course Activities Survey - Overall Results

Please answer the following questions about the recurring activities where you reflected on your work during the previous weeks of the course and set goals to plan your future work in the course.

Scale (**Q1-Q3**): 1 (Strongly Disagree) - 5 (Strongly Agree)

Scale (**Q4-Q10**): 1 (Not Very Much) - 7 (Very Much)

Q#	Question Text	Average
1	I saw the value of the reflection activities to develop ideas for how to improve my work in the course.	4.3
2	I saw the value of the planning activities to improve my future work in the course.	4.4
3	I feel that completing the reflection and planning activities improved my performance in the class.	4.1
4	How effortful was it for you to complete the reflection assignments?	4.2
5	How effortful was it for you to complete the planning assignments?	4.3
6	How much did you enjoy the reflection activities?	4.7
7	How much did you enjoy the planning activities?	4.8
8	How much did you learn about setting good goals for yourself?	5.5
9	How much did these activities help you learn about a structured process for improving your work in a class or similar long term activity?	5.6
10	How much would you like to do similar reflection and planning activities in future courses?	5.0

Appendix 3

Response Averages to Survey Questions by Institution and/or Course

			5 Point Likert Scale			7 Point Likert Scale						
School	Course Description	Semester	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
1	Introduction to IT	FA 2019	4.3	4.4	4.4	4.5	4.6	5.0	5.0	5.8	6.5	5.8
	Java Programming	FA 2019	3.4	4.0	4.0	3.8	4.0	4.2	3.9	4.5	4.9	4.3
	Introduction to IT	SP 2020	4.2	4.4	3.2	3.4	3.6	3.0	3.2	5.0	4.8	3.2
	Java Programming	SP 2020	4.3	4.2	4.2	4.2	3.7	4.5	4.7	5.5	5.3	5.3
	Agile: Business Value Analysis	SP 2020	4.6	4.7	4.4	4.7	4.8	5.9	6.3	6.6	6.1	6.3
	Capstone - Design	SP 2020	4.4	4.6	4.4	5.4	5.9	5.9	5.9	6.2	6.2	5.7
2	C# Programming Security Analytics	SP 2020	4.1	4.2	3.6	3.6	3.8	4.7	5.0	4.7	4.7	4.4
3	IT Security	SP 2020	4.7	4.7	4.5	3.6	3.6	4.7	4.0	5.3	6.1	4.6
		High	3.4	4.0	3.2	3.4	3.6	3.0	3.2	4.5	4.7	3.2
		Low	4.7	4.7	4.5	5.4	5.9	5.9	6.2	6.6	6.5	6.2