Growth Mindset, Motivated Strategies, and Testing Anxiety and Their Effects on Academic

Performance

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Abstract

Previous research suggests that academic success may be determined, in part, by one's degree of intrinsic motivation and interest in academic subjects. However, few studies of motivation have considered the role of growth (vs. fixed) mindset and the negative effects of testing anxiety on academic performance. This study was designed to better understand which variables may have the greatest impact on academic performance. In an online survey, participants answered a variety of questions on their Intrinsic and Extrinsic Motivation, Testing Anxiety, Self-Efficacy for Learning and Performance, Growth or Fixed Mindset, Task Value and Control of Learning Beliefs. Results suggest that, although neither motivating strategies nor growth/fixed mindset variables predicted performance, lower Test Anxiety and higher task value did predict higher levels of academic performance. Further, Extrinsic Motivation predicted Test Anxiety. Finally, positive relationships were found between Intrinsic Goal Orientation, Task Value and Self-Efficacy for Learning. Although there are positive relationships between motivating factors that lead to academic performance, marginally significant findings on the relationship between particular motivating factors and academic performance warrant for future research. This study is relevant to society due to the importance of academic achievement and the value of obtaining a better understanding about what influences higher academic success.

Growth Mindset, Motivated Strategies, and Testing Anxiety and Their Effects on Academic Performance

Behind each human action is a driving force that both initiates and maintains goal-oriented behaviors, which is best known as motivation (Cherry, 2022). More specifically, Intrinsic Motivation is a goal orientation in which the task is enjoyable in itself, while Extrinsic

Motivation is induced by outside rewards or punishments (Lin, 2003). Both types of motivating factors are prominent in education, and can have a substantial effect on student performance. In addition to Intrinsic and Extrinsic Motivation, there are other factors and variables that can influence a student's learning experience and academic performance. These include learning disabilities (Henry, 2001), anxiety/stress levels (Elaine M. Phillips, 1992), self-efficacy (Bandura, 1977), growth mindset (Dweck, 2016), control of learning beliefs (Manavipour, 2016), and task value (Neuville, Frenay, Bourgeois, 2007). Such variables can also have varying effects on the student's educational experience and performance.

Of all these varying factors that can affect academic performance, the variable of anxiety has received a great deal of attention in regard to its potential negative and positive effects on learning. According to the Yerkes-Dodson law, performance increases with a certain amount of physiological or mental arousal (anxiety), but only to a point, after which performance decreases (Gino, 2016). There is a certain level of anxiety needed for motivation of task completion, but too much anxiety can inhibit overall performance. Within the academic environment, perceived difficulty of an exam and high pressure extrinsic value result in higher testing anxiety, and this can in turn inhibit the student's performance and grade on the exam (Embyse, 2018). Both in and outside of the academic environment, any situation that provokes worry, particularly where one's abilities are being tested, can lead to higher levels of anxiety that is no longer beneficial to motivation, rather it is inhibitory to one's performance (Embse, 2018). Therefore, this study examined the effects of test-taking anxiety on task performance and overall academic success in the course.

While testing anxiety is a strong influencer of academic performance, there are Intrinsic Motivating factors that also have an impact on anxiety levels in an academic setting. Firstly, task

value, the incentive for engagement and performance of a task, is determined by the cost, or

value, that the completion of this task is expected to bring to the person (Khezri, 2010). The

higher the value associated with the task, the more anxiety may rise, and with an excessive

increase in anxiety, student performance and achievement may be inhibited. High anxiety comes

with feelings of inadequacy, poor self-esteem, and fear of failure (Byrne, 2000). These inhibitory

results of anxiety can correlate with the fixed mindset. Proposed by Stanford professor Carol

Dweck (2016), those who have a fixed mindset believe they are either good or bad at something

based on their inherent nature, and there is nothing they can do about it. As anxiety rises,

adopting a growth mindset–the belief that intelligence and skills are adaptable and improvement

is always accessible–can allow for the student to better manage the inhibiting effects of anxiety,

and in turn allow for higher success rates in academics. In addition to managing levels of anxiety,

a growth mindset is hypothesized to have positive effects on a student's academic performance,

compared to students who have a fixed mindset (Dweck, 2016). Adopting a growth mindset

rather than a fixed mindset allows for the student to view failure as a result of lack of preparation

with room for improvement, rather than identifying *themselves as* the failure with no room to

improve.

     Both the mindset one possesses and the beliefs about one's ability to achieve success

ultimately affect one's motivation to complete academic tasks. The belief that one has the

capacity to execute the behaviors needed to reach performance expectations is self-efficacy,

proposed by Psychologist Albert Bandura (Bandura, 1977). Likewise, the belief that there is a

correlation between one's behaviors and performance is known as control of learning beliefs

(Manavipour, 2016). When one believes their achievement is a result of their effort, one is better

able to believe that they have control over their learning process, and that they have the ability to

reach their academic potential. Therefore, a student with a growth mindset and positive control of learning beliefs view success as a consistent improvement in certain efforts (rather than as a result of their innate nature), resulting in greater efforts, and therefore a higher level of academic achievement and success. The intrinsic belief that one has the ability to perform academically or otherwise can lead to positive effects in academic achievement and attainment of goals.

One's beliefs of one's individual abilities and performance, motivating factors, and anxiety have various effects on a student's academic performance. There have been several studies that have found a positive relationship between intrinsic interest and increased academic achievement (Froiland and Worrell 2016; Vansteenkiste, Lens, and Deci 2006), and higher levels of academic satisfaction, in comparison to extrinsically interested students (Deci and Ryan 2008). Therefore, it was hypothesized that students with academic accommodations will be more likely to succeed academically when they express a growth mindset and are intrinsically interested in the course. As well, it was initially predicted that frequent use of the resources provided by the Educational Access Center would lead to higher academic success rates. However, we were unable to recruit an adequate number of participants required to reach acceptable levels of power, and this analysis was not run. In addition, Embse (2018) found that testing anxiety is negatively correlated to educational performance. Therefore, it was predicted that testing anxiety would negatively impact academic performance measured in this study. The present study was designed to examine a variety of motivating factors that may contribute to a student's interest in the subject, and overall academic performance in the course.

Methods

Participants

Participants consisted of 27 students ages 18-24 who are enrolled in the Psychology 1001 freshman general education course at Point Loma Nazarene University. No information regarding race or ethnicity was collected. To minimize error variance in grades, only participants enrolled in Point Loma Nazarene's Freshman course, Psychology 1001, were recruited, and all students were drawn from sections taught by the same professor. Participants were compensated for their efforts and participation in the study by being entered into a raffle to have the random chance to win a $25.00 gift card. They were assured of their right to skip any distressing questions or to withdraw from the study at any time without loss of compensation.

Procedure

Participants were directed to complete the survey on Qualtrics.com, an online survey tool. Before the participants began the survey, they were asked to read and agree to the informed consent form. Participants were informed that their participation was entirely voluntary, and that they could skip any questions or withdraw from the study at any time without penalty. They were also informed of any personal benefits and potential risks associated with the study, and were provided with the resources to obtain help following the study if they needed. Finally, participants were assured that their responses would be held confidentially, and would not be linked to any identifying information. Participants were required to electronically acknowledge their consent before moving on to the first part of the study.

The survey began by asking participants if they are enrolled in the Educational Access Center at PLNU. This is where students who have academic accommodations due to disabilities can access their needs at Point Loma Nazarene University. Participants then answered a series of questions regarding their growth mindset and motivating factors that influenced their learning experience in the Psychology 1001 course they currently were enrolled in. They were also asked

to report their current percentage grade in the class. To collect pre and post survey data,

participants were asked to complete the survey twice. The first survey was taken in the midst of

the semester in the Psychology 1001 course, and the second was after the course completed, and

their final grades were received.

<p style="text-align:center">Measures</p>

Motivated Section of the Learning Questionnaire (MSLQ)

Participants were asked to answer various questions from the motivation section of the

MSLQ (Motivated Section Learning Questionnaire), which has been used by Dayel, Diab,

Abdelaziz, Farghaly and Ansari (2018), to understand the validity of the motivated strategies for

learning in Saudi Arabia . The MSLQ is a 31-item measure of learning related processes, that

included subscales designed to measure growth mindset, intrinsic and extrinsic motivation,

testing anxiety, self-efficacy, control of learning beliefs, and task-value. Participants rated their

level of agreement using a 7-point Likert Scale (1 = *not at all true of me* and 7 = *very true of me*).

In Dayel's validation study, it was concluded that the hypothesized model of the MSLQ did not

fit the data well, leading to poor internal consistency reliability for each of the scales. The MSLQ

measure was selected because it is designed to measure college undergraduates' motivation and

self-regulated learning across hundreds of studies (Duncan & McKeachie, 2005).

The MSLQ consisted of two sections, one measuring academic performance, and the

other measuring a variety of learning strategies. In both the validity study and in this study, both

sections were used together. The academic motivation section began with the subscale of Control

of Learning Beliefs (alpha = 0.78) which tested the belief that outcomes depend on effort, rather

than external factors "If I study in appropriate ways, then I will be able to learn the material in

the course." Second in the academic motivation section is Self-Efficacy for Learning and

Performance (alpha = 0.89) which tests the confidence level of the student in their abilities leading to success "I believe I will receive an excellent grade in this class." The second construct on the value of academic achievement begins with the first subscale on Intrinsic Goal Orientation (alpha = 0.75) which focuses on learning and mastery, "In a class like this, I prefer course material that really challenges me, so I can learn new things." Second in the subscale was on Extrinsic Goal Orientation (alpha = 0.78), which focused on grades and approval of others "If I can, I want to get better grades in this class than most of the other students." The third subscale is the Task Value beliefs (alpha = 0.86), which focuses on the judgment of how interesting, useful, and essential the content is perceived by the student, "I think I will be able to use what I learn in this course in other courses." The last subscale is Testing anxiety (alpha = 0.77), addressing student worries regarding test taking "When I take a test, I think about how poorly I am doing with other students."

Growth Mindset Scale

The 3-item Growth Mindset Scale (Dweck, 1999) was used to measure the participants' levels of growth versus fixed mindset. This scale was chosen because it was developed by Psychologist Carol Dweck, whose research found both growth and fixed mindsets (Dweck, 1999). Participants answered questions on a 6-point Likert scale ranging from (1 = *strongly agree*; 6 = *strongly disagree*), which measures the degree to which the student believes they can get smarter with effort (growth mindset) or that they are born with a certain level of abilities and cannot change it (fixed mindset.) The three questions used to determine the mindset of the participants are as follows. "You have a certain amount of intelligence, and you can't really do much to change it." "Your intelligence is something about you that you can't change very much." "You can learn new things, but you can't really change your basic intelligence." Internal

consistency coefficients were tested in a study that measured growth mindset in youth and adults. The results in the adolescent sample were 0.83 and the adult sample 0.90, with the test-retest reliability 0.67 in adolescents and 0.45 in adults. (Rammstedt et al., 2021)

Results

The data on the effect of motivated strategies on each student's grade earned in Psychology 1001 was analyzed with a multiple linear regression analysis. It was predicted that participants who engaged in academic material due to Intrinsic Motivation would have reported a higher final grade in the course, in comparison to those engaged in material due to extrinsically motivating factors. It was found that neither Intrinsic goal orientation (β = -.17, p = .70) nor extrinsic goal orientation (β = .37, p = .43) predicted a higher final grade in the class. However, it was found that both lower test anxiety (β = - .70, p = .06) and higher task value (β = 1.05, p = .06) predicted higher grades in the class at a marginally significant level. There was no significant relationship between the student's final grade and self efficacy for learning (β = -.54, p = .33), growth mindset (β = -0.04, p = 0.90), and control of learning beliefs (β = -0.05, p = 0.90). Overall, all predictors accounted for 6% of the variance in the final grade (Adjusted R^2 = .057, R^2 = .47, p = .42).

Data on all variables was analyzed using Pearson product-moment correlations. It was found that there was a positive relationship between Intrinsic Goal Orientation and task value (*r(18)* = .77, *p* < .001) and self efficacy for learning (r(18) = .74, p < .001). As well as self-efficacy and task value were statistically significant (r(18) = .76, p < .001). It was also predicted that high Intrinsic Motivation would lead to low test anxiety, however there was no significant correlation between the two (r(18) = .33, p =.16). A post hoc analysis revealed that extrinsic motivation predicted higher levels of test anxiety (r(18) = 0.52, p = .02).

Discussion

Findings

The purpose of this study was to gain a better understanding of the ways in which motivation-related factors and growth mindset would impact student academic performance. It was hypothesized that participants who reported higher levels of Intrinsic Motivation to engage in academic material would report higher final grades than would those reporting lower levels of Intrinsic Motivation. In contrast, it was predicted that Extrinsic Motivation would negatively predict academic performance. However, results showed that there were no significant relationships between either Intrinsic or Extrinsic Motivation and students' final academic performance.

The hypothesis was based on the findings by Ning (2012) who found that intrinsic interest increased performance. Along with this, Deci and Ryan suggest that extrinsic motivation can have negative effects, due to undermining the intrinsic feeling of self-determination and freedom of choice (E.L. Deci *et al.*, as cited in Lin, 2003). Furthermore, data gathered from past studies on college student Intrinsic and/or Extrinsic Motivation and learning found that students with a moderate levels of extrinsic motivation and high levels of Intrinsic Motivation have higher mean course grades, than those with higher levels of extrinsic motivation and low Intrinsic Motivation (Lin, 2003). Therefore, as extrinsic motivation values outside goals such as achieving a higher grade in a course, or pleasing others, this increases the value of the particular goal, but according to Lin's study, intrinsic interest had a stronger positive effect on student achievement.

It was found that there was a marginally significant relationship between high task value and higher final grades in the course. This reveals that the more interest, usefulness, and importance the student places on the course material, there is predicted to be higher levels of

academic success. These results were predicted as it is believed that the students who place a higher task value in their school work, believing in the positive results the completion of these academic tasks will bring, may then have a higher chance at academic success. As well, it was found that lower testing anxiety predicted higher final grades in the course. Therefore, the less testing anxiety that is present in the academic setting, the more a student is predicted to have higher levels of academic success in the course. This result was predicted to be true due to the inhibiting effects of too much anxiety that can negatively impact students, especially in a testing setting. However, too little anxiety may not be enough to motivate the person physiologically to complete tasks. Likewise, too much anxiety can be inhibiting to the student. The results show that with some, but not too much anxiety, students are predicted to be more academically successful in the course. Increased value of achievement can also increase anxiety, and even more so if the person does not believe they can achieve this goal. Anxiety, beliefs about personal abilities to achieve goals, and other motivating factors are all variables to consider in determining the influencers of academic performance.

Although the results of this study do not support the findings of Lin's 2003 study that higher Intrinsic Motivation leads to higher grades, data was collected on the variety of motivating factors that can contribute to one's academic performance. There was no significant relationship between the student's final grade and self-efficacy for learning, growth mindset, and control of learning beliefs, but it was found that there was a positive relationship between Intrinsic goal orientation and task value. This positive relationship suggests that the more personal incentives there are for a task, there is higher Intrinsic Motivation, which is internally motivated without the need for external rewards or pressures. There was also a positive relationship between Intrinsic interest and self-efficacy for learning, meaning the more in which

the student believes in their ability to succeed, there are predicted higher levels of Intrinsic Motivation. The relationship between Intrinsic interest and self-efficacy for learning can be influenced both ways, meaning one's Intrinsic motivation due to internal reward can influence higher levels of personal belief of the ability to complete a task, and vice versa. In fact, it was found that higher extrinsic motivation leads to increased levels of test anxiety, meaning the more a student was motivated by outside factors, rewards, or pressures, the more prone they were to being anxious taking tests.

Limitations

Limited Sample Size

This research study had limitations in its sample size that may have impacted the results and contributed to a low statistical power of the study. The low power of this study most likely predicted a type 2 error, a false negative. The Type 2 error seen in this study may have been due to the inability to test a larger group of participants, and the lack of comparative value between subjects and their subsequent Intrinsic or Extrinsic Motivation of the student. In addition, due to the limited sample size and response rates, use of academic accommodations and learning disabilities affecting academic performance wasn't analyzed.

Lack of External Validity

Due to the lack of diversity in this sample, these findings are less likely to be generalized to a larger population of people, other situations and settings. Participants consisted of students enrolled in one freshman general education course, Psychology 1001, with all participants being taught by the same professor. This group of students did not represent the larger population of college-aged students. Therefore, this lack of external validity further reduced the power and validity of the study. Additionally, due to the limited responses from students enrolled in the

Educational Access Center who acquire academic accommodations, this sample did not accurately depict the educational experience of motivated strategies with students who have accommodations in school.

Online Administering

While the study was conducted in an effective and timely manner, administering questionnaires online may have contributed to less participation in the study, which further reduced the study's power and external validity. Online administering often leaves researchers feeling uncertain over the validity of the data, and with the inability to monitor participant's engagement, participants may be less likely to complete the survey to its entirety, which then can also negatively impact results.

Recommendations for Future Study

Marginally statistically significant relationships between Intrinsic goal orientation and task value and self efficacy for learning, as well as self-efficacy and task value were statistically significant. Additionally, it was found that both lower test anxiety and higher task value predicted higher grades in the class at a marginally significant level. However, there were no significant findings in which Intrinsic or Extrinsic Motivation predicted higher grades in the class. These results could have been caused by low power in the study. To resolve this, future research may involve the replication of this study using in-person tests, comparing the motivating variables present in multiple subjects, rather than just one, and conducting interviews in addition to the online survey. By closely monitoring the participants and including a comparison between multiple subjects, this will increase the power of the study, increase validity, and produce more accurate results.

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Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	93.482	1.118		83.586	< .001
H_1	(Intercept)	87.106	8.999		9.680	< .001
	Intrinsic_Goal_Orientation	-0.187	0.471	-0.165	-0.396	0.701
	Growth_Mindset	-0.041	0.305	-0.038	-0.133	0.897
	Extrinsic_Goal_Orientation	0.325	0.389	0.369	0.836	0.425

Task_Value	0.911	0.428	1.048	2.12 9	0.06 2
Control_of_Learning_ Beliefs	-0.055	0.423	-0.048	-0.1 29	0.90 0
Self_Efficacy_for_Lea rning	-0.363	0.352	-0.541	-1.0 29	0.33 0
Test_Anxiety	-0.896	0.421	-0.701	-2.1 32	0.06 2

Figure 1

Motivated Strategies Learning Questionnaire

Please rate the following items based on your behavior in this class. Your rating should be on a 7-point scale where **1= not at all true of me** to **7=very true of me**.

1. I prefer class work that is challenging so I can learn new things.
2. Compared with other students in this class I expect to do well
3. I am so nervous during a test that I cannot remember facts I have learned
4. It is important for me to learn what is being taught in this class
5. I like what I am learning in this class
6. I'm certain I can understand the ideas taught in this course
7. I think I will be able to use what I learn in this class in other classes
8. I expect to do very well in this class
9. Compared with others in this class, I think I'm a good student
10. I often choose paper topics I will learn something from even if they require more work
11. I am sure I can do an excellent job on the problems and tasks assigned for this class
12. I have an uneasy, upset feeling when I take a test
13. I think I will receive a good grade in this class
14. Even when I do poorly on a test I try to learn from my mistakes
15. I think that what I am learning in this class is useful for me to know
16. My study skills are excellent compared with others in this class
17. I think that what we are learning in this class is interesting
18. Compared with other students in this class I think I know a great deal about the subject

Figure 1

Motivated Strategies Learning Questionnaire

subject
19. I know that I will be able to learn the material for this class
20. I worry a great deal about tests
21. Understanding this subject is important to me
22. When I take a test I think about how poorly I am doing
23. When I study for a test, I try to put together the information from class and from the book
24. When I do homework, I try to remember what the teacher said in class so I can answer the questions correctly
25. I ask myself questions to make sure I know the material I have been studying
26. It is hard for me to decide what the main ideas are in what I read
27. When work is hard I either give up or study only the easy parts
28. When I study I put important ideas into my own words
29. I always try to understand what the teacher is saying even if it doesn't make sense.
30. When I study for a test I try to remember as many facts as I can
31. When studying, I copy my notes over to help me remember material
32. I work on practice exercises and answer end of chapter questions even when I don't have to
33. Even when study materials are dull and uninteresting, I keep working until I finish
34. When I study for a test I practice saying the important facts over and over to myself

Figure 2

Growth Mindset Scale

Instructions: Read each sentence below and then circle the *one* number that shows how much you agree with it. There are no right or wrong answers.

1. You have a certain amount of intelligence, and you can't really do much to change it.

| Strongly agree | Agree | Mostly agree | Mostly disagree | Disagree | Strongly disagree |

2. Your intelligence is something about you that you can't change very much.

| Strongly agree | Agree | Mostly agree | Mostly disagree | Disagree | Strongly disagree |

3. You can learn new things, but you can't really change your basic intelligence.

| Strongly agree | Agree | Mostly agree | Mostly disagree | Disagree | Strongly disagree |