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## Academic Self-Efficacy, Intrinsic Motivation and Academic Achievement: Moderating Effect of Gender

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### Abstract

Academic accomplishment may be viewed as the cornerstone of socioeconomic progress, technological advancement, and personal success. This study was carried out during the COVID 19 outbreak, whereby the delivery of education was done online.. By using data from 220 students who have studied online at one of the higher education centers in Malaysia, the results of the study using hierarchical multiple regression, indicated that academic self-efficacy and intrinsic motivation have a significant relationship with academic achievement. Moreover, post hoc analyzes show that the relationship between academic self-efficacy and academic achievement is stronger among female students than male students. In addition, the relationship between intrinsic motivation and academic achievement is stronger for female students than for males.

**Keywords:** Academic Achievement, Academic Self-efficacy, Intrinsic Motivation

### Introduction

Education is critical to a student's growth and talents. Outstanding academic success is not only a source of pride for students and their parents, but it is also a critical determinant of their future and that of the country as a whole. Outstanding academic achievement opens up vast opportunities for success in employment and improving the social status of the family, which in turn contributes to the pursuit of the nation's goal. Excellent academic achievement is not simple to attain since it is impacted by a variety of variables and has sparked the attention of researchers (Al Zoubi & Younes, 2015). Academic achievement refers to a student's or institution's progress toward short- or long-term educational goals. Graduation rates may be used to measure institutional performance, whereas grade point averages can be used to analyse student achievement. The academic success of students as well as the development of certain skills and abilities such as communication, decision-making, and leadership are all indications of the efficacy of an educational institution. Academic achievement is the result of a collaborative effort between students and instructors as well

as the use of all sorts of learning resources. A student's success is measured in a variety of ways, including job placement, personal growth, and degree completion (Schroeder, 2011). With the growing variety of students, one of the major priorities is to discover factors that boost higher education students' academic success (Danilowicz-Gosele et al., 2017). Various antecedents of academic performance have been examined in previous research. Several factors have been found to influence academic performance, including learning habits among students, classroom support, family support (Perger & Takacs, 2016), learning motivation (Hsieh, 2014), socioeconomic status and self-concept (Li et al., 2020), organisational citizenship behaviour (Khalid et al., 2010), students' prior academic achievement (Robert, 2013), approaches to learning (Angus, 2004), demographic factors (Hong, 1984), self-efficacy, and achievement motivation (Robbins, 2010). The majority of academic performance research methodologies are quantitative (Perger & Takacs, 2016). Grade point average (GPA) is one of the most widely used metrics for assessing students' academic success (Kuncel et al., 2007). Before the COVID-19 epidemic, most institutions of higher learning, including schools, used a face-to-face delivery approach. Since the outbreak of COVID-19, most education systems throughout the world, from primary to university level, have shifted to e-learning techniques (Mathew & Chung, 2020). Although earlier research has looked at the impact of self-efficacy and intrinsic motivation on academic achievement, the results have been mixed. Higher academic self-efficacy increases academic success over time, according to the most recent meta-analysis, and vice versa (Talsma et al., 2018). However, research has shown no relationship between academic self-efficacy and academic success (e.g., Crippen et al., 2009; Cho and Shen, 2013; Gebka, 2014). The conflicting findings have been attributed to the operationalization of academic self-efficacy, measuring time, and cultural differences (Honicke & Broadbent, 2016). The same situation also exists for the relationship between intrinsic motivation and academic achievement. Studies are needed to see if specific factors, such as gender, impact the effects of academic self-efficacy and intrinsic motivation on academic success. In online learning contexts, more data is needed to demonstrate the link between academic self-efficacy, intrinsic motivation, and academic performance.

Based on the above discussion, this study is carried out to achieve the following objectives:

1. To examine the relationship between self-efficacy, intrinsic motivation, and academic achievement.
2. To investigate whether gender moderates the relationship between self-efficacy, intrinsic motivation, and academic achievement.

## Literature

Academic achievement can be considered the foundation for socio-economic development, science, and technology, as well as success in life. Problems related to student achievement can usually be found in the mass media as well as published in academic journals. Academic achievement measures a student's level of mastery of the field studied. Employers are also accustomed to selecting students with outstanding academic achievements. For policymakers, academic achievement among students of higher learning institutions will determine the formation of human capital and, in turn, contribute to the economic development of the country. The academic achievement of students as well as the development of specific skills and talents, such as communication, decision-making, and leadership, are all indicators of an educational institution's performance. In terms of academic achievement, it is an integrated contribution by students themselves, with the help of

instructors and all types of learning tools available. In general, a person's success is measured in a variety of ways, including job placement, personal growth, and degree attainment (Schroeder, 2011). Academic performance is measured almost exclusively by grades (by course or assignment) and grade point average (GPA). This is not surprising since grades and GPA measures are by far the most readily available indicators of students' academic achievement (York et al., 2015). According to Perna and Thomas (2008), the research identifies three markers of student success: success in tertiary education, academic accomplishment during studies, and the strength and resilience to graduate. Students in higher education nowadays have a variety of educational backgrounds, social status, academic potential, and talents. With the growth in student diversity, one of the main goals is to identify probable characteristics that improve the academic performance of students in higher education (Danilowicz-Gosele et al., 2017).

Researchers and theorists in education have long been interested in the role of intrinsic motivation in academic success. Intrinsic motivation, according to self-determination theory, is the natural urge to participate in an activity out of interest and a desire to expand one's talents and knowledge (Ryan & Deci, 2000). Intrinsic motivation has been defined as having numerous distinct components, including independent mastery, curiosity, and task difficulty (Corpus & Iyengar, 2005). While "independent mastery" refers to the desire to develop abilities or complete a difficult task through mostly independent work (Nicholls, 1984), "curiosity" refers to the enjoyment or curiosity of engaging in tasks, and "challenge" refers to a preference for activities that require effort (Elliot, 1999). Previous studies have supported the relationship between intrinsic motivation and academic performance (Areepattamannil et al., 2011; Erten, 2014; Trevino & DeFreitas, 2014; Vansteenkiste et al., 2006). Hsieh (2014) notes that, depending on the form of motivation, the effect on students' learning often varies. A student with a high level of extrinsic motivation, for example, reported a high level of learning effort (Roebken, 2007), while intrinsic motivation was reported to have a stronger correlation with academic achievement as well as test results (Vansteenkiste et al., 2004).

Self-efficacy is one of the factors that is thought to have a significant impact on training and learning. Bandura (1997) defines self-efficacy as one's belief in one's own ability to comprehend or perform a task to some extent. He added that believing in one's own ability to complete a task is a big part of the achievement that comes from doing it. Self-efficacy is essential for improving academic achievement. When compared to students who are less confident in their abilities, a student with a high level of self-efficacy can learn hard, is effective in the learning process, has stamina, and is not emotionally upset when faced with obstacles (Zimmerman, 2000). Past studies have found that self-efficacy has a significant relationship with academic performance at all levels of education, namely primary, secondary, and tertiary education (Robbins et al., 2004). The link between self-efficacy and academic achievement has been proven in previous research (Choi, 2005; Zhu et al., 2011; Köseolu, 2015).

Although there is considerable evidence to support the direct effects of self-efficacy on academic achievement, very few studies have explored the motivational mechanism that moderates the self-efficacy–achievement relationship, which is necessary to understand how self-efficacy affects students' academic achievement. Huang (2012) conducted a meta-analysis and found that self-efficacy varies by gender, age, and domain, including mathematics and social sciences. From a gender perspective, several studies have revealed that women commonly have higher self-efficacy than men (Mahyuddin et al., 2006; Tenaw,

2013; Huang, 2013). Previous studies have also found a significant difference between males and females in terms of intrinsic motivation (Pascoe et al., 2018; Cortright et al., 2013). A study by Cortright et al. (2013) documented that sex influences the relationship between intrinsic motivation and class performance. This is not surprising since sex differences in how women and men learn and behave in educational settings exist (Slater et al., 2007). Furthermore, the brains of men and women appear to develop differently (Glazer, 2005). Female students reportedly have higher intrinsic motivation than male students for certain courses (Schatt, 2013). This may suggest that the relationship between self-efficacy, intrinsic motivation, and academic achievement may be influenced by gender. Therefore, studies are needed to determine whether the relationship between self-efficacy, intrinsic motivation, and academic achievement is stronger for a particular group of students.

## Methods

***This study's sample consists of students who are currently enrolled in online learning.*** A total of 220 students provided feedback. They consisted of 159 females and 61 males. A total of 173 students are management and accounting majors, while the remaining 47 are in science and technology. The average age of the respondents was 21.96 years, with a minimum age of 19 years and a maximum age of 25 years.

***Data Collection:*** Data was collected using Google Forms, where it was distributed to students through several WhatsApp groups that have been created to facilitate interaction during online learning.

***Measurement:*** Respondents were asked to provide demographic information, including age, gender, and programme of study. The grade point average (GPA) is used to assess a student's academic performance. GPA is the most widely used indicator of academic success and is measured as a ratio scale (York et al., 2015).

***Self-Efficacy.*** This variable was measured using a 3-item scale from (Spreitzer, 1995). A sample item is "I am confident about my ability to do my academic

***Intrinsic motivation.*** This variable was measured using a 7-item scale from Pintrich et al., cited in Hsieh (2014). Sample items are "The most satisfying thing for me in my course is trying to understand the content as thoroughly as possible" and "If I can, I want to get better grades in my course than most of the other students".

***Academic Performance.*** Student's academic performance is measured using Grade Point Average (GPA). GPA is the most frequently used indicator of academic success (York, Gibson & Rankin, 2015).

***Analysis*** - Hierarchical multiple regression was utilized to test the research hypothesis outlined relating to the moderating effect of gender. Aiken and West (1991); Cohen and Cohen (1983); Stone-Romero and Hollenbeck (1984) recommend the use of hierarchical multiple regression in research concerned with the detection of moderating effects. Baron and Kenny (1986) suggest that a moderator effect is most appropriately tested with multiple regression. The general procedure for testing moderating effects was to enter the sets of predictors into the regression equation in the following order. At step 1, the main effects of the ASE and intrinsic motivation were entered. At step 2, the moderator variable of gender was entered into the equation. The two-way interaction terms obtained by multiplying the moderator variable by the independent variables were added at step 3 after controlling for the main effects of the variables involved in each interaction. A significant interaction term would be taken as an indication of a moderating effect (Zhang & Leung, 2002). All the

variables were mean-centered to minimize the threat of multicollinearity in the equation when interaction terms were included (Aiken & West, 1991). Although regression analysis with tests for anticipated interactions are appropriate for assessing the moderating effect of demographic variables, subgroup analysis, and split regression are useful to illustrate the effect. Significant interactions were further analyzed via sub-grouping analysis, in which participants were split into appropriate groups based on hypothesized moderator variables. If the moderator is already in the categorical form such as sex the sample is normally split into dichotomized variables (Sharma et al., 1981). After sub-grouping the respondents, variables were plotted separately for each group on a multiple line graph to aid in interpreting the interaction terms (Aiken & West, 1991; Cohen & Cohen, 1983; Stone-Romero & Hollenbeck, 1984). The independent variable was divided into a low and high scores. The dependent variable was plotted on the Y-axis and the independent variable on the X-axis. Additionally, regression analysis was also used to investigate the relationship between the predictor variable and the criterion variable for each subgroup. The split-group analyses test differences between groups, where the regression is estimated for each group; and then the difference between the regression coefficients are compared (Arnold, 1982; Sharma et al., 1981). A moderator exists if participants in one subgroup have a significantly higher regression coefficient between the predictor and the criterion than those in other groups (Weiner et al., 1992). The use of the graphical method and split regression or simple correlation coefficients to probe the significant interaction effects have widely been used in research (see Aquino & Bommer, 2003; Haworth & Levy, 2001; Tepper, Lockhart & Hoobler, 2001) for post-hoc analysis of the significant two-way interaction.

## Findings

Table 1

### *Descriptive Statistics*

<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>Max</b>	<b>Min</b>	<b>SD</b>
GPA	216	3.31	4.00	2.59	.43
Academic Self-Efficacy	220	3.93	5.00	2.00	.60
Intrinsic motivation	220	3.82	5.00	1.75	.60

Table 1 shows the means, standard deviations, minimums, and maximums of all measures in this study. Academic self-efficacy and intrinsic motivation were measured using the 5-point Likert scale. GPA was measured on ratio scales. As can be seen, all mean scores for academic self-efficacy and intrinsic motivation were above the mid-point of 3. Based on this analysis, it can be said that the students have a relatively high level of academic self-efficacy and intrinsic motivation. In general, the standard deviation values for most of the constructs showed that the observations were rather close to the mean. In terms of GPA, some students have achieved a maximum GPA of 4.00.

Table 2

*Intercorrelations between variables*

Variable	1	2	3
1. GPA	-		
2. Academic Self-Efficacy	.18*	-	
3. Intrinsic Motivation	.17*	.56**	-

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

To measure the extent to which study variables are related, a Pearson correlation was carried out. As can be seen from Table 2, GPA was significantly related to academic self-efficacy ( $r = .18$ ,  $p .05$ ) and intrinsic motivation ( $r = .17$ ,  $p .05$ ). There was also a significant relationship between ASE and intrinsic motivation ( $r = .56$ ,  $p.01$ ).

Table 3

*Hierarchical Multiple Regression Predicting Academic Achievement - GPA*

Independent variables	Academic Achievement (Grade Point Average)		
	Step 1	Step 2	Step 3
Academic Self-efficacy	.09	.13*	.16*
Intrinsic motivation	.08	.13*	.15*
Gender		.04	.04
Academic Self-efficacy*Gender			.37**
Intrinsic motivation*Gender			.31**
R2	.02	.09	.18
$\Delta R2$	.02	.07	.09
F	1.456	2.546*	4.797**

\* $p < .05$ ; \*\* $p < .01$

The results from the hierarchical regression analysis (see Table 3) show that academic achievement measured based on Grade Point Average (GPA) is related to four variables (18% explained variance). In the full model, the four variables that are academic self-efficacy ( $\beta = .16$ ,  $p < .05$ ), intrinsic motivation ( $\beta = .15$ ,  $p < .05$ ), the interaction between self-efficacy and gender ( $\beta = .37$ ,  $p < .01$ ) and interaction between intrinsic motivation and gender ( $\beta = .31$ ,  $p < .01$ ).

To further investigate the significant interaction terms, post hoc analyses were carried out. For the first interaction term which is academic self-efficacy\*gender, split regression conducted revealed that the relationship between self-efficacy and academic achievement is significant and higher for females ( $\beta = .23$ ,  $p < .01$ ) than for males ( $\beta = .16$ ,  $p < .05$ ). The multiple line graph as depicted in Figure 1, indicates that the line representing females is more positively sloped as compared to males.

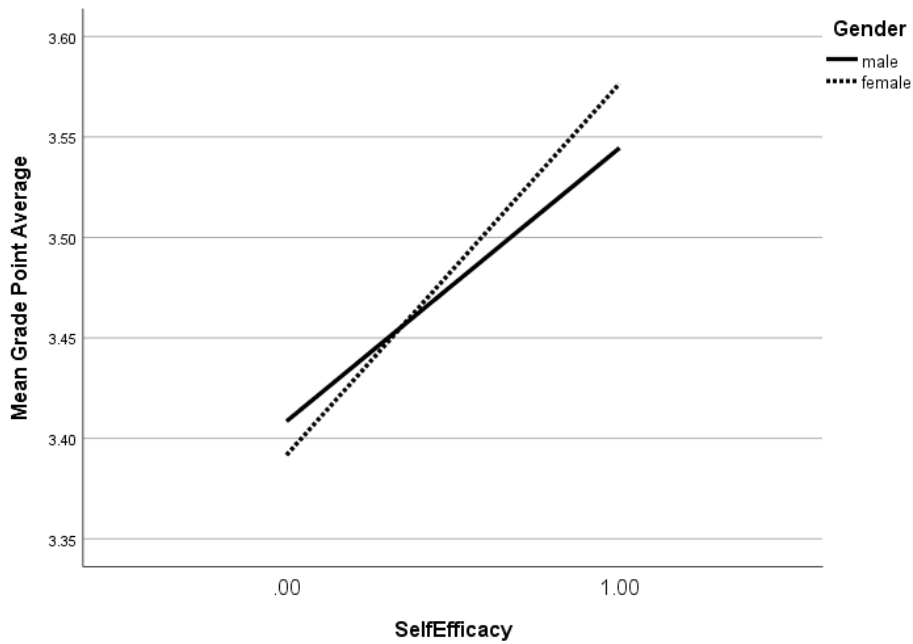


Figure 1 – Interaction between self-efficacy\*gender in predicting academic achievement

For the second interaction term which is intrinsic motivation\*gender, the split regression revealed that the relationship between intrinsic motivation and academic achievement is significant for females ( $\beta=.27, p<.01$ ) but not for males ( $\beta=.01, n.s.$ ). The multiple line graph as shown in Figure 2 shows that the line representing females is more positively sloped as compared to males.

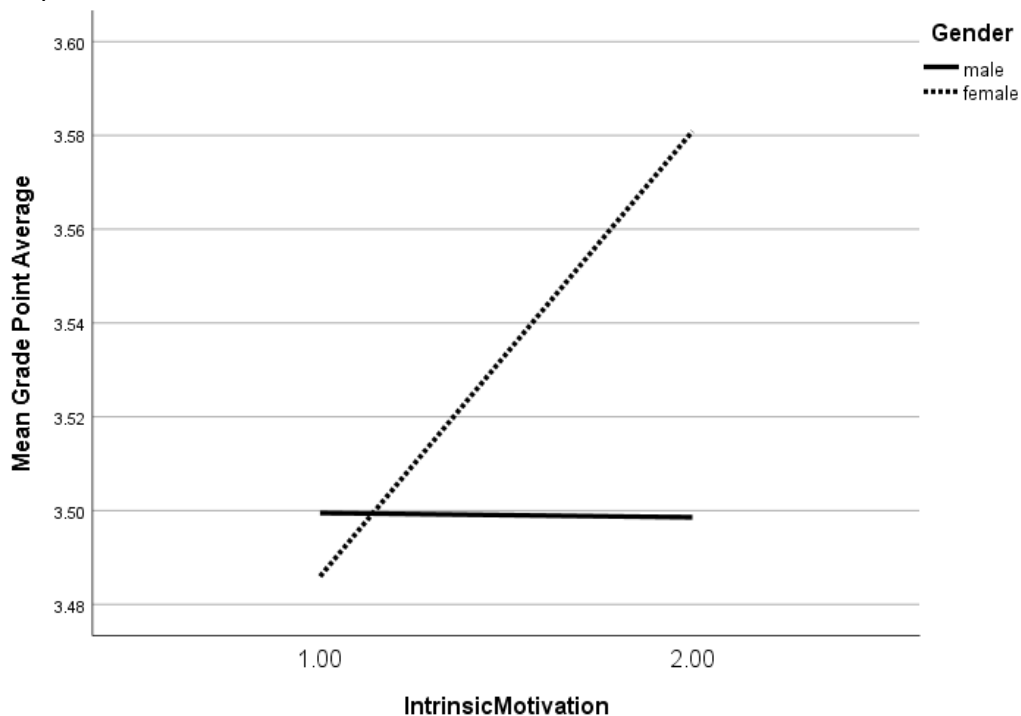


Figure 3 – Interaction between intrinsic motivation\*gender in predicting academic achievement



## Discussions

Academic excellence is one of the areas of research that continues to get the attention of researchers who continuously investigate contributing factors in primary, secondary, and tertiary education. Among the variables that are beginning to gain the attention of researchers as contributors to academic excellence are academic self-efficacy and intrinsic motivation. This study was designed to examine the effect of both on academic performance among Malaysian undergraduates. Additionally, this study used gender as a moderator. The results of this study, which show that self-efficacy and intrinsic motivation contribute to academic performance, have strengthened the argument for the importance of these two variables in explaining the academic success of students. The results of this study are in line with some previous studies (e.g., Vansteenkiste et al., 2004; Choi, 2005). Nevertheless, the role of gender as a moderator is the main contribution of this study. The results of this study clearly show that the positive relationship between the two independent variables, namely self-efficacy and intrinsic motivation, and academic achievement is stronger for females than males. The results of this study can have implications in terms of action plans aimed at improving academic achievement. The results of our study suggest that interventions to improve academic achievement by strengthening learning motivation and self-efficacy must also take into account students' gender. Our sense of self continues to increase as we grow older and have more diverse life experiences. Academic self-efficacy develops throughout time as we learn new abilities, gain new experiences, take risks, and persevere in our efforts to achieve. Bandura identified three important elements of self-efficacy and said that the interaction of these variables is what causes us to develop a substantial belief or doubt in ourselves. Experiences of mastery come first. Building efficacy via self-mastery necessitates the ability to moderate success expectations and accept failure constructively. After conquering the hurdles and recovering from the breakdown, those who succeed have a high feeling of self-efficacy. The second source of efficacy comes from observing others, particularly those with whom we may identify. Seeing or hearing similar individuals achieve success inspires us to believe that if they can do it, so can we. To develop self-efficacy, role models are essential. Those are the individuals we look up to, admire, and want to be like. Their deeds, ideals, and accomplishments instruct and encourage us to do the same. We are more willing to work hard and strive along the path they suggest. In conclusion, the management of higher learning institutions can take some actions to improve self-efficacy among students, especially female students. Among them are providing assignments that challenge students' abilities so that they can gain valuable experiences and using educators as role models who are always visible to students. One of the strategies recommended by Deci and Ryan (2008) to improve intrinsic motivation is to promote autonomy. To achieve intrinsic objectives in all areas of our lives, it is critical to establish the idea that we are in control of what we do, as opposed to a lack of control. In the context of students in higher education institutions, it is interesting to allow them more autonomy. Giving students more flexibility to choose what they want to learn (a broader range of optional courses) or pick their co-curricular activities of interest is one thing that may be done.

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### Authors' Contribution

Both authors have been directly and actively involved in the writing of this article, involved with data collection and data analysis.

### Conflict of Interest Declaration

I/We certify that the article is the Authors' and Co-Authors' original work. The article has not received prior publication and is not under consideration for publication elsewhere. This research/manuscript has not been submitted for publication nor has it been published in whole or in part elsewhere. We testify to the fact that all Authors have contributed significantly to the work, validity and legitimacy of the data and its interpretation for submission.

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