

## **Self – Efficacy and Academic Performance of Freshmen Engineering Students with Preparatory and Non-Preparatory Strands**

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### **Abstract**

The major purpose of this study is to investigate the relationship between the academic self-efficacy and performance of the engineering students with preparatory and non-preparatory strands of Eastern Visayas State University -Ormoc City Campus school year 2020 -2021. Based on the standardized multidimensional self-efficacy scale and academic performance developed by bandura, it was used to determine the respondent's academic self-efficacy and performance. A total of 78 students participated in the survey equally distributed from three different programs the Bachelor of science in Civil Engineering, Electrical Engineering, and Mechanical Engineering. The academic self-efficacy of both preparatory and non-preparatory students varies from low to high, while academic performance indicates that preparatory students have a higher mean grade than non-preparatory students. In comparison to its non-preparatory strand equivalent, the preparatory group showed and demonstrated a significant relationship between self-efficacy and academic performance in terms of subscale test taking. In terms of self-efficacy and academic performance, there was no significant difference between the preparatory and non-preparatory strands for self-efficacy, but a significant difference between the preparatory and non-preparatory strands for academic performance.

**Keywords:** *Self-Efficacy, Academic Performance, Preparatory Strand, Non-preparatory Strand, Senior High School Strand, Senior High School Academic Track*

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## **Introduction**

People's assumptions about their ability to achieve specified performance levels that influence events that impact their lives are referred to as perceived self-efficacy. Self-efficacy principles decide how individuals feel, believe, encourage themselves and act. Via four main processes, such beliefs create these diverse results. They include processes of perception, inspiration, affection and selection.

The study “Academic Self-efficacy and Academic performance of freshmen engineering students with preparatory and non-preparatory strands” is a study of Self-efficacy being a factor that affect a student academic performance that is reflected to their final grade. A student with preparatory strand refers to those students who were enrolled in DepEd senior high school program intended to prepare them for any college engineering program while the non-preparatory strand refers to those students who were enrolled to DepEd senior high school program intended to prepare them for college other than engineering program.

This study is conducted to find out the academic performance of engineering students whose strand in Senior High School is a preparatory for the Program, it refers to students with STEM (Science, Technology, Engineering and Mathematics) track which is considered as preparatory strand, other than STEM are considered non-preparatory. This research study is so interesting and equally important because it will bring new insight when it comes to academic performance and self-efficacy level with regards to the freshmen engineering students who graduated from the DepEd K12 program.

## **Literature Review**

Being able to live in an environment that is inconvenient and full of constraint is something that is not unusual. A person could have had something in him that makes him persevere. On the other hand, in the field of education, study showed that Self-efficacy has a wider impact by improving the effectiveness of metacognitive techniques such as planning and self-regulation—skills that become increasingly relevant as an individual progresses across educational levels and into less ordered and restricted environments (Chemers, et.al 2001).

Students with high academic self-efficacy use more efficient cognitive techniques in learning, better control their time and learning environments, and are better at tracking and regulating their own effort, according to a related report (Chemers, et.al 2001).

In this related study according to Zimmerman, et.al 1992; Students who have a strong sense of academic effectiveness show more perseverance, effort, and intrinsic engagement in their academic work. According to an increasing body of correlational studies, self-regulated

learners use more learning strategies and produce better results than learners who use less self-directed learning strategies (Zimmerman, et.al 1992).

In some related literature the level of target difficulty people set for themselves, the amount of effort they mobilize, and their resilience in the face of difficulties are all influenced by perceived self-efficacy (Zimmerman, et al. 1992). Perceived self-efficacy is thought to have an impact on performance outcomes both directly and indirectly through its effects on self-set goals. In organizational science, this hypothesized relationship has been checked and verified (Bandura, 1993).

The related study conducted by D MacPhee et.al (2015), he examined academic self-efficacy and achievement in Science/Technology/Engineering/Math (STEM) majors who are underrepresented in STEM education and occupations, such as women, ethnic minorities, and people with low socioeconomic status (SES). At the time of enrollment and graduation from a STEM mentoring program, academic performance and self-perceptions of academic skills were evaluated. Despite equal academic success, women considered themselves to be poorer academically than men at entry. Women's academic self-efficacy, on the other hand, was equal to men by graduation. Furthermore, students with dual STEM-minority status, as measured by ethnicity and socioeconomic status, had lower academic self-efficacy and success than students with a single STEM-minority status. Exploratory studies of changes in ethnic/SES groups over time revealed different patterns of change depending on the outcome variable. The fact that women and students from STEM-minority backgrounds had higher academic self-efficacy after completing a mentoring program, regardless of ethnicity or socioeconomic status, suggests that mentoring has a positive effect. The mixed results for students with single and double STEM-minority status at the end of the program highlight the dynamic relationship between social deprivation, academic self-efficacy, and academic success.

This related study examined (a) the relationship between academic performance and the four hypothesized sources of self-efficacy (mastery experience, vicarious experience, social persuasion, and emotional arousal), and (b) the estimation of the key source of self-efficacy that influences academic performance. 178 third-year engineering students were given a 40-item survey evaluating sources of mathematics self-efficacy. Academic success was evaluated, including math module grades and cumulative grade point average (GPA) ratings. The current study's findings revealed a connection between self-efficacy sources and math achievement scores as well as the cumulative GPA of electronics-related engineering diplomas. Furthermore, mastery experience was discovered to be the strongest indicator of

academic achievement in mathematics and associated engineering modules. Finally, recommendations are made to assist curriculum creators in instructional design in order to increase engineering students' academic success. 'Loo et al.' are a group of researchers who have (2013).

In a related study, researchers looked at the role of self-efficacy beliefs in self-regulated learning (SESRL) in predicting academic achievement at the end of junior high school, in addition to previous academic achievement, gender, socioeconomic status, intellect, personality traits, and self-esteem. A total of 170 eighth grade students (87 females) from a junior high school in a small town near Rome took part in the study (Mage=13.47) (Italy). All of the tests were given at the start of eighth grade. SESRL's unique contribution to academic success at the end of the school year was validated by hierarchical regression analysis. There is a discussion of both theoretical and practical implications. A. Zuffiano and others (2011).

This related study investigated the importance of self-efficacy and self-esteem in academic success. The aim of the study was to see whether self-efficacy beliefs and self-esteem have an effect on students' academic performance. A convenient sampling method was used to pick a sample of 100 students (18–36 years, mean =21 years) from the University of Botswana. The study's key finding was that students who have high self-efficacy and self-esteem are more likely to excel academically. Rosenberg is a well-known figure in the Self-esteem and self-efficacy were measured using the Global Self-Esteem and General Self-Efficacy Scales, respectively. The GPAs of the students were used to assess their academic success. There are no important links between academic success, self-efficacy, or self-esteem, according to the findings. Despite the fact that 98.1 percent of respondents said they could get good grades if they wanted to, only 12.2% had a high GPA. Strong self-efficacy students were more likely to have low self-esteem ( $p=.000$ ). Maropamabi, G (2014).

### **Methodology**

This study employs both quantitative and descriptive correlational methods. It is quantitative in nature because it has calculated variables, and descriptive in nature because it shows the relationship between these variables. This study evaluated the academic self-efficacy and academic performance of engineering students enrolled during the first semester of the school year 2020-2021 grouped under preparatory and non-preparatory strand.

1. The level of academic self-efficacy of the engineering students from preparatory and non-preparatory strands.

2. The level of academic performance of the engineering students from preparatory and non-preparatory strands.
3. The significant relationship between the level of academic self-efficacy and academic performance of the engineering students from;
  - 3.1 Preparatory strand; and
  - 3.2 Non-preparatory strand.
4. The significant difference on the academic self-efficacy and performance between the engineering students from;
  - 4.1 Preparatory strand; and
  - 4.2 Non-preparatory strand.

The research questionnaire that was used in this study is an integration from the published research study of Albert Banduras' Multidimensional Self-Efficacy Scales. It measured the self-efficacy of student through two categories which are the self-efficacy for regulated learning and academic achievement. The measure was based on a 4-point liker scale and the dissemination of the questionnaires was made online. The research instrument was adapted from the Multidimensional Self-Efficacy Scale of Bandura with a 0.87 coefficient Cronbach alpha reliability test conducted during its study.

Engineering students enrolled in the first semester of the school year 2020-2021 are the study's respondents. According to the school's Management Information System (MIS), a total of 360 students were enrolled for the first semester, which included all freshmen engineering students who graduated from Senior High School K12, willingly participated, had the support needed to complete the assessment/survey, and are physically, emotionally, and mentally healthy. Participants who did not meet any of the above inclusion requirements were automatically disqualified. The researcher also emphasized that participants/respondents have the absolute right to withdraw their participation or withhold any research study information. With the use of Slovin's Formula, a sample size of 78 out of 360 was found out needed in the participation for the research study.

### Results

**Table 7. Level of Academic Self-efficacy of Preparatory & Non-preparatory strand**

Self-efficacy for Self-regulated learning	Preparatory Strand	Non-preparatory Strand
<b>A. Scheduling of task</b>	<b>3.29</b>	<b>3.37</b>
➤ <i>Plan of school work,</i>	3.33	3.46
➤ <i>Arrange a place to study</i>	3.26	3.35
➤ <i>Organize school work</i>	3.28	3.30

<b>B. Note taking</b>	<b>3.18</b>	<b>3.46</b>
➤ <i>Take class notes of class instruction</i>	3.18	3.46
<b>C. Test taking</b>	<b>3.28</b>	<b>3.29</b>
➤ <i>Study when there is an interesting thing</i>	3.03	3.07
➤ <i>Remembering information presented in class and textbooks</i>	3.23	3.17
➤ <i>Motivate self to do school work</i>	3.49	3.69
➤ <i>Concentrate on school subjects</i>	3.41	3.41
➤ <i>Participate in class</i>	3.23	3.12
<b>D. Researching &amp; writing paper</b>	<b>3.09</b>	<b>3.04</b>
➤ <i>Use library to get information for class assignment</i>	2.67	2.82
➤ <i>Finish homework assignments within deadline</i>	3.51	3.25

Legend: 3.26 – 4.0 High ; 2.51 – 3.25 Moderate; 1.76 – 2.50 Fair; 1.0 – 1.75 Low

**Table 8. Academic performance of Preparatory & Non-preparatory Strand**

Course	Preparatory Strand	Non-preparatory Strand
Civil	2.23	2.24
Mechanical	2.40	2.62
Electrical	2.67	3.15
Overall	2.43	2.67

Legend: 1.00 – 1.50 – Superior; 1.60 – 2.00 – Very Good; 2.10 – 2.50 – Good; 2.60 – 3.00 – Fair/Passing; 3.10 – 5.00 – Conditional or Failure

**Table 9. Correlations between GPA and academic self-efficacy mean scores and its subscales in preparatory students**

Variables	1	2	3	4	5	6
1. Scheduling of tasks	1					
2. Note taking	.252	1				
3. Test takings	.572**	.438**	1			
4. Researching and writing papers	.127	.496**	.253	1		
5. Overall self-efficacy	.789**	.616**	.876**	.505**	1	
6. Academic Performance	.071	.223	.350*	.235	.296	1

\*\* . Correlation is significant at the 0.01. and \* at the 0.05 level (2-tailed).

**Table 10. Correlations between GPA and academic self-efficacy mean scores and its subscales in non-preparatory students**

Variables	1	2	3	4	5	6
1. Scheduling of tasks	1					
2. Note taking		1				
3. Test taking		.098	1			
4. Researching and writing paper	.557**	.254	.442**	1		
5. Overall self-efficacy	.865**	.379*	.879**	.701**	1	
6. Academic Performance	-.125	-.053	.076	.014	-.011	1

\*\* . Correlation is significant at the 0.01. and \* at the 0.05 level (2-tailed).

**Table 11. Test of Significant Difference of Group Academic self-efficacy**

Self-Efficacy	Course	Strands	t	df	P
Schedule of tasks	Civil	Preparatory	-1.193	24	.245
		Non-preparatory			
	Mechanical	Preparatory	.242	24	.811
		Non-preparatory			
	Electrical	Preparatory	-.510	24	.615
		Non-preparatory			
Note takings	Civil	Preparatory	-1.929	24	.066
		Non-preparatory			
	Mechanical	Preparatory	.299	24	.767
		Non-preparatory			
	Electrical	Preparatory	-1.594	24	.124
		Non-preparatory			
Test takings	Civil	Preparatory	-.530	24	.601
		Non-preparatory			
	Mechanical	Preparatory	.713	24	.483
		Non-preparatory			
	Electrical	Preparatory	-.859	24	.399
		Non-preparatory			
Researching and writing papers	Civil	Preparatory	1.213	24	.237
		Non-preparatory			
	Mechanical	Preparatory	.645	24	.525
		Non-preparatory			
	Electrical	Preparatory	-1.057	24	.301
		Non-preparatory			
Overall Self-efficacy	Civil	Preparatory	-.853	24	.402
		Non-preparatory			
	Mechanical	Preparatory	.653	24	.520
		Non-preparatory			
	Electrical	Preparatory	-1.190	24	.246
		Non-preparatory			

\*Significant at  $p = 0.05$ **Table 12. Test of Significant Difference of Group Academic Performance**

Academic performance	Course	Strands	t	df	P
Grade Point Average (GPA)	Civil	Preparatory	.070	24	.944
		Non-preparatory			
	Mechanical	Preparatory	-2.471	24	.021*
		Non-preparatory			
	Electrical	Preparatory	-1.645	24	.113
		Non-preparatory			
	Overall	Preparatory	-2.041	76	.045*
		Non-preparatory			

\*Significant at  $p = 0.05$

## Discussion

1. The level of academic self-efficacy of the engineering students from preparatory and non-preparatory strands.

Level of Academic Self-efficacy of sub-scale Scheduling of task, Note taking, Test taking, Researching & writing with strands preparatory and non-preparatory having mean scores of  $M=3.29$ ,  $M=3.37$ ;  $M=3.18$ ,  $M=3.46$ ;  $M=3.28$ ,  $M=3.29$ ;  $M=3.09$ ,  $M=3.04$  respectively, this values falls within the range of moderate to high. This result indicates that self-efficacy is not affected by the type of strand taken in senior high school.

2. The level of academic performance of the engineering students from preparatory and non-preparatory strands.

Level of Academic performance for programs BSCE, BSME, & BSEE with strands preparatory and non-preparatory having mean grade are  $M=2.23$ ,  $M=2.24$ ;  $M=2.40$ ,  $M=2.62$ ;  $M=2.67$ ,  $M=3.15$  with overall mean of  $M=2.43$ ,  $M=2.67$  respectively, this values falls within the range of passing to good. This result indicates that academic performance is not totally dependent to the type of strand taken in senior high school.

3. The significant relationship between the level of academic self-efficacy and academic performance of the engineering students from;

- a. Preparatory Strand; &
- b. Non-preparatory Strand

Significant relationship to the level of self-efficacy & performance between prep & non-prep; between the level of self-efficacy and performance among preparatory student it exhibited a significant relationship between the subscale test taking and performance while there is no significant relationship between all level of self-efficacy subscale and performance for the non-preparatory strand students. It displayed that when it comes to test taking the preparatory students do better compared to non-preparatory strand students.

4. The significant difference on the academic self-efficacy and performance between the engineering students from;

- a. Preparatory Strand; &
- b. Non-preparatory Strand

Significant Difference to the level of self-efficacy & performance between prep & non-prep; as to the significant difference in the level of self-efficacy between preparatory and non-preparatory students it shows that there is no significant difference which means that both groups are well-versed when it comes to self-efficacy with all its subscale which means that



the prior training is good. Also, with regards to the significant level of academic performance between preparatory and non-preparatory it came out that there is significant difference, which means that prior training in science and math subject have impact to their performance level as reflected to their GPA.

### Conclusion

Based on the study conducted, it is therefore concluded that a special tutorial program be given to the non-preparatory group of students in particular the mathematics subjects such as Algebra, Trigonometry, Calculus, and Analytic Geometry. Also, based from the data analysis which shows a slight difference in the academic performance between preparatory and non-preparatory group of students, with preparatory group performance higher compared to the non-preparatory group. Thus, it is therefore recommended the institution should establish a program that will address the special training program of the non-preparatory group in a form of tutorial sessions.

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