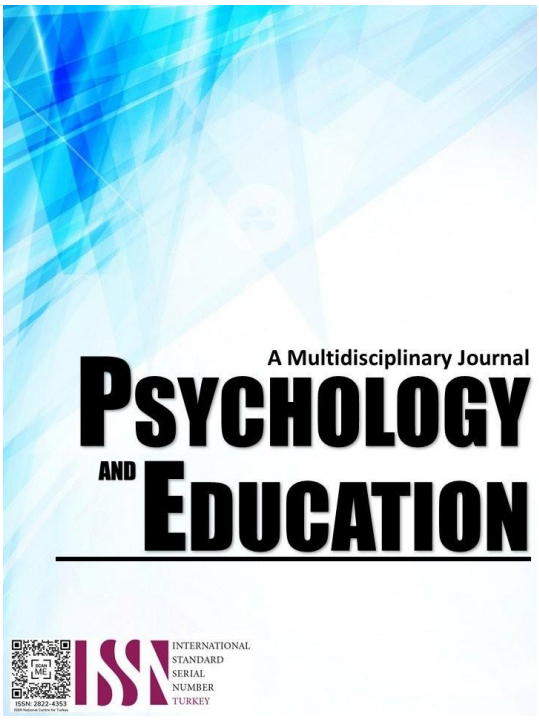
MODELLING THE IMPACT OF SELF-EFFICACY BELIEFS, ENGAGEMENT AND TRIARCHIC INTELLIGENCE OF GRADE 10 STUDENTS' MATHEMATICS ACHIEVEMENT



PSYCHOLOGY AND EDUCATION: A MULTIDISCIPLINARY JOURNAL

Volume: 29
Issue 7
Pages: 1079-1093
Document ID: 2024PEMJ2802
DOI: 10.5281/zenodo.14566790
Manuscript Accepted: 11-15-2024

Psych Educ, 2024, **29**(7): 1079-1093, Document ID:2024PEMJ2802, doi:10.5281/zenodo.14566790, ISSN 2822-4353

Research Article

Modelling the Impact of Self-efficacy Beliefs, Engagement and Triarchic Intelligence of Grade 10 Students' Mathematics Achievement

Grace Mae G. Flores, * Diobein C. Flores
For affiliations and correspondence, see the last page.

Abstract

This study developed a model of self-efficacy beliefs, engagement and triarchic intelligence on mathematics achievement of 1148 Grade 10 students in the Division of Davao del Norte who were enrolled in the school year 2017-2018. It investigated the relationship among variables and determined the variables that best predict mathematics achievement as well as the best fitting structural model on achievement. The study utilized a descriptive correlational and causal-comparative research design. Pearson-r, mean, standard deviation, and regression analysis are the statistical tools used in this study. Structural equation model (SEM) was shown to find the best fit model of the study. Modified survey questionnaires were used for self-efficacy scale, engagement scale and triarchic intelligences scale while Division Unified Test was used to measure the mathematics achievement. The findings of the study showed that students did not meet the expectation in mathematics achievement were lacked of knowledge and skills in terms of mastering the content area in the topic for the first quarter of the said school year. Self-efficacy beliefs, engagement and triarchic intelligences were at moderate level. Behavioral engagement and verbal persuasion of self – efficacy belief were the predictors of the achievement. Among the five structural models, only model 5 consistently indicate a very good fit model to the data, since both self-efficacy and engagement contributed much to the mathematics achievement with the total effects of 7% and 17% respectively. This model indicates that the mathematics achievement of the students is best anchored on their self-efficacy and engagement. Thus, the model suggests that the more engaged the students are, coupled with self-efficacy beliefs, the better and higher is the achievement of the students.

Keywords: *triarchic intelligences, engagement, self-efficacy beliefs, mathematics achievement*

Introduction

In a mathematical world, students who can do and understand mathematics have opportunities which others do not have. Mathematics need not be tough for anyone, or even if it is difficult as experienced by many, it can still be enjoyed and appreciated as it should be so that an individual may reach a certain point of achievement. The enjoyment of the subject depends on how significant and dynamic the person's perception is.

The low achievement score of the Filipino students of the National Achievement Test (NAT) is one of the indicators of a defective education system. The Division of Davao del Norte has noted the poor performance of its students in mathematics during the Achievement Test. When the K to 12 started having the National Achievement Test (NAT), the data revealed that the NAT of the school year 2012-2013 was only 64.89. In the second year, 2013-2014, the mean percentage score was only 67.39%. Moreover, the result revealed a poor performance of students in Davao del Norte. Mathematics achievement was 71.45% only (DepED NAT Result, 2013). Additionally, Filipino students' performance in Math needs to be improved as reflected in the 2016-2017 Global Competitiveness Report as the Philippines ranked 79th out of the 138 participating countries in terms of the quality of Science and Math education. This report is consistent with the Department of Education's (DepEd) National Achievement Test (NAT) results, in which the Mean Percentage Score in Mathematics was 48.63% a score below the 50 percent requirement of DepEd based from the report of Capuno et al. (2019).

Across the globe, achievement in mathematics among secondary school students is influenced by a range of factors including mathematics anxiety (Sosnowski, 2017) and instructional design (Libienski et al., 2008) thus pointing out that Asian students realize that understanding is a better way than rote memorization. All their findings could be concluded that math ability perceptions affect students' valuing of math and their expectations for achievement. Thus, in the concluding statement of Simbulas (2018) that there are many studies conducted in line with identifying factors that contribute to the understanding of students' achievement, there are also many factors added to presumed ones among the ordinary thinker.

Consequently, as observed by the researcher, most of the students are afraid of mathematics and they scratch their heads when the teachers start their lessons especially if the topic is on word problem-solving. This observation is evident because, during the submission of the frequency of error every quarter, the least-learned competencies are more on word problems. This urged the researcher to conduct this study to help in the improvement of the students' academic career.

Thus, this current study considers other factors such as self-efficacy beliefs, engagement and triarchic intelligences since there has been no adequate research conducted in the Division of Davao del Norte which established a firm connection between these factors. In parallel to this existing problem, this prompted also the researcher to conduct the study to find the strength of relationships between self-efficacy beliefs, engagement and triarchic intelligences using structural equation model to reveal the appropriate pedagogy that could lead to having a better teaching-learning process specifically in a mathematical perspective.

Research Questions

This study determined which among self-efficacy beliefs, engagement and triarchic intelligences could significantly affect the mathematics achievement of the students in the Division of Davao del Norte for the school year 2017-2018.

1. What is the level of achievement of Grade 10 students in Mathematics?
2. What is the level of self-efficacy beliefs of Grade 10 students in mathematics in terms of mastery experience, verbal persuasions, vicarious experience and psychological states?
3. What is the level of engagement of Grade 10 students in terms of cognitive, affective and behavioral?
4. What is the level of triarchic intelligences of Grade 10 students in terms of analytical, creative and practical?
5. What relationships exist between Mathematics Achievement, self-efficacy beliefs, engagement and triarchic intelligences of Grade 10 students?
6. Which variable best predicts the achievement of Grade 10 students in mathematics?
7. What structural model best fits in determining the achievement of Grade 10 students in Mathematics?

Methodology

Research Design

The researcher used descriptive, correlational, and causal-comparative research designs. Correlational studies are non-experimental, which means that the experimenter does not manipulate or control any of the variables (Kendra, 2023). In this study, descriptive-correlational design was used to describe and determine the relationship between self-efficacy beliefs, triarchic intelligence and engagement toward mathematics achievement. A descriptive correlational design also was used because it deals with quantitative data about the problem while causal-comparative research was used to determine the cause or consequences of the differences that already exist between the variables (Fraenkel, 2006). By adopting this approach, this study aimed to identify and analyze the specific factors within the domains of self-efficacy beliefs, triarchic intelligence and engagement that substantially influence the mathematics achievement. The researcher also determined which among the self-efficacy beliefs, triarchic intelligence and engagement variables affect the mathematics achievement and sought possible causes.

Respondents

The participants of the study comprising of 1148 Grade 10 students from secondary public schools. These students were coming from the different schools of the different clusters in the Division of Davao del Norte and were enrolled for the school year. The said division is comprised of 34 schools from 4 different clusters. Using cluster sampling, the participants were randomly selected from different schools in the different clusters. Cluster 1 comprised of 363 samples or 28% , Cluster 2 has only 160 samples or 19%, Cluster 3 has 405 samples or 30% while Cluster 4 has 230 participants or 23%. These students also belonged to the K to 12 curricula and were considered to be active participants in both academic and school-related activities.

Instrument

Four instruments were used and validated to gather data for this study. Triarchic Intelligences survey questionnaire which was adopted and developed based on the Sternberg Triarchic Intelligence Test in his book entitled “Gifted Child Quarterly Engagement survey questionnaire, Self-efficacy Beliefs survey questionnaire, and mathematics achievement test utilizing the Division Unified Test in First Quarter Examination for the school year 2017 – 2018. The survey questionnaires were pilot tested to students to measure its internal consistency or reliability and the data on students’ responses were encoded and analyzed using SPSS which was validated by the panel of experts and external validators to ensure the questionnaire's appropriateness for the study context. The questionnaires were modified to align with the variables setting. Additionally, items were simplified and translated into the vernacular to enhance respondent comprehension. Triarchic intelligences has a Cronbach’s alpha score of 0.910 which denoted a good internal consistency. For the Engagement Survey Questionnaire was underwent a reliability test with a Cronbach’s alpha of 0.880 which has acceptable internal consistency. And for self-efficacy survey questionnaire with a Cronbach’s alpha of 0.922, denoting a good internal consistency. The rating was based on the five (5) point scales with 1 representing “Never,” 2 (Seldom), 3 (Sometimes), 4 (Oftentimes) and 5 (Always) were used as a basis of determining the intelligence of the students. Meanwhile, to obtain the data for students’ achievement, the Division Unified Test (DUT) results for the First Quarter of the School Year 2017-2018 was utilized. This DUT was prepared by the selected Mathematics Teacher-writers in the division. A Table of Specification was laid following the 40 competency-based items and used to identify the achievement domains range from 74 and below (Did not meet Expectations), 75–79 (Fairly Satisfactory), 80–84 (Satisfactory), 85-89 (Very Satisfactory) and 90-100 (Outstanding). The pilot testing was done only during the mathematics period of the teachers to ensure that there is no interruption of other classes.

Data Analysis

This research employed different statistical tools like Mean, Pearson (r), Multiple Linear Regression and Structural Equation Modelling. Mean which was used to determine the proficiency level of the students, Pearson Product Moment Coefficient Correlation (Pearson r) was used to find the relationship between the variables self-efficacy, triarchic intelligences, engagement and Mathematics achievement

of the students, Multiple Linear Regression was used to determine which domain in self-efficacy beliefs, engagement and triarchic intelligences significantly influence the mathematics achievement and Structural Equation Modelling to assess the best fit among the models and to determine the validity of the hypothesized model. In evaluating the models, the following criteria indexes were computed such as CMIN/DF, Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), the P of close Fit (p-close), Normed Fit Index (NFI) and Goodness of Fit Index (GFI). All of these indices should be greater than 0.95 to indicate a good fit based from the four hypothesized structural model.

To ensure the ethical consideration of the study, this follows the guidelines and principles in conducting the research. The informed consent given to the cluster heads was kept in maintaining the privacy and confidentiality of collected data, upholding integrity and honesty throughout the research process.

Results and Discussion

Level of Students' Mathematics Achievement

The mathematics achievement level of students under K to 12 programs presented in the table. It shows that the level of the participants belongs to the lowest level of proficiency which did not meet the expectation. The over-all mathematics performance of Grade 10 students falls at the 74 and below bracket. This means that the students do not possess the minimum knowledge, skills and understanding and they struggle to understand the prerequisite to learn the concepts. This implies that the students undergo remedial classes for learning areas and comply all the requirements set by the K to 12 Curriculum Guide.

Table 1. *Level of Students' Mathematics Achievement*

Transmuted Grade	Frequency	Percentage	Level of Proficiency
90 -100 (84.00 - 100)	0	0%	Outstanding
85 – 89 (76.00- 83.99)	0	0%	Very Satisfactory
80 – 84 (68.00-75.99)	3	0.2%	Satisfactory
75 – 79 (60.00 – 67.99)	51	4.4%	Fairly Satisfactory
74 and Below (0 – 59.99)	1115	95.4%	Did not meet Expectations

Legend: Mean: 39.09 SD:10.46 Description: Did not meet expectations

The result signifies that there is difficulty among students in mastering the content area of the topics in the first quarter of the said school year. The result confirmed in the study by Alingay (2017) that the observed poor performance in mathematics test has been a matter of serious concern to all well-meaning education as she mentioned in her study that mathematics is the second most difficult area in the subject test in elementary and high school. The lack of competence in mathematics is the root of the country's poverty. A similar result was found in the study of Cordova (2015) about the performance involving Grade 9 private high schools in Bukidnon.

Level of Self-efficacy Beliefs

The data is shown in Table 2 with its four indicators. The result shows the overall mean of 3.33 with a descriptive equivalent of moderate. It implies that most of the students have a neutral belief since they responded to a moderate descriptive level. This means that students sometimes observed the activities applied by their teachers inside their classroom.

Although, all the indicators in self-efficacy beliefs were rated by the participants at a moderate level, activities in vicarious experiences were observed by most of the students. Students feel better and satisfy about the mathematics related activities. They also feel confident and motivated in doing math activity.

The result conforms in the statement of Bandura (1994) that self-efficacy increases when you can relate to your model or models. If the students are surrounded by the interactions with people who are not successful, even trying hard to be motivated by these challenges, still, this will undermine the efforts. Developing self-efficacy beliefs within the students inside the classroom environment is very important.

Table 2. *Summary of Self-Efficacy Beliefs*

Indicators	Mean	Standard Deviation	Qualitative Description
Vicarious Experiences	3.36	1.16	Moderate
Mastery Experiences	3.33	1.12	Moderate
Verbal Persuasion	3.32	1.15	Moderate
Psychological States	3.29	1.16	Moderate
Overall	3.33	1.15	Moderate

Level of Engagement

Table 3 shows the level of students in engagement with the overall mean of 3.37 with a descriptive equivalent of moderate level. This means that students have enough involvement in the classroom and extracurricular activities; they have a sense of belongingness and a general sense of liking toward school.

It can be gleaned also in the table that both behavioral and affective engagements got the same mean of 3.39 with a moderate level. This indicates that students are attentive in learning activities and they have sense of belongingness. As emphasized by Fredericks et al (2004) that having these engagements help correspond to the developmental needs of the students for competency, autonomy and relatedness in school.

Table 3. *Summary of the Level of Engagement*

Indicators	Mean	Standard Deviation	Qualitative Description
Behavioral	3.39	1.21	Moderate
Affective	3.39	1.17	Moderate
Cognitive	3.32	1.19	Moderate
Overall	3.37	1.19	Moderate

The result is supported by Wang and Peck (2013) emerged with the notion that students' perceptions of the school environment influence their motivation for academic achievement that can be influenced by these three types of engagement.

Level of Triarchic Intelligence.

Table 4 presents a summary of the level of triarchic intelligence. The descriptive analysis shows that the level of the students in triarchic intelligence has an overall mean of 3.34 which falls at moderate level. This means that most of the students sometimes observed analytical, creative and practical activities inside the classroom.

The table also reveals that practical intelligence got the highest mean of 3.36 with a descriptive equivalent of moderate. This means that most of the students acquired doing everyday activities through various means. They have their learning in real life and they have a positive feeling of belongingness to school because they enjoyed interacting with their peers or like their teachers.

The result is supported by the statement of Drebin (2014) that students should be aware of their capabilities and see how to connect the skills from one area to another.

Table 4. *Level of Triarchic Intelligences*

Indicators	Mean	Standard Deviation	Qualitative Description
Practical	3.36	1.14	Moderate
Analytical	3.34	1.16	Moderate
Creative	3.33	1.17	Moderate
Overall	3.34	1.16	Moderate

Relationship of the Variables and Mathematics Achievement

Table 5 shows the correlation between triarchic intelligence, engagement and self-efficacy beliefs and mathematic achievement of the students. This table follows one of the objectives of this study. It shows that the triarchic intelligences, engagement, and self-efficacy beliefs variables were correlated to mathematics achievement. This implies that the students' acquired engagement and self-efficacy beliefs have contributed to the mathematics achievement of the students as reflected in the p-value results ($p<0.01$), while, triarchic intelligences and indicator of self-efficacy beliefs which is vicarious experiences also contributed to mathematics achievement as shown in the p-value ($p<0.05$).

Table 5. *Relationship of Variables and Mathematics Achievement*

	Mathematics Achievement	
Variables	r	p-value
Self-Efficacy Beliefs	.148	.000**
Mastery Experiences	.096	.001**
Vicarious Experiences	.075	.011*
Verbal Persuasion	.141	.000**
Psychological States	.131	.000**
Engagement	.139	.000**
Behavioral Engagement	.159	.000**
Affective Engagement	.094	.001**
Cognitive Engagement	.116	.000**
Triarchic Intelligences	.072	.014*
Analytical	.057	.049*
Creative	.073	.012*
Practical	.063	.014*

Legend: **. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed)

Significantly, in the claim of Akram et al. (2014) agreed the result that students display better performance and receive superior evaluation when they possess higher self-efficacy.

In this connection, the null hypothesis was rejected stating that "there is no significant relationship between self-efficacy beliefs; triarchic intelligences, engagement and mathematics achievement of the Grade 10 students. This entails that a significant relationship was exist between self-efficacy beliefs, triarchic intelligences and engagement. This further shows that there is a connection between self-efficacy beliefs, triarchic intelligences and engagement to the mathematics achievement.

Predictors of Mathematics Achievement

Presented in Table 6 is the multiple regression analysis. Among the ten independent variables, only two were found to be meaningful and significant predictors of the mathematics achievement. These are behavioral indicator of engagement and verbal persuasion indicator of self-efficacy beliefs. The R2 value which is 0.034 means that at most 3.4% of the variance of the achievement is explained by these independent variables in the model.

Table 6. *Predictors of Mathematics Achievement*

Independent Variables	Unstandardized Coefficients		Standardized Coefficients		
	B	Std.Error	Beta	t	Sig.
Constant	29.471	1.596	18.462	.000	
SELF-EFFICACY					
Verbal Persuasion	1.4632	.460	.098	3.182	.002
Mastery Experience	0.2170	.181		1.200	.231
Vicarious Persuasion	0.4589	.765		1.910	.066
Psychological State	-0.4071	.243		-1.670	.095
ENGAGEMENT					
Behavioral	1.4060	.347	.124	4.051	.000
Affective	0.8170	.233		3.490	.236
Cognitive	-0.1592	.223		-0.712	.476
TRIARCHIC INTELLIGENCES					
Analytical	-0.2853	.235		-1.210	.226
Creative	0.2256	.234		0.960	.335
Practical	-0.1213	.231		-0.520	.601

Note: r=0.183, r^2=0.034, F-ratio=20.227, p-value=.000
Dependent: Mathematics Achievement

Moreover, it can be concluded that for every increase in the self-efficacy, there is a corresponding increase in mathematics achievement as evidenced by their beta values .098 and 0.124, respectively. This means that the high levels of behavioral engagement and verbal persuasion of self-efficacy beliefs result in a good classroom climate for learning of the students.

The result is aligned with the theory of Parsons et al. (2014) that when the students are more engaged, they maintain positive attitudes toward learning which results to higher achievement following the tasks that engagement is associated with student achievement, teachers can increase and decrease student engagement and there are variety of ways to evaluate student engagement. Together with Ouweneel et al. (2011) that self-efficacy is positively related to engagement which leads to a greater willingness to expend additional energy and effort in completing a task or an assignment.

Structural Models of Mathematical Achievement

The hypothesized models were evaluated in terms of measures of fit and other statistical significance of coefficients. Also, the fit indices are provided which describe the model fit. Hence, the structural equation models were developed to investigate their correspondence. The discussion on these models is presented as well as their implications for understanding the impact of exogenous variables on the endogenous variables.

Structural Model 1

The structural model 1 depicts a network of the causal relationship of following exogenous variables: Triarchic Intelligence (TRIARIN), Engagement (ENGAG) and Self-efficacy Beliefs (SEFFIC) and an endogenous variable Mathematics Achievement (ACHIEV). Specifically, the causal relationships are being illustrated: (1) Triarchic Intelligences with the following indicators: analytical (ANAL), creative (CREA) and practical (PRAC); Engagement having the following indicators: cognitive engagement (COGN), behavioral engagement (BEHA) and affective engagement (AFFEC). While Self-efficacy Beliefs comprised of mastery experience (MAST), verbal persuasion (VERB), vicarious experience (VICA) and psychological states (PSYC) which labeled Model 1 for the possibility of model development based on the modification. Exogenous variables in this study are Triachic Intelligence, Engagement and Self-efficacy beliefs while

Mathematics Achievement is the endogenous variable.

Outcomes showed that the amount of variance explained by the combined influence of triarchic intelligence, engagement and self-efficacy beliefs is 3% only. Moreover, the latent variables namely: self-efficacy beliefs and engagement strongly contribute to the variations of their observed variables with beta values 93% while triarchic intelligence moderately contributes to the variation of the

observed variables as shown in Figure 1.

The standardized estimates of direct, indirect and total effects of exogenous variables to endogenous variables are shown in Table 7. Also, among the exogenous variables, only self-efficacy beliefs have a great influence on mathematics achievement. In the same manner, engagement acted a role on the Mathematical achievement of the students together with triarchic intelligence.

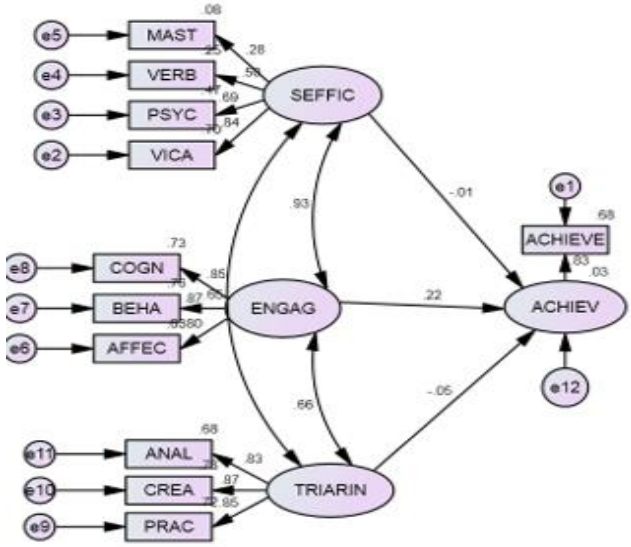


Figure 1. *Structural Model 1 on Mathematics Achievement*

Legend: *SEFFIC – Self Efficacy Beliefs* *MAST – Mastery experience* *VERB - Verbal Persuasion* *PSYC – Psychological State* *VICA – Vicarious Experience* *ENGAGE-Engagement* *COGN – Cognitive Engagement* *AFFEC- Affective Engagement* *BEHA-Behavioral Engagement* *ACHIEV – Mathematics Achievement* *TRIARIN – Triarchic Intelligences* *ANAL – Analytical Intelligence* *CREA – Creative Intelligence* *PRAC – Practical Intelligence*

Table 7. *Standardized Direct, Indirect and Total Effects Estimates of Structural Model 1*

Latent Variables	Direct Effect	Indirect Effect	Total Effect
Triarchic Intelligences	-0.05	0	-0.05
Self-efficacy Beliefs	0.22	0	0.22
Engagement	-0.01	0	-0.01

Presented in Table 8 is the standardized regression weight of structural model 1. This is the effects of the latent variables and between measured and latent variables to come up with regression weights. The results indicate that the three variables: triarchic intelligence, engagement and self-efficacy beliefs are significant (p>0.05). This means that these variables predict mathematics achievement. The model further suggests that Mathematics achievement is strongly predicted by triarchic intelligences, engagement and self-efficacy beliefs.

Table 8. *Standardized Regression Weights of Structural Model 1*

Variables			B	S.E.	C.R	Beta	P-value
ACHIEV	<---	SEFFIC	-.075	2.218	-.034	-.006	.973
ACHIEV	<---	ENGAG	2.814	2.244	1.254	.222	.210
ACHIEV	<---	TRIARIN	-.590	.634	-.931	-.050	.352
ACHIEV	<---	ACHIEV	1.000			.825	
VICA	<---	SEFFIC	1.000			.837	
PSYC	<---	SEFFIC	.787	.032	24.661	.689	.000
VERB	<---	SEFFIC	.504	.029	17.127	.505	.000
MAST	<---	SEFFIC	.311	.034	9.069	.279	.000
AFFEC	<---	ENGAG	1.000			.795	
BEHA	<---	ENGAG	1.188	.036	33.286	.874	.000
COGN	<---	ENGAG	1.147	.035	32.394	.854	.000
PRAC	<---	TRIARIN	1.000			.850	
CREA	<---	TRIARIN	1.049	.030	35.168	.872	.000
ANAL	<---	TRIARIN	.924	.028	33.081	.826	.000

Legend:
SEFFIC – Self-efficacy beliefs *ENGAG – Engagement* *TRIARIN – Triarchic Intelligence* *VICA – Vicarious Experience* *PSYC – Psychological States* *AFFEC – Affective engagement* *BEHA – Behavioral engagement* *COGN – Cognitive engagement* *PRAC – Practical Intelligence* *CREA – Creative Intelligence* *VERB – Verbal Persuasion* *ANAL – Analytical Intelligence* *MAST – Mastery Experience* *ACHIEV – Mathematics Achievement*

Table 9. *Standard Fit Indices Structural Model 1*

STANDARD FIT	STANDARD	MODEL I FIT VALUE
CMIN/DF	< 2.00	18.841
P-value	> 0.05	0.000
NFI	> 0.95	0.894
TLI	> 0.95	0.858
CFI	> 0.95	0.899
GFI	> 0.95	0.895
RMSEA	< 0.05	0.124

Legend: CMIN/DF –Chi-square/Degrees of Freedom NFI – Normed Fit Index
GFI – Goodness of Fit Index TLI – Tucker-Lewis Index
RMSEA – Root Mean Square Error of Approximation CFI – Comparative Fit Index

Displayed in Table 9 is the standard fit index of structure model 1 which the values do not fit the standard value. Thus, results revealed that the model did not fit the data. This is indicated by CMIN/DF > 2, p-value < 0.05. Likewise, the other indices such as NFI, TLI, CFI, GFI, and RMSEA also suggest a poor fit of the model to the data as all the index values do not fall within each criterion.

This implies that the first structural model is not a fit model because the resulting values do not fit the standard values.

Structural Model 2

The second model was derived since structural model 1 did not fit the criteria. This structural model 2 depicts a relationship between exogenous variables Triarchic Intelligences (TRIARIN) with the following indicators: analytical intelligence (ANAL), creative intelligence (CREA) and practical intelligence (PRAC) and also Self-efficacy Beliefs (SEFFIC) has the following indicators: mastery experience (MAST), verbal persuasion (VERB), psychological states (PSYC) and vicarious experience (VICA) and the endogenous variable; the Mathematics Achievement (ACHIEV). As depicted in the diagram, there is a little amount of variance explained by the combined influence of triarchic intelligence and self-efficacy beliefs.

This shows that self-efficacy beliefs moderately contribute to the variations of their observed variables with beta values 26% while triarchic intelligence has the weakest value to the variation of the observed variables which is -0.4%. The combined influence of triarchic intelligence and self-efficacy beliefs is only 5%. Figure 2 shows the structural model of Mathematics achievement.

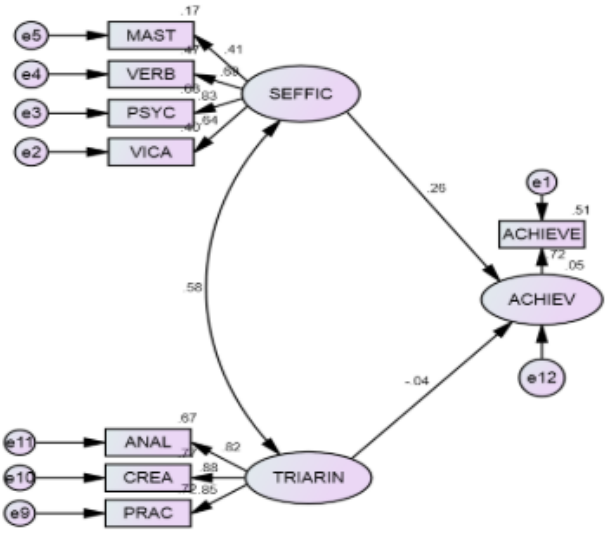


Figure 2. *Structural Model 2 on Mathematics Achievement*

Legend: SEFFIC – Self Efficacy Beliefs ENGAGE-Engagement TRIARIN – Triarchic Intelligences
MAST – Mastery experience COGN – Cognitive Engagement ANAL – Analytical Intelligence
VERB - Verbal Persuasion AFFEC- Affective Engagement CREA – Creative Intelligence
PSYC – Psychological State BEHA-Behavioral Engagement PRAC – Practical Intelligence
VICA – Vicarious Experience ACHIEV – Mathematics Achievement

Reflected in Table 10 is the standardized direct, indirect and total effect estimate of model 2 of triarchic intelligence and self-efficacy on mathematics achievement. As shown, the Table provides an overview of the total effects between latent variables. Based on the direct effect values, the exogenous variable self-efficacy belief has a great influence on mathematics achievement.

The negative result was also emphasized to the work of Sternberg et al. (2000) that there is a weak correlation on the intellectual abilities and academic success of students.

Thus, the triarchic intelligence did not complement the ability of the students. In general, triarchic intelligence was superior to the other modes of instruction, and it requires pure memory-based performance which students perceived those parents and teachers' appreciation

is one of the means to achieve the everyday goals in mathematics class.

Table 10. *Standardized Direct, Indirect and Total Effect of Model 2*

Latent Variables	Direct Effect	Indirect Effect	Total Effect
Triarchic Intelligences	-0.04	0	-0.04
Self-efficacy beliefs	0.26	0	0.26

Shown in Table 11 is the standardized regression weight of structural model 2 to determine the effects between measured and latent variables to come up regression weights. The result indicates that self-efficacy belief is the sole variable that significantly predicts mathematics achievement as reflected by the respective value ($p<0.01$).

This means that self-efficacy beliefs predict Mathematics achievement. Moreover, self-efficacy was found to be mostly represented by the observed variable psychological states, verbal persuasion, and mastery experience. The model also reveals that self-efficacy can help in developing students' mathematical learning. However, it indicates that triarchic intelligence does not predict mathematics achievement.

Table 11. *Standardized Regression Weights of Structural Model 2*

Variables			B	S.E.	C.R	Beta	P-value
ACHIEV	<---	SEFFIC	3.614	.858	4.212	.256	.000
ACHIEV	<---	TRIARIN	-.435	.585	-.743	-.043	.458
ACHIEV	<---	ACHIEV	1.000			.717	
VICA	<---	SEFFIC	1.000			.636	
PSYC	<---	SEFFIC	1.244	.064	19.555	.827	.000
VERB	<---	SEFFIC	.902	.049	18.246	.686	.000
MAST	<---	SEFFIC	.601	.050	11.957	.409	.000
PRAC	<---	TRIARIN	1.000			.849	
CREA	<---	TRIARIN	1.059	.030	34.831	.879	.000
ANAL	<---	TRIARIN	.918	.028	32.492	.820	.000

Legend:
SEFFIC – Self-efficacy belieft *TRIARIN – Triarchic Intelligence* *VERB – Verbal Persuasion*
VICA – Vicarious Experience *PRAC – Practical Intelligence* *ANAL – Analytical Intelligence*
PSYC – Psychological States *CREA – Creative Intelligence* *MAST – Mastery Experience*
ACHIEV – Mathematics Achievement

Displayed in Table 12 is the standard fit index of model 2. This model was created because model 1 resulted in a poor fit model. As shown in the table, the values also do not fit the standard value.

Thus, results reveal that the generated structural model 2 does not fit the data since some of the criteria of the indices were not met as indicated by CMIN/DF as greater than 2. The other indices like NFI, TLI, CFI, and GFI were less than 0.95 while RMSEA is > 0.05.

This implies that the second structural model is not a fit model because the resulting values did not fit the standard values.

Table 12. *Standard Fit Indices of Structural Model 2*

STANDARD FIT	STANDARD	MODEL 2 FIT VALUE
CMIN/DF	< 2.00	17. 615
P-value	> 0.05	0.000
NFI	> 0.95	0.913
TLI	> 0.95	0.872
CFI	> 0.95	0.918
GFI	> 0.95	0.935
RMSEA	< 0.05	0.119

Legend: CMIN/DF –Chi-square/Degrees of Freedom *NFI – Normed Fit Index*
GFI – Goodness of Fit Index *TLI – Tucker-Lewis Index*
RMSEA – Root Mean Square Error of Approximation *CFI – Comparative Fit Index*

Structural Model 3

Since there was an inconsistency of all indices in model 2, modification of the model was performed, and Model 3 was made. This model shows the relationship of the exogenous variables Triarchic Intelligence (TRIARIN) with the following indicators: analytical (ANAL), creative (CREA) and practical (PRAC): and Engagement (ENGAG) which consist of the indicators: cognitive engagement (COGN), behavioral engagement (BEHA) and affective (AFFEC) to the endogenous variable Mathematics Achievement (ACHIEVE).

It is assumed in this model that engagement and triarchic intelligence will have interrelationships with each other. Figure 3 shows the structural model 3.

As shown in the figure, the amount of variance described by the combined influence of triarchic intelligence and engagement is only 3%. Moreover, only the engagement variable strongly contributes to the variations of the observed variables with beta values of 66%. Meanwhile, a negative value of triarchic intelligence indicates the probability of least manifestation as to the influence in the Mathematics Achievement.

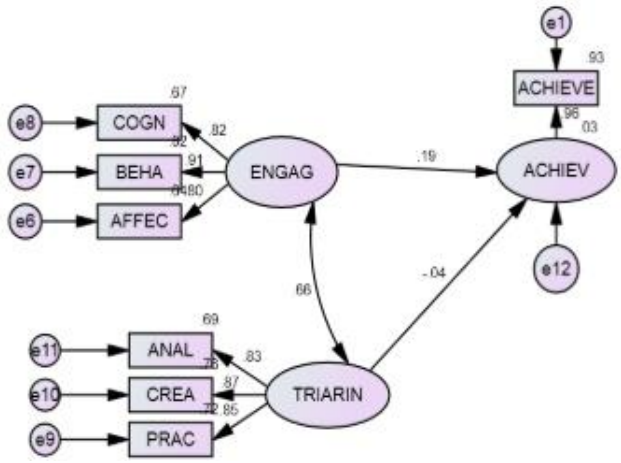


Figure 3. *Structural Model 3 of Mathematics Achievement*

Legend: *SEFFIC – Self Efficacy Beliefs* *ENGAGE-Engagement* *TRIARIN – Triarchic Intelligences*
MAST – Mastery experience *COGN – Cognitive Engagement* *ANAL – Analytical Intelligence*
VERB - Verbal Persuasion *AFFEC- Affective Engagement* *CREA – Creative Intelligence*
PSYC – Psychological State *BEHA-Behavioral Engagement* *PRAC – Practical Intelligence*
VICA – Vicarious Experience *ACHIEV – Mathematics Achievement*

Displayed in Table 13 is the standardized estimates of direct, indirect and total effects of triarchic intelligence and engagement to Mathematics achievement. It can be seen that among the exogenous variables, only engagement has a greater influence on Mathematics achievement than triarchic intelligence as shown by their respective beta values. However, triarchic intelligence shows a little contribution that gives negative effects on Mathematics achievement.

Table 13. *Standardized Direct, Indirect and Total Effect Estimates of Structural Model 3*

Latent Variables	Direct Effect	Indirect Effect	Total Effect
Triarchic Intelligences	-0.04	0	-0.04
Engagement	0.19	0	0.19

Reflected in Table 14 are the standardized regression weights of structural model 3. This is to determine the effects between measured and latent variables. As shown in the table, engagement is the sole variable that significantly predicts Mathematics achievement as reflected by the respective value ($p<0.01$).

Moreover, the engagement was found to be mostly represented by the observed variable behavioral and cognitive. Also, the model reveals that engagement can also help in developing students' mathematical learning. However, it indicates that triarchic intelligence does not predict Mathematics achievement.

Table 14. *Standardized Regression Weights of Structural Model 3*

Variables			B	S.E.	C.R	Beta	P-value
ACHIEV	<---	ENGAG	2.785	.669	4.164	.190	.000
ACHIEV	<---	TRIARIN	-.620	.628	-.987	-.045	.324
ACHIEV	<---	ACHIEV	1.000			.964	
AFFEC	<---	ENGAG	1.000			.803	
BEHA	<---	ENGAG	1.221	.037	33.447	.907	.000
COGN	<---	ENGAG	1.085	.036	30.557	.816	.000
PRAC	<---	TRIARIN	1.000		.847		
CREA	<---	TRIARIN	1.056	.030	34.944	.874	.000
ANAL	<---	TRIARIN	.930	.028	32.963	.828	.000

Legend: *ENGAG – Engagement* *COGN – Cognitive engagement* *BEHA – Behavioral engagement*
TRIARIN – Triarchic Intelligence *PRAC – Practical intelligence* *ANAL – Analytic intelligence*
AFFEC – Affective engagement *CREA – creative intelligence*

Presented in Table 15 is the standard fit indices of structural model 3. This model was created since model 1 and 2 are considered poor fit models. To ensure a best fit model, all criteria must be satisfied. As shown in the model, the values do not fit again the standard value.

Thus, results reveal that the model does not fit the data subsequently. This is indicated by CMIN/DF and RMSEA that do not meet the criteria of the indices. CMIN/DF is greater than 2 while RMSEA is less than 0.05.

On the other hand, other indices like NFI, TLI, CFI, and GFI signify a reasonable model fit of the data since these indices satisfy the criteria. This implies that the model is not a fit model because the resulting values do not fit the standard values.

Table 15. *Standard Fit Indices of Structural Model 3*

STANDARD FIT	STANDARD	MODEL 3 FIT VALUE
CMIN/DF	< 2.00	4.550
P-value	> 0.05	0.000
NFI	> 0.95	0.998
TLI	> 0.95	0.983
CFI	> 0.95	0.990
GFI	> 0.95	0.987
RMSEA	< 0.05	0.055

Legend: CMIN/DF –Chi-square/Degrees of Freedom; NFI – Normed Fit Index; GFI – Goodness of Fit Index; TLI – Tucker-Lewis Index; RMSEA – Root Mean Square Error of Approximation; CFI – Comparative Fit Index

Structure Model 4

Since there was an inconsistency of all indices in model 3, modification of the model was performed, and Model 4 was made. This model shows the relationship of the exogenous variables Self-efficacy beliefs (SEFFIC) with the following indicators: mastery experience (MAST), vicarious experience (VICA), verbal persuasion (VERB) and psychological states (PSYC): and Engagement (ENGAG) which consist of the indicators: cognitive engagement (COGN), behavioral engagement (BEHA) and affective (AFFEC) to the endogenous variable Mathematics Achievement (ACHIEV). It is assumed in this model that engagement and self-efficacy beliefs have interrelationships with each other. Figure 4 shows the structural model 4.

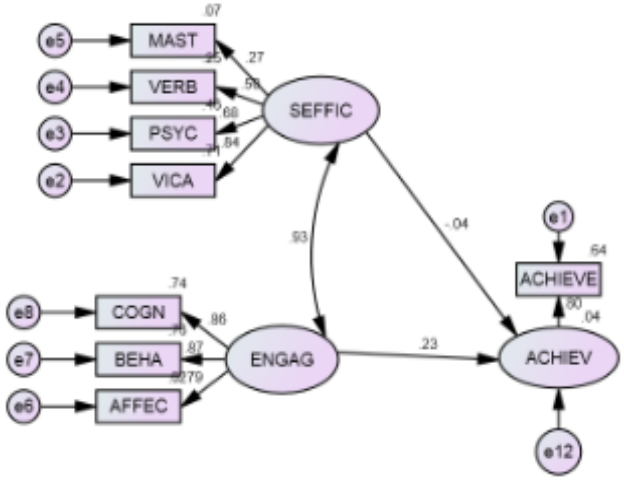


Figure 9. *Structural Model 4 on Mathematics Achievement*

Legend: SEFFIC – Self Efficacy Beliefs; MAST – Mastery experience; VERB - Verbal Persuasion; PSYC – Psychological State; VICA – Vicarious Experience; ENGAGE-Engagement; COGN – Cognitive Engagement; AFFEC- Affective Engagement; BEHA-Behavioral Engagement; ACHIEV – Mathematics Achievement; TRIARIN – Triarchic Intelligences; ANAL – Analytical Intelligence; CREA – Creative Intelligence; PRAC – Practical Intelligence

As displayed in the model, only 4% is found as the amount of variance explained by the combined influence of self-efficacy beliefs and engagement. Furthermore, the latent variables like self-efficacy beliefs and engagement strongly contribute to the variations of the observed variable Mathematics achievement with beta values of 93%.

Depicted in Table 16 are the standardized estimates of direct, indirect and total effects of engagement and self-efficacy beliefs to Mathematics achievement. Based on the table, engagement has a greater influence on mathematics achievement than self-efficacy beliefs. Students expressed a desire to engage in a task related to real life and to learn something that they can use in their future careers.

Table 16. *Standardized Direct, Indirect and Total Effects Estimates of Model 4*

Latent Variables	Direct Effect	Indirect Effect	Total Effect
Engagement	0.23	0	0.23
Self-efficacy beliefs	-0.04	0	-0.04

The effects of latent variables and between measured and latent variables were estimated to produce standardized regression weights which are shown in Table 17. Results indicate that both self-efficacy beliefs and engagement are significant ($p<0.05$).

This means that these variables are significant to mathematics achievement. The model further suggests that mathematics achievement is strongly predicted by self-efficacy beliefs and engagement.

Table 17. *Standardized Regression Weights of Structural Model 4*

Variables			B	S.E.	C.R	Beta	P-value
ACHIEV	<---	SEFFIC	-.503	2.246	-.224	-.042	.823
ACHIEV	<---	ENGAG	2.827	2.307	1.226	.227	.220
ACHIEV	<---	ACHIEV	1.000				.802
VICA	<---	SEFFIC	1.000				.844
PSYC	<---	SEFFIC	.772	.032	24.348	.681	.000
MAST	<---	SEFFIC	.302	.034	8.879	.499	.000
VERB	<---	SEFFIC	.494	.029	16.887	.273	.000
AFFEC	<---	ENGAG	1.000				.788
BEHA	<---	ENGAG	1.196	.037	32.523	.872	.000
COGN	<---	ENGAG	1.166	.036	32.053	.861	.000

Legend: SEFFIC – Self-efficacy beliefs; VERB – Verbal persuasion; ENGAG – Engagement; AFFEC – Affective Engagement; VICA – Vicarious Experience; BEHA – Behavioral Engagement; PSYC – Psychological States; COGN – Cognitive Engagement; MAST –Mastery Experience; ACHIEV – Mathematics Achievement

Shown in Table 18 is the standard fit indices of structural model 4. This model was generated since model 1, 2 and 3 are considered poor fit models. To ensure again a best fit model, all criteria must be satisfied. Results revealed that the model does not fit the data. The goodness fit measures about the patterns ACHIEV - SEFFIC and ACHIEV – ENGAG revealed that model 4 is a poor fit model since the criteria of each index were not satisfied. CMIN/DF is greater than 2, the NFI, TLI, CFI, GFI were < 0.95 and RMSEA > 0.05. Model 4 did not satisfy the given set of criteria. This implies that the model is not a fit model because the resulting values did not meet the standard values.

Table 18. *Standard Fit Indices of Structural Model 4*

STANDARD FIT	STANDARD	MODEL 4 FIT VALUE
CMIN/DF	< 2	36.581
P-value	> 0.05	0.000
NFI	> 0.95	0.850
TLI	> 0.95	0.772
CFI	> 0.95	0.854
GFI	> 0.95	0.874
RMSEA	< 0.05	0.175

Legend: CMIN/DF –Chi-square/Degrees of Freedom; NFI – Normed Fit Index; RMSEA – Root Mean Square Error of Approximation; GFI – Goodness of Fit Index; TLI – Tucker-Lewis Index; CFI – Comparative Fit Index

Structural Model 5

This model was generated since all models 1, 2, 3 and 4 did not fit the given criteria. This model shows the relationship of the exogenous variables Self-efficacy beliefs (SEFFIC) with the following indicators: mastery experience (MAST), verbal persuasion (VERB) and psychological states (PSYC): and Engagement (ENGAG) which consists of the indicators: cognitive engagement (COGN), behavioral engagement (BEHA) and affective (AFFEC) to the endogenous variable Mathematics Achievement (ACHIEV).

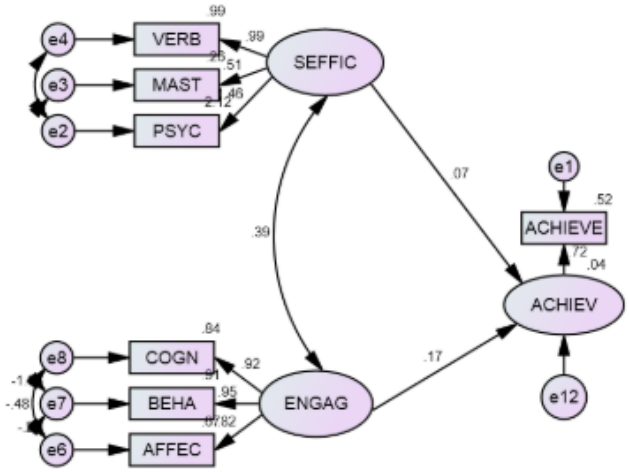


Figure 5. *Structural Model 5 on Mathematics Achievement*

Legend: SEFFIC – Self Efficacy Beliefs; MAST – Mastery experience; VERB - Verbal Persuasion; PSYC – Psychological State; VICA – Vicarious Experience; ENGAGE-Engagement; COGN – Cognitive Engagement; AFFEC- Affective Engagement; BEHA-Behavioral Engagement; ACHIEV – Mathematics Achievement; TRIARIN – Triarchic Intelligences; ANAL – Analytical Intelligence; CREA – Creative Intelligence; PRAC – Practical Intelligence

It is expected in this model that engagement and self-efficacy beliefs will have interrelationships with each other. Depicted in the model is the amount of variance explained by the combined influence of self-efficacy beliefs and engagement of only 4%. This shows that self-efficacy beliefs with the remaining indicators: mastery experience, verbal persuasion, and psychological states; and engagement with the following factors such affective, cognitive and behavioral contribute much to the variations of the observed variable mathematics achievement with the beta values of 39%. Figure 10 shows the structural model 5. The engagement contributes much to mathematics achievement with 17%. This means that students perform the activities always inside the classroom like paying attention to the class, taking note on math problems, enjoying new learning, receiving prompt feedbacks from teachers and parents, reading different mathematics books, outlining the chapters and spending time in doing different classroom tasks.

Moreover, self-efficacy beliefs also contributed in mathematics achievement at 7%. The students are likely praising themselves for answering the test, feel good when the teachers and parents gave feedbacks on their works, maintaining positive attitude when having a class recitation and reminding about the success in mathematics.

Table 19. *Standardized Direct, Indirect and Total Effects Estimates of Structural Model 5*

Latent Variables	Direct Effect	Indirect Effect	Total Effect
Engagement	0.17	0	0.17
Self-efficacy beliefs	0.07	0	0.07

Reflected in Table 19 are the standardized estimates of direct, indirect and total effects of engagement and self-efficacy beliefs to Mathematics achievement. Based on the table, engagement has a greater influence on mathematics achievement, supported by self-efficacy beliefs. The effects of latent variables and between measured and latent variables were estimated to produce standardized regression weights which are shown in Table 20. Results indicate that both self-efficacy and engagement predict Mathematics achievement ($p<0.05$) and give positive effects on mathematics achievement.

Table 20 is the standardized regression weights between the variables of the structural model 5. The results revealed that both self-efficacy and engagement predict Mathematics achievement ($p<0.05$). Such correlation would indicate that there are variations in the latent constructs to which errors correlate that are not explained in the model. This shows that the patterns ACHIEV – SEFFIC, and ACHIEV – ENGAG predict Mathematics achievement.

Table 20. *Standardized Regression Weights of Structural Model 5*

Variables			B	S.E.	C.R	Beta	P-value
ACHIEV	<---	SEFFIC	.424				.065
ACHIEV	<---	ENGAG	1.488				.174
ACHIEV	<---	ACHIEV	1.000				.722
PSYC	<---	SEFFIC	1.000				1.455
MAST	<---	SEFFIC	.339	.048	7.017	.505	.000
VERB	<---	SEFFIC	.596	.037	6.218	.993	.000
AFFEC	<---	ENGAG	.793	.035	22.866	.818	.000
BEHA	<---	ENGAG	1.000			.954	.000
COGN	<---	ENGAG	.948	.037	25.477	.916	.000

Legend: SEFFIC – Self-efficacy beliefs; ENGAG – Engagement; PSYC – Psychological States; AFFEC – Affective Engagement; MAST – Mastery Experience; BEHA – Behavioral Engagement; VERB – Verbal Persuasion; COGN – Cognitive Engagement; ACHIEV – Mathematics Achievement

Table 21. *Standard Fit Indices of Structural Model 5*

STANDARD FIT	STANDARD	MODEL 5 FIT VALUE
CMIN/DF	< 2.00	1.942
P-value	> 0.05	0.065
NFI	> 0.95	0.995
TLI	> 0.95	0.994
CFI	> 0.95	0.998
GFI	> 0.95	0.996
RMSEA	< 0.05	0.028

Legend: CMIN/DF –Chi-square/Degrees of Freedom; NFI – Normed Fit Index; GFI – Goodness of Fit Index; TLI – Tucker-Lewis Index; RMSEA – Root Mean Square Error of Approximation; CFI – Comparative Fit Index

Displayed in Table 21 is the standard fit indices of structural model 5. This model was generated since model 1, 2, 3 and 4 are considered poor fit models. To ensure a best fit model, all criteria must be satisfied. All of the indices were consistently supported by CMIN/DF was less than 2, the NFI, TLI, CFI, GFI were > 0.95 and RMSEA < 0.05 which all fall within the acceptable range. The goodness fit measures about the patterns ACHIEV - SEFFIC and ACHIEV – ENGAG revealed that model 5 is a very good fit model since the criteria of each index were satisfied with the data. This shows that the criteria were all set from the given data. This implies that the

model is a fit model because the resulting values fit the standard values.

Summary of Standard Fit Indices of the Five Structural Models

A summary of the fit indices of the five structural models considered in this study is displayed in Table 22 that using standard values determined from Models 1 to 4 have not fit the criteria. Thus, these models do not fit the data in this study. However, in Model 5, the fit indices values were closer to the prescribed values. Therefore, it is concluded that the final model about self-efficacy beliefs, engagement, and mathematical achievement is model 5.

Table 22. *Summary of Standard Fit Indices of the Five Structural Model*

Model	CMIN/DF	P-value	GFI	NFI	TLI	CFI	RMSEA
1	18.841	0.000	0.895	0.894	0.858	0.899	0.124
2	17.615	0.000	0.935	0.913	0.872	0.918	0.119
3	4.550	0.000	0.987	0.998	0.983	0.990	0.055
4	36.581	0.000	0.874	0.850	0.772	0.854	0.175
5	1.942	0.000	0.996	0.995	0.994	0.998	0.028
Standard:	<2	>0.05	>0.95	>0.95	>0.95	>0.95	<0.05

This indicates that mathematics achievement is best anchored on strong evidence of behavioral engagement and verbal persuasion of self-efficacy beliefs. This means that engagement and self-efficacy beliefs complement each other. Researchers revealed that positive outcomes are related to student engagement as well as academic self-efficacy as stated by Galyon et al. (2012). Additionally, Pajares (2008) who found out that self-efficacy beliefs predict learners' cognitive and metacognitive behaviors. Likewise, Ouweneel et al. (2011) added also that self-efficacy is positively related to engagement because it leads to a greater willingness to expend additional energy and effort in completing a task or an assignment. The relationship between student engagement and self-efficacy beliefs is more significant in high school students, identity development and increased self- determination as what Majer (2009) concluded.

Consequently, scholars like Krishna-Reddy (2009) and even local researchers like Cajindos (2012) said that it is not only triarchic intelligences that can influence mathematics achievement, for there are many factors that affect academic performance of the students - the environment, socio-economic, cultural background, family background, curriculum, pedagogies, teachers and school setting are some of the identified reasons contributed much on the academic success of the students. Also, lack of computation skills in the fundamental operations, lack of understanding and even teachers' lack of pedagogical content knowledge were also found as factors that affect mathematics achievement. Additionally, talking about intelligence, Gardner's Theory of Multiple Intelligences can also be applied inside the classroom so with Spearman's factor theory of intelligence and Guilford's Structure of the Intellect theory.

Furthermore, behavioral engagement and verbal persuasion of self-efficacy beliefs significantly predict mathematics achievement; DepEd officials may extend technical assistance specifically on training highlighting the different teaching strategies inside the classroom focusing on how to increase engagement and self-efficacy beliefs among the students.

Similar studies may be conducted to further explore and determine other possible predictors of mathematics achievement. So, the teachers may also assist themselves for them to be more creative in crafting instructional innovations in their respective classes. In this sense, the standards set by the K to 12 systems will be realized and make Mathematical achievement of learners in the DepEd Division of Davao del Norte more promising.

Mathematics achievement therefore is permanently forecasted by the role of behavioral engagement and verbal persuasion of self-efficacy beliefs. It can be posited that self-paced engagement and self-mechanized contributed on the achievement of students. Hence, the perception of students clarified that listening, sharing, checking, note-taking, and self-encouragement could give development in mathematical learning. It was also emphasized that praising, feed backing, motivating, support system and performing marked notable role in raising better performance in mathematics.

Moreover, the study pointed out that behavioral engagement of students predicts mathematical learning. In fact, Fredericks et.al. (2004) insisted that classroom activities produce tangible behavioral engagement. Focusing questions, peer discussions, and numerical-based topic exploration allow students to staidly give attention and encourage themselves in taking notes contributed much to the success of its learning.

As Trowler (2010) supported the above statement that engagement is not used as the statement of value judgment but as a reflection of the students' attitude in terms of productivity or counter-productivity. This means that students' engagement depends on the teacher's behavior which may produce the most fruitful outcomes on academic achievement. In the nutshell, the above readings encouraged the students to engaged and actively participate in the learning process. At the same time, teachers also show covering caring and concern for others' welfare especially the students, ethical conduct and integrity as themes for good teaching. Because the engage teachers is always available to provide support, adjusts ones teaching to accommodate students' pace, and set aside time to know students' needs and concerns.

Another theory that supports the contribution of behavioral engagement to the achievement of the students is the learning pyramid theory. It claimed that people generally remember; 10% of what they read (reading), 20% of what they hear (audio visual), 30% of

what they see (demonstration), 50% of what they hear and see (group discussion), 70% of what they say (practice by doing), and 90% of what they say as they do a thing (teaching others) according to Kelly (2012).

It can be quoted in the study that verbal persuasion of self-efficacy is postulated as mechanism of cognitive efficacy. One of the highlights of Bandura (1997) theory of self-efficacy beliefs that enactive attainment like recognition, providing remark of given work can successfully raises self-efficacy. He also added that verbal persuasion matter much in determining achievement. The positive encouragement gives direct effect of learners' belief.

Thus, it can be theorized that Mathematics achievement of the students is best anchored on their behavioral engagement coupled with verbal persuasion of self-efficacy beliefs. This further implies that students with a high level of behavioral engagements joined with verbal persuasion of self-efficacy beliefs towards Mathematics are the key factors to have better achievement in Mathematics.

Conclusions

References

Akram, B. & Ghaanfar, L. (2014). Self-efficacy And Academic Performance of the Students of Gujrat University Pakistan. Academic Research International Vol 5. No.1.

Alingay, A. S. (2017). Mathematical Competencies, Psychological Attitudes, Teaching Characteristics and Students' Achievement. Unpublished MAT Thesis. Central Mindanao University, Musuan, Bukidnon.

Appleton, JJ., Christenson, S. L., Kim, D., & Reschly, A. (2006). Measuring cognitive and psychological engagement: Validation of the Student Engagement Instrument. Journal of School Psychology, 44, 427-445. doi: 10.1016/j.jsp.2006.04.002.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), Encyclopedia of human behavior (Vol. 4, pp. 71-81). New York, NY, US: Academic Press.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman and Company. Emory University, Division of Educational Studies, Information on Self-efficacy: A community of Scholars.

Cajindos, R. P. B. (2012). Analysis of the performance in trigonometry of the first year college students of Divine World College in Vigan.

Cordova, C. C. (2015). Mathematics proficiency, attitude and performance of grade 9 Students in private high schools. Unpublished Master's Thesis. Central Mindanao University, Musuan, Bukidnon.

Department of Education Order 31, S. 2012. Policy Guidelines on the Implementation of Grade1 to 10 of the K to 12 Basic Education Curriculum (BEC) Effective School Year 2012-2013.

Department of Education Order 8, S. 2015. Policy Guidelines on Classroom Assessment for the K to 12 Basic Education Program.

Drebin, C. (2014). What is Creative Intelligence?. The Globe and Mail Inc. Toronto, Canada.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. Review of Educational Research, 74, 59–109.

Galyon, C. E., Blondin, C. A., Yaw, J. S., Nalls, M. L., & William, R. L. (2012). The relationship of academic self-efficacy to class participation and exam performance. Social Psychology of Education, 15, 233-249.

Kendra, C. (2023). Correlation Studies in Psychology Research. Determining the relationship between two or more variables.

Krishna-Reddy, D. (2009). Achievement of 10th class students in mathematics in relation to certain psycho-sociological variables. Unpublished Doctoral thesis, S.V. University, Tirupati (A.P), India.

Kunwar, R. (2023). Exploring Students' Attitudes, Learning Behaviors and their Effects on Mathematics Achievements. DOI:10.13140/RG.2.2.31101.13286

Majer, J. M. (2009). Self-efficacy and academic success among ethnically diverse first generation community college students. Journal of Diversity in Higher Education, 2: 243-250

Ouweneel, E., Le Blanc, P. M., & Schaufeli, W. B. (2011). Flourishing students: A longitudinal study on positive emotions, personal resources, and study engagement. The Journal of Positive Psychology, 6(2), 142-153.

Pajares, F. (2008). Sources of Self-efficacy in School: Critical Review of the Literature and Future Directions. Review of Educational Research.

Parsons, S. A., Nuland, L. R., & Parsons, A. W. (2014). The ABCs of student engagement: Teachers can increase all-important student engagement by being aware of its affective, behavioral, and cognitive dimensions. Phi delta kappan, 95(8), 23.

Sternberg, R. J. (1999). The theory of successful intelligence. Review of General Psychology, 3, 292–316.

Sternberg, R. J. and Lubart, T. I. (1995). Defying the Crowd: Cultivating Creativity in a Culture of Conformity. New York: Free Press.

Sternberg, R. J., Forsythe, G. B., Hedlund, J., Horvath, J, Snook, S, Williams, W. M., Wagner, R. K. and Grigorenko, E. L. (2000). Practical Intelligence in Everyday Life. New York: Cambridge University Press.

Sternberg & Rainbow Project Collaborators, 2006). The Rainbow Project: Enhancing the SAT through Assessments of analytical, practical and creative skills

Sutton, E. (2021). Student Engagement: Why It's Important and How To Promote It. Branching Minds.

Trowler, V (2010). Student engagement review literature. Department of Educational Research. Lancaster University.

Wang, M. T. & Peck, S. (2013). Adolescent educational success and mental health vary across school engagement profiles. Development Psychology.

Affiliations and Corresponding Information

Grace Mae G. Flores
Kapalong National High School
Department of Education – Philippines

Diobein C. Flores
Santo Tomas College of Agriculture, Sciences and Technology – Philippines