Admission Profiles as Predictors of Academic Performance

Magnolia A. Laus
College of Social Sciences, University of the Philippines Cebu, Cebu City, Philippines
malaus1@up.edu.ph

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Abstract –*A state university-operated secondary school in Cebu City, Philippines requires a minimum grade to qualify to take the high school admission test (HSAT). However, despite the grade requirement, only the HSAT scores are used as a basis in the final selection of students for admission. This study aims to establish the relationship between the admission criteria used in the selection of candidates for admission and the academic performance of students during their first year in high school. The predictive ability of the HSAT and pre-entry grades to the academic performance of 164 students were examined. A multiple regression analysis was used to identify which among the variables (pre-entry grades and admission test scores in Math, Science, APFil, English, and OLSAT) can predict the overall academic performance of students. The result showed a statistically significant positive relationship between the following: pre-entry grades; admission test scores in Math, English, and APFil; and the final grades of the students in Grade 7. Among the variables considered in the study, the pre-entry grade was the greatest predictor of academic performance, while the admission test score in APFil was the least. Moreover, admission test scores in Science and OLSAT have no substantial impact on the student's academic performance. Hence, the suggested model recommends that the pre-entry grades of the applicants are to be included in evaluating and ranking the candidates for admission and ascribing numerical weights must also be ascribed to the test scores in Math, English, APFil, and Science. This will help improve the school's admission process and overall academic outcomes. Furthermore, the study also suggests that the analysis of the relationship of pre-entry criteria and academic performance will include the grades of students in higher year level to strengthen the argument that prior ability is a strong predictor of school success in high school. The inclusion of non-cognitive factors affecting the academic performance of high student in future investigations is also strongly suggested to provide a comprehensive understanding of predictors of learning outcomes in secondary level.*

Keywords *–academic performance, academic success, HSAT, OLSAT, pre-entry grades, predictor models*

INTRODUCTION

Premier state universities in the Philippines spend around half a million pesos of people's taxes for every student who graduates [1]. The high cost of education in leading academic institutions of the country underscores the importance of ensuring the academic success of students admitted to avoid waste of limited public resources and to guarantee a steady supply of the needed labor force.

Academic performance and student retention had drawn popular interest among educational researchers and theorists in the past years. Several studies identified the range of predictors of the scholastic performance of students at various levels. Walberg's Theory of Educational Productivity determined nine factors that affect the performance of students in school, which includes: ability or prior achievement, development, motivation, the quantity of instructions, quality of instructions, home environment, school environment, peer group, and mass media [2]. These factors were further grouped into three categories - student aptitude, instructional variables, and the psychological environment – and were identified as directly correlated to learning. Furthermore, the said theory also established that student ability or prior knowledge is a better predictor of academic success as compared to the other factors identified.

Student ability or prior knowledge, which is measured through standardized examinations. Aside from predicting academic performance, establishing the prior knowledge of students is commonly used by academic institutions in screening candidates for admission to a program. Literature shows that the common practice of schools around the world in

choosing candidates for admission is the use of cognitive (*i.e.* pre-entry academic performance, verbal and quantitative aptitude, entrance test scores) and non-cognitive (*i.e.* age, socioeconomic status) criteria [3]. Most of these variables were identified as predictors of academic success in Walberg's theory of Educational Productivity.

The predictive validity of the admission criteria used by academic institutions has also been a subject of various researches in the past years, but the results were highly varied. For example, studies revealed a significant relationship between admission test scores and undergraduate performance, particularly during the first year in college [4]-[9]. High school grade was also found to be a strong determinant of academic school performance in college [10]–[11]. Others further suggested that admission tests, combined with high school grades and prior academic achievements, were strong determinants of student performance throughout college life [12]-[15]. Other studies, however, also showed that aptitude test scores have moderate [8] or weak relationships [11],[16]-[18] with the academic performance of college students.

Establishing the predictive validity of admission instruments is also critical in providing the basis for monitoring students' performance during their entire stay in the academe. An effective admission instrument can classify the candidates into those who are likely to pass or fail in the program. By predicting academic performance through the admission test results, schools can determine what additional support or programs to provide for the students, especially in their first year. Understanding how the different attributes of the entry criteria contribute to its overall validity is vital since different curriculums require different proficiencies from their learners. Test scores are indicative of the student's level of knowledge and skills in a particular subject. The validity of the questionnaire may also expose the vulnerability of the students in different areas, but this information is convenient in formulating policies and interventions to improve future school success.

Predictive validity models that look into the variability of the different components of the student prior knowledge and the consequent academic performance of learners also produced different results. Fayeke [19] and Martirosyan [20] found a strong relationship between proficiency in English and the overall academic performance of tertiary students in Nigeria and the United States, respectively. In contrast, students' performance in English was hardly correlated with the overall academic performance in South Africa [21]. Prior mathematical knowledge and competence were also observed to be integral components to the overall academic success of learners [202]. Moreover, a positive relationship between entrance test scores and academic performance in Math, Science, and English was established among tertiary students with low socioeconomic backgrounds [23]. Performance in Science was also known to be a strong predictor of academic success for medical courses [24], while a study on four secondary schools in Nigeria concluded that an integrated Social Studies curriculum has no substantial impact on the academic performance of students [25].

Otis-Lennon School Ability Test (OLSAT) is a popular tool used by many schools in screening applicants for admission. The test is designed to measure intelligence, or cognitive skills deemed critical for successful learning, relative to the learner's age. The studies on OLSAT as a predictor of academic performance also incurred conflicting results. A high degree of correlation between OLSAT scores and grades of college students was observed during the first semester of schooling [26]. OLSAT scores were also related to college students' grades in Algebra, Trigonometry, English, and Filipino [27]. However, in another study of tertiary learners, OLSAT failed to predict the students' grades in college [28].

While the predictive validity of admission criteria used in college and universities was widely investigated at different angles, only a few studies discuss the relationship between high school admission criteria and the academic performance of students. Secondary education is essential because students acquire the skills and knowledge necessary for future education and for the employment of those who choose not to continue beyond this level. Hence, studying the pre-entry criteria in relation to student's academic performance will not only improve the selection process but may consequently contribute to a better understanding of indicators of success in high school.

This paper looked into the validity of the admission criteria used by a state university-operated high school in Cebu City, Philippines. Annual household income and a minimum grade are required to take the school admission test. The income and grade requirements fulfill the school's mandate to prioritize and accept only the children who are smart but are from economically disadvantaged families. Although required in the admission process, the pre-entry grades are not factored in the final selection of applicants to be

admitted. The basis for the final ranking of candidates for admission is the result of the entrance test.

OBJECTIVES OF THE STUDY

This study aims to investigate the validity of the admission criteria used by a state university-operated secondary school in Cebu City, Philippines. Specifically, this paper aims to determine the relationship between the admission criteria (grades and admission test) and the overall academic performance of Grade 7 students; establish if there is a significant relationship between the different subtests of the admission test (Mathematics, Science, English, APFil, and OLSAT) and the Grade 7 student's overall academic performance; and identify which among the admission criteria (grades and admission test scores) has a substantial contribution to the student's overall academic performance.

Furthermore, the study would try to suggest an alternative predictive validity model to improve the admission selection process of the school.

MATERIALS AND METHODS

Design

The study employed a descriptive-correlational research approach to determine the predictive validity of the entry criteria used in a public high school in Cebu City. The main predictor variables considered in this study were the High School Admission Test (HSAT) and pre-entry grades. The final grade of the student in Grade 7 served as the criterion variable and is referred to as Academic Performance in this paper. Below is the description of the variables used in the study.

HSAT. It is an assessment designed to measure the student's skills and readiness for secondary-level academic work. It includes OLSAT and achievement tests in English, Math, Science, and APFil (Social Studies and Filipino). The achievement test is a standardized test prepared by the school faculty. Each subject is composed of 40 to 50 questions covering competencies required by the school. All applicants must take and pass the HSAT to be admitted to the school.

Pre-entry Grades. In this study, pre-entry grades are the average rating of the applicant in five subject areas – English, Filipino, Mathematics, Science, and Social Studies – either in the second or third quarter of Grade 6. The school requires applicants to submit their latest report cards when applying for the HSAT. A grade of 85 or better in the five subject areas is needed to qualify to take the HSAT. Moreover, the applicant must also have no grade below 80 in any other subject to be eligible to take the admission test.

Academic Performance. The criterion variable of this study is the student's final grade in Grade 7. This is computed based on the coefficient of the grades in the Fourth Grading Period and the credit unit divided by the total number of credit units.

Sampling

This study covered a total of four academic years. There were 164 students admitted to Grade 7 from A.Y. 2015 to A.Y. 2018. The study used the data for the whole population.

Respondents

The respondents were the 164 students admitted to Grade 7 from A.Y. 2015 to A.Y. 2018 (see Table 1). Grade 7 is the first year of Junior High School in the K to 12 program. The school only has 40 slots for new students every year, making the admission very competitive. For the initial screening, the applicant should belong to a low-income family with a gross income not exceeding 250,000 pesos annually — the poverty limits set by the government [27]. Grades should also be within the minimum standards set by the school for admission. Only the qualifiers based on income and grades are allowed to take the admission test. The selection of the final 40 Grade 7 qualifiers is identified based on their HSAT ranking. A waitlisted applicant can only be considered for admission if one of the HSAT qualifiers decided not to pursue his or her enrolment. This multi-layered screening process assumes that those accepted to the school are economically disadvantaged but intellectually capable individuals. In addition, those admitted to the school have satisfactory grades in Grade 6, are honorific students, and are regarded as "cream of the crop" of public schools in the region.

Table 1. Profile of Respondents

Year	No. of Students Admitted to Grade 7	No. of Students Admitted to Grade 8	Dropout Rate
2015	41	38	7.3 %
2016	43	41	4.6 %
2017	40	40	0 %
2018	40	37	7.5 %
TOTAL	164	156	4.8 %

Table 1 also showed that the school has an average dropout rate of 4.8 percent from 2015 to 2018. This data means that two out of 40 students enrolled in Grade 7 transferred to other schools at the end of the school year

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due to low or failing grades. The policies of the school state that a student who incurs two or more failures in the final grading will no longer be readmitted.

Data Collection

The sources of the data were the records of HSAT results, Grade 6 final grades, and Grade 7 final grades of the students. Letters requesting permission to conduct the study and to access the documents were submitted to the offices of the principal and the guidance counselor. Upon approval of the request, the data on the achievement test and Grade 7 final grades were collected from the principal's office while OLSAT results were collected from the records of the guidance office. All data were redacted to protect the identity and maintain the anonymity of the subjects. Data confidentiality was also observed throughout the conduct of the research.

Data Analysis

Multiple linear regression was used to determine the relationship between the admission criteria and the student's academic performance. This also determined the relationship and predictive value of the different subtests to academic performance. A regression model that showed a good fit of the data was generated and used as the basis for the suggested template for admission criteria. T-test was also utilized to compare the Grade 6 second quarter average grade and Grade 6 final average grade as admission criteria.

Jeffreys's Amazing Statistical Program (JASP), an open-source graphical program for statistical analysis developed by the University of Amsterdam, was used for regression and t-test. The software is easy to use, especially for those familiar with SPSS. Moreover, all statistical tests were conducted at 0.05 level of significance.

RESULTS AND DISCUSSION

Previous studies highlighted the importance of establishing the relationships of the different factors that determine academic performance to help ensure overall academic success. The student's performance during the first year of the program is also perceived as a critical indicator of school outcomes [29]. In this study, the predictive validity of pre-entry criteria (grades and admission test) used by a public secondary school to determine the candidates for admission was investigated.

Table 2 shows the multiple regression analysis of the admission criteria and overall academic performance of Grade 7 students. Two models are generated to compare the validity of the variables. The predictors for the first model are the HSAT scores in English, Math, Science, APFil, and OLSAT, while the dependent variable is the student's Grade 7 final grade. The second model includes the HSAT scores in English, Math, Science, APFil, and pre-entry grades as predictors of academic performance in the first year of the students.

From the two models generated, Model 2 has a higher R coefficient compared to Model 1. The regression analysis of Model 2 has an R coefficient of .691 and an R squared of .477, with a standard error of the estimate at 2.4060. These values show that the predicted variable (academic performance, as signified by the general weighted average in Grade 7) will deviate from the true value by 2.4060 limits of the measure and that the pre-entry criteria of Model 2 explain 47.70 percent of the variability of the student's academic performance in Grade 7.

Table 2

Model Summary of HSAT Scores, Pre-entry Grades, and Student's Academic Performance[c]

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	Durbin-Watson
1	.570[a]	.324	.303	2.7923	1.492
2	.691[b]	.477	.459	2.4060	1.449

a. Predictors: (Constant), Science, APFil, English, Math, OLSAT

b. Predictors: (Constant), Science, APFil, English, Math, Grade 6 Final Grades

c. Dependent Variable: Grade 7 Final Grade

For pre-entry grades in Model 2, the regression analysis uses the fourth quarter average instead of the second quarter average of the five major subjects in Grade 6. The school accepts either the second or third quarter report card of the applicants in the initial screening of candidates for admission. T-test was applied to compare the two quarter averages and results indicate that the fourth quarter average (Mean = 91.38, SD = 2.58) is significantly higher than the second quarter average (Mean = 90.94, SD = 2.48), $t(139) = 4.2429$, $p < .05$, significant. The grades of the applicants were expected to increase in the fourth quarter; hence, the school can use the applicant's grades in the previous grading in the initial screening of HSAT application.

The result of the regression analysis showed that the pre-entry grades and admission test have a significant relationship with the academic performance of the

students during their first year in high school. This result validated Walberg's Theory of Educational Productivity which mentioned that student prior ability, herein determined by the pre-entry grades and admission test, is strongly linked to the learner's academic performance. This result also agreed with previous findings, which stated that predictor variables such as admission assessment score and high school grades [9],[10] have strong statistical relationships with the first-year academic performance of college students [7],[15]. However, the result of the study contradicted that of Davidovitch and Soen [17], which found no systematic connection between admission test scores and students' grade average at the end of their first year in the university. The said study further mentioned that student's matriculation test scores were a better predictor of academic performance compared to admission test.

Table 3. *Analysis of Variance of the HSAT Scores, Pre-entry Grades, and Student's Academic Performance*[a]

Model		Sum of Squares	df	Mean Square	F	Sig
1	Regression	591.616	5	118.232	15.176	.000[b]
	Residual	1231.856	158	7.797		
	Total	1823.472	163			
2	Regression	746.061	5	149.212	25.766	.001[c]
	Residual	816.526	141	5.791		
	Total	1562.587	146			

a. *Dependent Variable: Grade 7 Final Grade*
b. Predictors: (Constant), Science, APFil, English, Math, OLSAT
c. Predictors: (Constant), Science, APFil, English, Math, Grade 6 Final Grades

Table 3 presents the analysis of variance of the HSAT scores, pre-entry grades, and student's academic performance. Both generated models show that the entry criteria used by the school are valid predictors of academic performance. For Model 1, the F-value at α = .05 with (5,158) df = 15.176, p=.000 is significant. Similarly, the analysis of variance for Model 2 indicates that F-value at α= .05 with (5,141) df= 25.766, p= .001 is significant.

The regression analysis also established the predictive validity of the admission criteria used by the school. Model 1, which uses HSAT scores as the basis in the final selection of candidates, is the current admission process being practiced. The school uses a multi-layered process, where pre-entry grades are required but not considered in the final selection of students admitted to Grade 7. The 40 qualified candidates for admission were drawn from the top 40 highest scorers in the admission test. However, the inclusion of Grade 6 final grades as a variable along with the HSAT scores in Model 2 increased the potential of the school's criteria to select the best candidates for admission; hence, Model 2 is a better model to predict the academic performance of Grade 7 students. This result supported the conclusions of previous studies, which stated that pre-entry grades is a factor for college students' performance [7],[31]-[3]. In contrast, the same result negated the findings of the study which mentioned that the entrance test is the greatest determinant of academic performance [5].

Table 4 indicates the contribution of HSAT scores and pre-entry grades to the prediction of academic performance for Grade 7 students. Both models show that HSAT scores in Math, APFil, and English are potential predictors of the academic performance of Grade 7 students. Model 2 also shows Grade 6 final grades as another potential predictor. However, OLSAT (for Model 1) and Science (for Models 1 and 2) have no significant influence on the academic performance of the students.

Among the predictors in Model 2, Grade 6 final grades, t = 6.792, p= <.001 (p<.05); HSAT scores in Math, t=3.792, p= <.001 (p<.05); English, t= 2.880, p=.005 (p<.05); and APFil, t=2.069, p=.004 (p<.05) are the significant predictors of academic performance. The HSAT score in Science has no significant influence on the academic performance of the students; however, it is still included as a variable in the recommended model because it is a major subject of the school curriculum. The regression model is, therefore, a good fit of the data, and can be expressed as:

Academic Performance in Grade 7 = 21.449 + .025 (Science) + .075 (Math) + .054 (APFil) + .071 (English) + .587 (Grade 6 Final Grades)

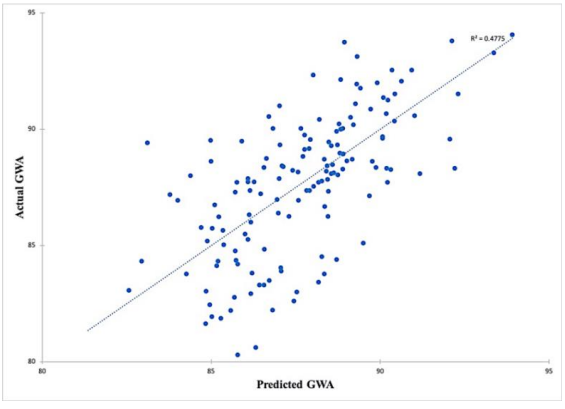

Figure 1. *Scatter plot representation of the suggested regression model.*

Table 4. *Multiple Regression Coefficient of the HSAT Scores, Pre-entry Grades, and Student's Academic Performance*[a]

Model	Unstandardized Coefficient		Standardized Coefficient		Sig.	Remarks
	Beta	Std. Error	Beta	t		
1 (Constant)	67.218	3.697		18.183	.000	
Science	.017	.027	.044	.635	.526	Not significant
Math	.113	.022	.373	5.130	.000	Significant
APFIL	.123	.027	.303	4.591	.000	Significant
English	.081	.028	.193	2.877	.005	Significant
OLSAT	.011	.024	.033	.465	.643	Not significant
2 (Constant)	21.449	7.317		2.931	.004	
Science	.025	.025	.064	1.000	.319	Not significant
Math	.075	.020	.251	3.792	< .001	Significant
APFil	.054	.026	.135	2.069	.004	Significant
English	.071	.025	.179	2.880	.005	Significant
Grade 6 Final Grades	.587	.086	.459	6.792	< .001	Significant

a. Dependent Variable: Grade 7 Final Grade

The expression above means that for every one-point increase in each of the HSAT scores in Science, Math, APFil, and English, the academic performance of the students in Grade 7 will increase by .025, .075, .054, and .071, respectively. Moreover, for every one-point increase in Grade 6 final grades, the overall academic performance in Grade 7 will increase by .587. A visualization of the suggested model is presented in Figure 1.

This study also found that the HSAT scores in Math, English, and APFil are potential predictors of student's academic performance in Grade 7. This result supported the findings that performance in Math [23], English [19],[20], and Social Studies [34] are strongly related to the overall academic performance of students. Mathematics and Science are major subjects in the K to 12 curriculum, each with 5-units credit. The grades acquired in the said subjects can potentially increase or decrease the final grades of the students. This study indicated that Math is the best predictor of the academic performance of Grade 7 students, among the scores in the admission test; therefore, high admission test scores in Math will lead to high final grades at the end of the first year in high school. This result confirmed the finding that acquiring mathematical knowledge and competence is a vital component in the overall academic success of secondary students [22].

Mathematics also serves as the foundation for many subjects such as science, technology, social sciences, and research. It teaches knowledge and skills that develop the analysis, logical thinking, and problem-solving ability of learners, which are indispensable in learning the other subjects. Thus, pre-entry performance in Math can affect the grades of other subjects and the overall academic performance of the students. However, Science is not a predictor of academic performance in this study. Many similar prediction studies of admission criteria identified Science as a factor of the overall academic performance of learners [23],[24]. The deviation of the current study may indicate the student's poor academic preparations, making them less capable to engage in the Grade 7 Science curriculum [35]. They were probably just guessing the answers during the science portion of the HSAT since the topics included in the admission test were not covered in elementary. However, Science was still included as a variable in Model 2 because it is a core subject of the school curriculum. Thus, assessing the applicant's readiness in Science may result in the better academic performance of the students in Grade 7.

HSAT score in English is also strongly related to the final grades of Grade 7 students. English is used by the school as the official medium of instruction for all subjects, except Filipino. Tests and academic evaluations for all major subjects are in English; hence, the more adept the students are with English, the more they are likely to perform well in their academic subjects [37]. This result validated the studies in which English proficiency is significantly related to the academic performance in Science and Math of high school students [37]; and the overall academic success of tertiary students [19],[20]. However, the current results negated other researches that found no correlation between the two mentioned variables [21].

Filipino is the medium of instruction for Social Studies in public elementary and high schools in the country. The admission test in Social Studies was written and taken together with the Filipino subject, thus APFil. Though Social Studies is already taught in English in this high school, the statistical analysis still revealed that APFil contributed significantly to the student's Grade 7 final grades. This result contradicted the findings where performance in Social Studies has contributed to the grades of other integrated subjects but has no substantial impact on the student's academic performance [25].

Lastly, OLSAT is not a potential predictor of academic performance in this study. The said test measures the thinking skills and potentials of learners in performing reasoning tasks. OLSAT is recommended to be administered along with standard achievement tests to give educators a complete idea of each student's potential for success in school. In Model 1, OLSAT is in the formula but is not a significant variable of academic performance, which may mean that a high level of intelligence is not translated to good academic performance. Note that qualifying grades is one of the requirements in taking the HSAT. As a result, an instrument that measures the level of intelligence may fail to discriminate who fairs better in the different subjects, considering the cognitive profile of students that the school admits. This result negated the findings of Cadao-Esperal [37] and Calaguas [38] that cited a positive correlation between OLSAT and academic performance.

Considering the results as mentioned earlier, the current admission process of school in which final selection for admission is based solely on the entrance test results can already predict the academic performance of students during the first year in high school (as shown in Model 1). However, it is beneficial and productive for the school to include Grade 6 grades when ranking the candidates for admission (as shown in Model 2). Grade 6 grades is the greatest contributor to the academic performance of students during their first year in junior high school. Ascribing numerical weights to English, Math, APFil, and Science for the ranking of candidates may also help improve the school's admission process. Though Science was not a significant predictor of academic success based on the regression result of the study, it is a major subject in the K to 12 curriculum and has the same credit unit with Math. Excluding Science, as an admission variable may result in poor academic performance of the learner. However, there is a need for the school to improve the HSAT questions in Science to ensure that it measures the required academic competencies in high school.

Moreover, OLSAT can be excluded in the HSAT for it has no impact on the student's scholastic performance. However, the school may administer the said instrument to admitted Grade 7 students so that teachers will have a better appreciation of the learner's strengths and weaknesses. In which case, the exclusion of OLSAT from the HSAT can save time and resources for the school.

CONCLUSION AND RECOMMENDATION

Recent researches on academic performance reiterated the argument that scholastic achievement is a consequence of cognitive and non-cognitive factors. The findings of the study showed that student prior knowledge as measured by admission test and pre-entry grades in the suggested model are significant predictors of academic performance of students during their first year in high school; hence it is a valid instrument in selecting the best and most dedicated candidates for admission. The individual contributions of the admission test scores to the academic performance stressed the importance of language proficiency and knowledge in Math and Social Studies to predict the subsequent academic performance of students. The findings that Science was not a predictor of academic performance of the students in this study may point towards the applicant's lack of readiness to engage in the Grade 7 Science curriculum. It further suggests that the school review the HSAT questions in Science to ensure that academic competencies for the said subject are followed. Furthermore, OLSAT may also indicate the student's level of intelligence, but such potential, unless fully utilized, will not be translated into positive academic outcomes.

To improve the school's admission process, this study recommends that the pre-entry grades of applicants will be included in the final ranking of candidates for admission; numerical weights will also be ascribed to HSAT scores in Science, Math, English, and APFil; and OLSAT will be excluded in the HSAT. This will help the school select the best candidates for admission, and increase its productivity in terms of the overall academic performance of the students.

This study used the Grade 7 final grades to determine the academic performance of the students in high school. Though academic performance during the first year in the curriculum is crucial to the overall school success of learners, this study recommends that the predictive validity analysis will include the student's

final grades in higher year levels. This will strengthen the argument that the student prior knowledge is a strong predictor of academic success in high school.

Furthermore, it is also recommended that other factors of academic success such as the learning environment and the quality of instructions in high schools will be explored by future researchers.

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