Original Research Article

ACADEMIC MOTIVATION AND COGNITIVE ABILITIES ASPREDICTORS OF ENGLISH LANGUAGE PROFICIENCYAMONGSENIOR HIGH SCHOOL STUDENTS

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ABSTRACT

This study aimed to determine whether academic motivation and cognitive abilities significantly predict English language proficiency among senior high school students in a public secondary institution in Davao City, Philippines. Employing a descriptive-correlational research design, standardized questionnaires were administered through face-to-face surveys to 209 students. The mean, standard deviation (SD), Pearson product-moment correlation, as well as simple and multiple linear regression analyses were utilized for data analysis. The findings revealed that while the academic motivation of the students was described as extensive, their cognitive abilities and English language proficiency were described as moderately extensive. Correlation analysis indicated significant relationships between academic motivation, cognitive abilities, and English language proficiency. Furthermore, there was a significant combined influence of academic motivation and cognitive abilities on English language proficiency among senior high school students. It is recommended to focus on enhancing both academic motivation and cognitive skills to improve English language proficiency further. Collaborative interventions targeting these areas can effectively support students in achieving greater proficiency in English.

Keywords: Academic Motivation, Cognitive Abilities, English Language Proficiency, Senior High School, Descriptive Correlational, Davao City, Education, Philippines

1. INTRODUCTION

Statistics from diverse countries highlight a growing challenge in nurturing language proficiency among students. According to the Programme for International Student Assessment (PISA) conducted by the Organization for Economic Co-operation and Development (OECD) [1], a significant proportion of students globally struggle with applying macro skills to real-world situations. For instance, for every 100 students who participated in the assessment, only nine could understand long texts, grasp ideas that are hard to understand and tell the difference between facts and opinions using hints in the text or where the information comes from. The 2018 PISA results indicated that 23% of the students could not figure out the main point in a moderately long text, locate information using clear but sometimes tricky instructions, and think about why and how texts are written when they were specifically told to do so.

The Philippines is recognized as one of the largest English-speaking nations, with a substantial portion of its population possessing some degree of proficiency in the English language. However, there has been a noticeable decline in English language proficiency, as

evidenced by the annual EF English Proficiency Index. This decline is evident when comparing rankings over the past few years. In 2018, the Philippines was ranked 14th, but by 2019, it had slipped to the 20th position. In 2020, the ranking further declined to 27th. While there was a slight improvement in 2021, with the Philippines rising to the 18th position, it remains distant from its 13th ranking in 2016. A noteworthy article published by GMA News and PhilStar Global in February 2018 highlighted the concerning trend that the English proficiency level of college graduates in the Philippines falls below the target proficiency level for high school students in Thailand [2].

In a study conducted among first-year college students in selected higher education institutions in the province of Davao del Norte, it was found that the level of exposure to the English linguistic environment of the students was moderate, and their level of oral proficiency in terms of comprehension, fluency, grammar, pronunciation and vocabulary was low [3]. Similarly, senior high school students enrolled in three academic institutions in Davao City demonstrated only moderate levels of speaking, listening, reading, and writing [4]. Among the top reasons for language difficulties were the difficulty in explaining ideas using the English language and the inability to comprehend the customs, attitudes, and social circumstances of the native speakers of English.

Additionally, cognitive abilities, which involve thinking, reasoning, and problem-solving skills, are closely linked to language proficiency. The ability to process information effectively and make connections between concepts aids in language comprehension and use. Research by various scholars emphasized the relationship between cognitive abilities, positive attitudes toward learning, and language proficiency, highlighting that students who possess strong cognitive skills and maintain a favorable attitude toward English tend to perform better in language assessments [5, 6, 7].

Despite the valuable insights provided by previous research on the influence of academic motivation and cognitive abilities on English language proficiency, a notable research gap persists. Many existing studies have primarily focused on individual aspects of these factors or have examined their impact in broader educational settings, often overlooking the specific context of senior high school students. There is a need for more comprehensive investigations that explore the intricate interplay between academic motivation and cognitive abilities within the unique environment of senior high schools. Additionally, while previous research has highlighted the importance of these factors in enhancing language proficiency, there remains a scarcity of studies that delve into the combined effects and interrelationships between academic motivation and cognitive abilities on students' English language skills, especially in the local context.

English is one of the difficult subjects both in the elementary and secondary levels of education in the Philippines. Even before the pre-COVID-19 era, this subject has been the source of teaching and learning difficulties in educational institutions. The researcher, being an English teacher in a public senior high school institution in Davao City, is in a dilemma of determining what factors can improve the English language proficiency of the students in order to enhance their overall academic performance and future opportunities. Therefore, this study aims to determine the English language proficiency of senior high school students in selected public schools in Davao City and describe how academic motivation and cognitive abilities affect it. Understanding how these factors interact and influence language proficiency can provide valuable insights into the development of effective strategies and interventions to empower students with the language skills they need to succeed academically and in their future endeavors.

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The third paragraph discussed about the levels of English proficiency and the reasons of using English but the fourth paragraph it suddenly discussed about cognitive abilities that not mentioned previously.
The fifth paragraph did not showed the findings from the previous studies about cognitive abilities and motivation.

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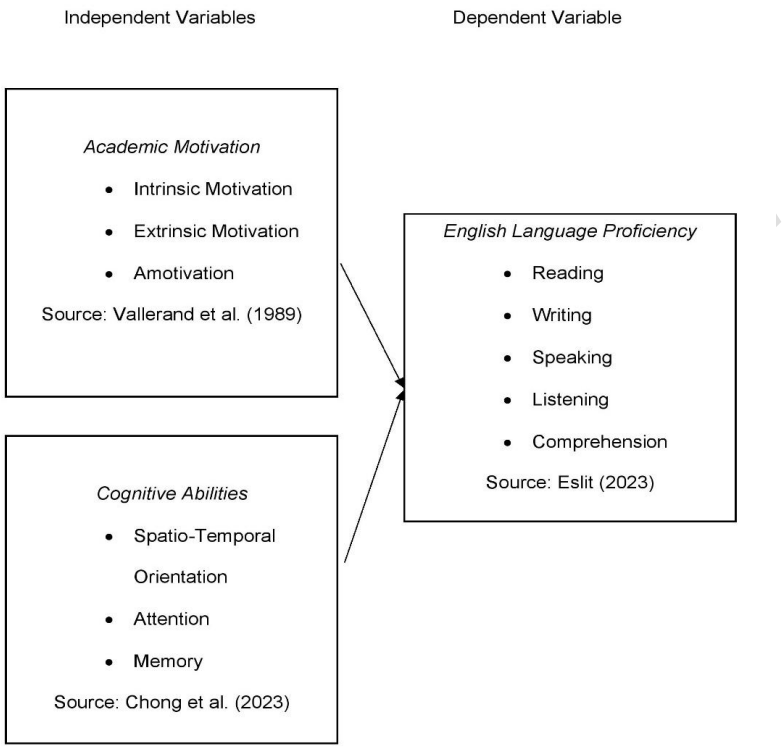

Figure 1. Conceptual Framework of the Study

2. METHODOLOGY

2.1 Research Design

This study utilized the quantitative approach, particularly a descriptive-correlational research design, which falls under non-experimental research. Quantitative research is a systematic empirical approach to investigating phenomena through collecting and analyzing numerical data. It is a widely used research methodology in various disciplines, including psychology, sociology, economics, and the natural science. Non-experimental research, such as descriptive-correlational design, focuses on observing and analyzing existing relationships without manipulating variables. Quantitative research, whether experimental or non-experimental, is characterized by its emphasis on objectivity, measurement, and statistical

analysis, making it a valuable tool for understanding complex relationships, patterns, and trends [8].

On the other hand, the descriptive design was used to describe the respondents' extent of academic motivation and, cognitive abilities and language proficiency. Descriptive design can accurately and systematically describe characteristics of a population, situation or phenomenon that are being studied such as the variables used in this study. Describing the characteristics of these variables is important to gather information and identify the level of the variables identified.Moreover, the correlation design was used to describe the relationships between the study variables. In this paper, this design was established to ascertain the degree of influence of academic motivation, cognitive abilities, and language proficiency [9].

2.2 Research Respondents

The study encompassed a total of 209 senior high school students in a public secondary institution. The population size of respondents from each participating school was determined using Slovin's formula. To ensure the reliability of the results, the study employed a 95% confidence interval with a 5% margin of error. In order to enhance sample homogeneity, specific inclusion criteria were applied. Firstly, the students had to officially enroll in a public senior high school for the academic year 2023-2024. Secondly, they had to be enrolled in at least one English subject.

Stratified random sampling was used in this study, involving dividing the population into smaller sub-groups formed based on members' shared attributes or characteristics. Moreover, stratified sampling is a statistical technique used in research and data analysis to ensure that a sample drawn from a population accurately represents different subgroups or strata within that population. It involved dividing the population into distinct, non-overlapping subgroups or strata based on certain characteristics or attributes relevant to the research objectives. Samples were then independently and randomly selected from each stratum in proportion to their size within the overall population [10]. Since the population under study had varied characteristics, this sampling technique obtained a sample that best represented the studied population.

In this study, the population was divided into two phases. Phase 1 allowed the learners to be divided into Grade 11 and Grade 12 levels. Phase 2 further divided each learner into four academic strands, namely, the HUMSS and TVL. These two phases of sample division were necessary to ensure an equal representation of the sample in each academic strand per grade level.

2.3 Research Instrument

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The instrument used for this study was composed of four parts, namely, the academic motivation scale, cognitive abilities self-assessment scale, and English language proficiency questionnaire. These instruments were carefully chosen based on published related studies and literature.

On the other hand, the researcher invited experts to validate the questionnaires. Five experts were asked to assess the content validity of the survey questionnaire to ensure its readability and comprehensibility. Revisions to the questionnaire were done in accordance with the possible suggestions of the expert-validators [11].

A 28-item Academic Motivation Scale High School Version measured the first part of the questionnaire. The scale has three dimensions, namely, intrinsic motivation, extrinsic motivation, and amotivation. The scale was constructed by Vallerand [12]. Moreover, the Academic Motivation questionnaire demonstrated good reliability in this study, with a Cronbach's alpha value of 0.86.

The second part of the questionnaire was adopted from the psychometric properties of the Cognitive Abilities Self-Assessment Scale by Chung et al. [13] consisting of 18 questions. The scale has three dimensions: spatio-temporal orientation, attention, and memory. Furthermore, the Cognitive Abilities questionnaire demonstrated excellent reliability in this study, with a Cronbach's alpha value of 0.95.

The third part was adopted from the Eslit[14] questionnaire on English Language Proficiency, consisting of 50 questions. The scale has five dimensions, namely, reading, writing, speaking, listening and comprehension. Moreover, the English Language Proficiency questionnaire demonstrated excellent reliability in this study, with a Cronbach's alpha value of 0.98.

2.4Data Analysis

In analyzing and interpreting the data gathered for this study, the following statistical tools were employed:

Mean. This was used to determine the respondents' extent of academic motivation, cognitive abilities, and language proficiency.

Standard Deviation. This was used to determine how spread out, how far, or how close the students' responses were in relation to the mean.

Pearson-r Moment Correlation. This was used to determine the significant relationship among the respondents' academic motivation, cognitive abilities, and language proficiency.

Multiple Linear Regression. This was used to determine whether the respondents' academic motivation and cognitive abilities would significantly predict their language proficiency.

2.5Ethical Consideration

In this study, the researcher adhered to the ethical principles of research outlined in the Graduate School Research Manual. The researcher secured an institutional ethics certification with certificate number 203-01-20-24 to ensure compliance with ethical standards. The respondents were provided with a copy of the informed consent, which they thoroughly read and understood before voluntarily agreeing to participate. They were also

informed of their right to withdraw from the study at any time, with no requirement for justification, and any withdrawn data were duly retracted by the researcher.

Additionally, the researcher was the sole individual with access to the information and data gathered from the respondents. To maintain anonymity, personal details such as age and gender were not collected, and the identities of both respondents and schools were kept confidential in any publication arising from this research. Furthermore, the researcher declared the absence of any potential conflicts of interest, whether financial, proprietary, or commercial, with the sponsor, respondents, or the study site.

3. RESULTS AND DISCUSSION

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3.1 Extent of Academic Motivation among Senior High School Students

Table 1. *Extent of Academic Motivation among Senior High School Students*

Indicators	SD	Mean	Descriptive Level
Intrinsic Motivation	0.88	4.08	Extensive
Extrinsic Motivation	0.90	4.18	Extensive
Amotivation	1.34	3.07	Moderately Extensive
Overall	**1.06**	**3.96**	**Extensive**

Table 1 presents the summary of indicators in the extent of academic motivation among senior high school students. It has garnered an extensive overall mean rating of 3.96 with the mean rating of the different indicators ranging from 3.07 to 4.18. This implied that the respondents were often motivated. The indicator "Amotivation" had a mean rating of 3.07, while the "Extrinsic Motivation" had a mean rating of 4.18. The overall standard deviation of 1.06, being higher than 1, indicated that the ratings were spread out over a wider range around the mean.

Previous research by Ryan and Deci [15] provided valuable insights into the factors influencing academic motivation among high school students. Their study highlighted the importance of intrinsic, extrinsic, and amotivation in shaping students' engagement and achievement in academic tasks.Furthermore, Tuominen et al. [16] suggested that students who perceive themselves as competent, find value in academic tasks, and adopt mastery-oriented goals are more likely to exhibit higher levels of academic motivation. Moreover, Gbollie and Keamu[17] highlighted the importance of goal setting, monitoring progress, and employing effective learning strategies in enhancing students' academic motivation and performance.

3.2Extent of Cognitive Abilities among Senior High School Students

Table 2. *Extent of Cognitive Abilities among Senior High School Students*

Indicators	SD	Mean	Descriptive Level
Spatio-Temporal Orientation	1.16	2.57	Less Extensive
Attention	1.24	2.70	Moderately Extensive
Memory	1.04	3.05	Moderately Extensive
Overall	**1.17**	**2.77**	**Moderately Extensive**

Table 2 presents the summary of indicators in the extent of cognitive abilities among senior high school students. It has garnered a moderately extensive overall mean rating of 2.77, with the mean rating of the different indicators ranging from 2.57 to 3.05.This implied that the cognitive abilities of the respondents were sometimes observed. The indicator “Spatio-Temporal Orientation” had a mean rating of 2.57, while the " Memory " had a mean rating of 3.05. The overall standard deviation of 1.17, being higher than 1, indicated that the ratings were spread out over a wider range around the mean.

This finding supports the argument of Keen et al. [18] who suggested that cognitive abilities among senior high school students varied, with some demonstrating strengths in certain areas while others exhibiting weaknesses. Additionally, Bardach and Klassen [19] suggested that students with stronger cognitive abilities tended to perform better academically, as they effectively utilized cognitive processes such as attention, memory, and problem-solving skills to achieve academic success. Moreover, Laube et al. [20] emphasized that cognitive abilities undergo significant changes and improvements throughout adolescence, influenced by factors such as brain development and environmental experiences. By recognizing the dynamic nature of cognitive abilities, educators can implement targeted interventions to support students' cognitive development and enhance their academic achievement in the senior high school context.

3.3 Extent of English Language Proficiency among Senior High School Students

Table 3. *Extent of English Language Proficiency among Senior High School Students*

Indicators	SD	Mean	Descriptive Level
Reading	0.92	3.54	Extensive
Writing	0.90	3.31	Moderately Extensive
Speaking	0.97	3.20	Moderately Extensive
Listening	0.92	3.43	Extensive
Comprehension	0.88	3.44	Extensive
Overall	**0.93**	**3.38**	**Moderately Extensive**

Table 3 presents the extent of English language proficiency among senior high school students. It has garnered a moderately extensive overall mean rating of 3.38, with the mean rating of the different indicators ranging from 3.20 to 3.54. This implied that the respondents' English language proficiency was sometimes observed. The indicator “Speaking” showeda mean rating of 3.20, while the indicator “Reading” showed a mean rating of 3.54. The overall standard deviation of 0.93, being less than 1, indicated that the ratings were tightly clustered around the mean.

In a comprehensive study conducted by Aizawa et al. [21] revealed a moderate level of English language proficiency among the student population, with many demonstrating competency in basic communication skills but requiring further development in complex linguistic tasks. Building upon this research, Washington-Nortey et al. [22] highlighted the disparities in language acquisition experiences and the impact of socioeconomic factors on students' language development. While many students exhibited a moderate level of English proficiency, they found that access to resources, exposure to English-speaking environments, and quality of language instruction significantly influenced students' language abilities. Additionally, Téllez and Manthey [23] investigated the effectiveness of language acquisition programs to enhance English language proficiency among English language learners (ELLs). Their findings indicated that while these programs contributed to

improvements in students' English language proficiency, the level of proficiency achieved varied, with many ELLs attaining a moderate level of proficiency over time.

3.4Significance of Relationship between Academic Motivation, Cognitive Abilities and English Language Proficiency

Table 4. *Significance of Relationship between Academic Motivation, Cognitive Abilities and English Language Proficiency*

	English Language Proficiency		
	R	p-value	Remarks
Academic Motivation	0.402	0.000	Significant
Cognitive Abilities	0.237	0.001	Significant

Table 4 shows that academic motivation was significantly related to English language proficiency, with an R-value of 0.402. Also, it reflects a p-value of .000, which is less than the alpha set at .05 (two-tailed), supporting a significant relationship. It means that as the extent of academic motivation increases, the extent of English language proficiency of students also significantly increases. In similar manner, cognitive abilities revealed a significant positive relationship with English language proficiency ($r = 0.237$, $p<0.05$). It means that as the extent of cognitive abilities increases, the extent of English language proficiency of students significantly increases.

The finding of a significant connection between academic motivation and English language proficiency among students aligns with Vygotsky's [24] Sociocultural Theory.This theory emphasizes the role of social interactions and cultural contexts in cognitive development, including language acquisition.

Building on this theory, Chen et al. [25] investigated this connection in a study of secondary school students and confirmed a significant positive correlation: students with higher academic motivation were more engaged in language learning activities. This active participation, driven by strong motivation, led students to leverage social interactions with peers and educators to enhance their language skills. Engaging in communicative tasks fostered language development by providing opportunities for meaningful language use and negotiation of meaning within social contexts.

Furthermore, Chen [26] observed that motivated students benefited from scaffolded support from teachers and peers, aligning with Vygotsky's concept of the Zone of Proximal Development (ZPD). Through collaborative interactions and guided instruction, students were able to access linguistic resources beyond their current proficiency levels, leading to accelerated language learning and proficiency growth.

The positive correlation between students' cognitive abilities and English language proficiency strengthens the tenets of Cognitive Load Theory [27]. Language learning inherently demands significant cognitive resources. Students with higher cognitive abilities are better equipped to handle this load, effectively juggling the complexities of a new language. This includes simultaneously acquiring vocabulary, comprehending grammar rules, and filtering out distractions. Consequently, stronger cognitive abilities can facilitate more effective language learning.

3.5 Significance of the Influence of Academic Motivation, and Cognitive Abilities on English Language Proficiency

Table 5. *Significance of the Influence of Academic Motivation, and Cognitive Abilities on English Language Proficiency*

		English Language Proficiency			
Singular Influence of the Predictors		Standardized Coefficients	T	p-value	Remarks
Academic Motivation		0.377	5.158	0.000	Significant
Cognitive Abilities		0.053	0.724	0.470	Not Significant
Combined Influence of the Predictors					
R	0.405				
R^2	0.164				
F	20.220				
P	0.000				Significant

Table 5 shows the results of the multiple regression analysis. In singular capacity, the academic motivation shows a p-value of 0.000, which is less than 0.05 level of significance (2-tailed) with a positive standardized beta value of 0.377. It means that for every unit increase in the value of the level of academic motivation, there is a corresponding increase of 0.377 in the level of English language proficiency among students.

Likewise, the independent variable, cognitive abilities, reflects a positive standardized beta value of 0.053 and a p-value of 0.470, greater than the 0.05 level of significance (2-tailed). This means that in a singular capacity, the level of cognitive ability is not a significant predictor of the level of English language proficiency among students.

In addition, the combined influence of the two independent variables, academic motivation and cognitive abilities toward English language proficiency was significant ($F=20.22, p<.05$). Meanwhile, the model explains 16 percent of the variance of English language proficiency based on the independent variables included in this study as indicated by $\mathbf{R^2}= 0.16$. This means that 84 percent of the variance in English language proficiency can be attributed to other factors aside from academic motivation and cognitive abilities.

The finding about academic motivation as a significant predictor of English language proficiency replicates the findings of Rose et al. [28] in their longitudinal study involving a large sample of high school students. They found that students' academic motivation levels, as measured by self-reported interest in English classes and willingness to engage in language learning activities, significantly predict English language proficiency scores. Peng and Patterson [29 also found that students who exhibited higher levels of intrinsic motivation towards English learning made greater gains in language proficiency over time than their less motivated peers.

Further supporting the notion that cognitive abilities do not significantly influence English language proficiency, El Soufi and See [30] found in their study that cognitive abilities do not

significantly predict English language proficiency among adult learners. Galla et al. [31] identified a possible explanation for this unexpected finding: language learning is a highly complex and multifaceted process that involves more than just cognitive abilities. Factors such as motivation, exposure to the language, and individual learning strategies may play equally if not more, important roles in determining language proficiency outcomes.

4. SUMMARY OF FINDINGS

This study aimed to determine if academic motivation and cognitive abilities significantly predict English language proficiency among senior high school students in public secondary institutions in Davao City. Five specific objectives were set to accomplish the general objective of the study. First, the study determined the extent of academic motivation in terms of intrinsic, extrinsic, and amotivation. Second, the study determined the extent of cognitive abilities in terms of spatio-temporal orientation, attention and memory. Third, the study determined the extent of English language proficiency in terms of reading, writing, speaking, listening and comprehension. Fourth, the study determined the significance of the relationship of academic motivation, cognitive abilities on English language proficiency. Finally, the study determined the significance of the singular and combined influence of academic motivation and cognitive abilities on English language proficiency. Utilizing a descriptive-correlational research design, a total of 209 senior high school students from a secondary education institution in Davao City, Philippines, were surveyed using standardized questionnaires administered through face-to-face survey. The mean, standard deviation (SD), Pearson product-moment correlation, as well as simple and multiple linear regression analyses were employed to analyze the collected data.

From the data gathered, the following findings were drawn:

The extent of academic motivation among senior high school students obtained an overall mean of 3.96, which was described as extensive and a standard deviation of 1.06. The indicators, intrinsic motivation, extrinsic motivation and amotivation, showed a mean of 4.08, 4.18 and 3.07, respectively.

Moreover, the extent of cognitive abilities among senior high school students obtained an overall mean of 2.77, which was described as moderately extensive and a standard deviation of 1.17. The indicators, spatio-temporal orientation, attention and memory, showed a mean of 2.57, 2.70 and 3.05 respectively.

Furthermore, the extent of English language proficiency among senior high school students obtained an overall mean of 3.38, which was described as moderately extensive. The indicators, reading, writing, speaking, listening and comprehension, showed a mean of 3.54, 3.31, 3.20, 3.43, and 3.44, respectively.

Additionally, the correlation between academic motivation and English language proficiency obtained an r-value of 0.402, which was significant ($p=0.000$) at a 0.05 alpha level of significance. Meanwhile, the correlation between cognitive abilities and English language proficiency obtained an r-value of 0.237, which was significant ($p=0.001$) at a 0.05 alpha level of significance.

Finally, when the singular influence of the independent variables on the dependent variable was determined, academic motivation ($\beta=0.377$, $p=0.000$) significantly influenced English language proficiency. However, cognitive abilities ($\beta=0.053$, $p=0.470$) did not significantly influence English language proficiency. When the combined influence of the independent

variables on the dependent variable was examined, both academic motivation and cognitive abilities ($F=20.22$, $p<0.05$) significantly influenced English language proficiency.

5. CONCLUSIONS

Based on the findings of the study, the following conclusions were formulated:

The academic motivation of senior high school students is often observed. This implies that students are actively engaged and committed to their learning goals, which can lead to higher levels of achievement and success in their academic endeavors.

The cognitive abilities of the senior high school students are sometimes observed. This implies that while some students may excel in these areas, others may require additional support or development to enhance their cognitive abilities.

The English language proficiency of the senior high school students is sometimes observed. This implies that while some students may demonstrate strong English language skills, others may still be developing or struggling with aspects of language acquisition.

There is a significant relationship between academic motivation and English language proficiency. A significant relationship is also observed between cognitive abilities and English language proficiency. This means that students who are highly motivated academically and possess strong cognitive abilities are more likely to excel in learning and mastering the English language.

Academic motivation and cognitive abilities significantly influenced English language proficiency. This implies that academic motivation and cognitive abilities substantially impact the development and enhancement of English language proficiency among students. The significant influence of these factors suggests that students who are highly motivated academically and possess strong cognitive abilities are more likely to achieve higher English proficiency levels.

6. RECOMMENDATIONS

Based on the findings and conclusions of the study, the following recommendations were created:

The Department of Education may prioritize integrating programs and interventions to enhance cognitive abilities and English language proficiency into the senior high school curriculum. By providing resources and training opportunities for teachers, they can simultaneously develop effective strategies to promote cognitive development and English language skills. Conducting research to identify best practices for improving these areas among senior high school students will ensure evidence-based curriculum design and implementation decision-making.

Moreover, school administrators play a crucial role in enhancing students' cognitive abilities and English language proficiency. They may allocate resources and support for initiatives targeting these areas, collaborating with teachers to design interdisciplinary projects and activities. Implementing regular assessment tools to monitor students' progress will enable administrators to track the effectiveness of interventions and make necessary adjustments to support student growth.

Furthermore, teachers can make a significant impact by implementing differentiated instruction strategies tailored to address the diverse cognitive levels and English language proficiency levels of students. Integrating activities that promote critical thinking, problem-solving, and language acquisition into their lessons will help students develop both cognitive abilities and English language skills simultaneously. Additionally, providing collaborative learning and peer interaction opportunities can further enhance student engagement and learning outcomes.

Apart from this, students may take an active role in their learning by seeking opportunities for self-directed practice to improve cognitive abilities and English language proficiency. Engaging in activities such as reading, writing, and participating in discussions or clubs outside of the classroom can provide valuable opportunities for language practice and cognitive growth. Seeking support from teachers or peers when facing challenges can also aid in overcoming obstacles and achieving academic success.

In addition, parents play a crucial role in supporting their children's cognitive abilities and English language proficiency development. They may encourage and facilitate participation in activities that promote cognitive growth and language practice outside of school. Access to resources such as books, educational games, and language learning materials can supplement classroom learning and reinforce skills at home.

Also, future researchers can investigate the relationship between cognitive abilities and English language proficiency among senior high school students. Longitudinal studies or experimental research can help uncover underlying mechanisms and identify effective interventions or instructional approaches. Considering socioeconomic status, cultural background, and educational context will provide a more comprehensive understanding of how these variables influence student outcomes. Researchers can inform policy and practice to better support student learning and development by contributing to the body of knowledge in this area.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

AUTHORS' CONTRIBUTIONS

All authors have contributed equally. They have read and agreed to the published version of the manuscript.

CONSENT

All authors declare that 'written informed consent was obtained from the respondent (or other approved parties) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

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