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INFLUENCE OF TECHNOLOGY AND STUDENT ENGAGEMENT ON ACADEMIC PERFORMANCE OF COLLEGE STUDENTS

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ABSTRACT

The primary purpose of this study is to determine whether technology use and student engagement predict academic performance of students. This study employed a quantitative descriptive-correlational design. Using simple random sampling, 234 tertiary elementary education students were selected as respondents from four public higher institutions in Davao de Oro during the school year 2025-2026. Furthermore, this study employed two adapted survey questionnaires and one researcher-designed questionnaire, all validated to collect data and treated using mean, Pearson-r, and linear analysis. The findings showed that technology use and student engagement among the students are high, while their academic performance is very good. The results also revealed that technology use and student engagement negatively correlated with problem-solving skills. Moreover, technology use and student engagement do not predict the academic performance of students. Furthermore, replication studies in many locations are required to strengthen the results' applicability. This will confirm the longevity of these linkages beyond the current research environment and help to a more complete understanding of these difficulties.

KEYWORDS: *Elementary Education, Technology Use, Student Engagement, Academic Performance, Descriptive-Correlational Research*

INTRODUCTION

Academic performance has consistently remained a central concern among educational institutions. It generally refers to the extent to which students successfully fulfill their academic responsibilities and achieve expected learning outcomes in their studies. Multiple factors influence students' academic performance, in the study of Shahjahan et al. (2021) identifying social media and technology use as contributing to poor outcomes. Additionally, Al Husaini and Shukor (2023) highlighting low entry grades, family support, accommodation, gender, prior assessment results, GPA, and e-learning activity as key determinants. Further, Fuertes et al. (2023) revealed that low student engagement driven by weak teacher-student relationships, limited peer support, and insufficient family support contributes significantly to students' poor academic performance.

Furthermore, in China, a study conducted by Li et al. (2023) revealed that students have poor academic performance due to high reliance on technology. In addition, approximately 45% of students reported a low or medium level of academic performance. They added that the more students are dependent to technology, the higher they would get a low academic performance. In addition, the study of Song et al. (2023) showed that Chinese students have poor academic performance due to mental health problems. They added that the students have high depression and anxiety, which leads to poor academic performance.

In the Philippines, in Poblacion, San Ildefonso, Bulacan, Albarico et al. (2023) found that students' poor academic performance is influenced by school-related factors, home-related circumstances, and personal conditions. Their findings further revealed that academic performance is shaped by several contributing elements, including students' learning skills, parental background, peer influence, teacher quality, and the availability of learning infrastructure. Additionally, the study conducted by Velez et al. (2023) in Tagum City revealed that the students have low academic performance as they cannot solve word problems due to a lack of understanding and low engagement in class.

Moreover, the study of Velez and Abuzo (2024) in a public tertiary institution in Montevista, Davao de Oro, showed that the mean level of academic performance of the students is 19.41, showing that the students have a very low academic performance. This is because the students are not engaging during the discussion of the topic, and have low motivation for learning as they are using their gadgets while the teacher is discussing.

Moreover, this study may contribute to the academic community by providing a basis for developing interventions and solutions related to the identified variables. Technology utilization and student engagement are considered significant factors that may

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influence students' academic performance. Furthermore, the findings of this research may assist educators in addressing the demands and challenges of 21st-century education through the development of innovative strategies that promote the appropriate use of technology and enhance students' engagement in learning, ultimately improving their academic performance.

Statement of the Problem

This research seeks to determine whether technology and student engagement influence the academic performance of students. The respondents of this study will be tertiary elementary education students from Davao de Oro public higher education. This study specifically aimed to provide answers to the following questions:

1. What is the level of students' technology use in terms of:
   1.1 technical proficiency;
   1.2 creativity;
   1.3 digital citizenship and participation; and
   1.4 innovativeness?
2. What is the level of student engagement in terms of:
   2.1 affective engagement;
   2.2 behavioral engagement; and
   2.3 cognitive engagement?
3. What is the level of academic performance of students in terms of test scores?
4. Is there a significant relationship between technology and the academic performance of students?
5. Is there a significant relationship between student engagement and the academic performance of students?
6. Does the use of technology predict the academic performance of students?
7. Does student engagement predict the academic performance of students?

METHODS

Research Design

This study utilized a quantitative descriptive-correlational research design. A quantitative approach involves the collection and analysis of numerical data to examine measurable variables and their relationships. It is commonly applied in statistical analysis to identify patterns, trends, averages, and possible relationships between variables (Bhandari, 2020). This method was used to find out the relationship between the variables that constitute the study, which include technology use by students, their engagement, and their academic achievement.

Research Respondents

The respondents of this study were tertiary Bachelor of Elementary Education students who attended public higher education institutions located at a state college in Davao de Oro for the school year 2025–2026. These respondents were chosen randomly in order to give everyone an equal chance of being included. The size of the sample used in this research was estimated using the Raosoft Sample Size Calculator with a 5% margin of error and 95% confidence interval. Out of the 594 respondents of the total population, a total of 234 respondents were chosen. The number of respondents belonging to each institution was as follows: School A is 53, School B is 67, School C is 40, and School D is 74.

Research Instrument

The questionnaire used in this study was adapted to measure both the use of technology and the level of engagement of the student. The Technology Scale was adapted from the work of Misirli and Akbulut (2013). On the other hand, the measure used to measure the engagement of the student was adapted from the work done by Lam and Jimerson (2008). The student academic performance will be measured using the test scores of the students.

Statistical Treatment

The collected data from the questionnaire was analyzed through systematic recording, encoding, and tabulation. The data was subjected to statistical analysis using the Statistical Package for the Social Sciences (SPSS). The statistical measures that were used to analyze the data involved mean and standard deviation as descriptive statistics, Pearson r correlation coefficient as inferential measure to establish the relationship between variables, and linear regression to test the influence of variables.

RESULTS

Level of students' technology use

The level of the students' use of technology is indicated in Table 1 in four different aspects: technical proficiency, creativity, digital citizenship and participation, and innovativeness. The findings reveal the use of technology by the students in an academic context and indicate their level of competency in each aspect.

Table 1

Indicators	Mean	Descriptive Equivalent
Technical proficiency	3.50	High
Creativity	3.50	High
Digital citizenship and participation	3.50	High
Innovativeness	3.40	Moderate

The data indicate that the general mean for technical competency, innovativeness, and digital citizenship and participation is high, while the innovativeness indicator demonstrates the general mean at the moderate level.

These results correspond with the research by Ahmad et al. (2019), who found out that the majority of students were able to apply their technical skills and knowledge, as well as adapt to technological changes. While many students displayed the skillsets of leaders and communicators, they still needed to work on their ability to cope with different issues, especially concerning the implementation of technology.

In addition, the results of the study corroborate the arguments made by Page & Thorsteinsson (2017), according to whom the usage of technological devices is considered a crucial skill in learning in the twenty-first century. Besides, Page and

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Thorsteinsson (2017) contended that the correlation between technology and creativity is one of the most important components of modern education. Furthermore, Magolego et al. (2024) have stressed that the development of creativity through classes conducted using technologies allows preparing students to cope with the rapid changes introduced by new industrial revolutions.

Additionally, Altınyazıcı Gazi (2016) carried out a research study on a second group in which the concept of digital citizenship was taught for one hour. The results obtained from this study show that there was an enhancement in the awareness regarding digital citizenship among the high school students and teachers involved in the study. Likewise, Martin et al. (2020) observed that those teachers who underwent a professional development course showed improved knowledge in digital citizenship as compared to their previous competency levels.

Moreover, Rodrigo-Alarcon et al. (2017) explored innovativeness in the face of technology and market dynamism. The results of their research suggested that there is a positive impact of technological dynamism on innovation in a business. Further, it is mentioned in the research paper written by Barua and Urme (2023) that technological innovativeness is a factor or consequence of digital transformation based on the viewpoint taken into consideration.

Level of student engagement in terms of affective engagement

The degree of engagement of students is shown in Table 2 with regard to affective, behavioral, and cognitive dimensions. These findings offer an insight into the engagement of students in their learning processes as well as emotional, behavioral, and cognitive aspects thereof.

Table 2
Student Engagement

Indicators	Mean	Descriptive Equivalent
Affective Engagement	3.80	Moderate
Behavioral Engagement	3.50	High
Cognitive engagement	3.60	High

Overall high means of scores on affective, behavioral, and cognitive engagement were reported; hence, student engagement was very well reflected among the participants.

In the research of Khawlah Altuwairqi et al. (2018), strong feelings related to student engagement include surprise, enthusiasm, disappointment, and boredom, with the degree of engagement determined by the level of interest or lack thereof in assigned learning activities. Similarly, Singhi and Anmol (2025) highlighted the role of good relations with educators, peers, and parents in promoting affective engagement by creating a feeling of belonging and interest in studies. The emotional component of education plays an important role in helping students cope with difficulties during their learning process.

Moreover, according to Baldwin (2019), it has been observed that when the learning environment supports the behaviors of students that showcase their engagement with the learning process, then their overall engagement level increases. Such behaviors include the active participation, interactions, and responses from students toward different classroom environments. In the same vein, the research carried out by Böheim et al. (2020) showed how hand-raising was crucial for assessing behavioral engagement in teacher-centered classrooms, as it directly impacted academic success.

Similarly, it has been found through Verma & Joshi's (2018) research that teaching practices facilitate cognitive and emotional engagement in students, and therefore promote improved student performance. Moreover, academic performance is influenced by a wide range of factors, including parents' educational attainment and income, teachers' subject-matter expertise, student truancy, availability and accessibility of textbooks, access to libraries and laboratory facilities, provision of school meals, and the integration of technology in education (Mustaq and Khan, 2012). In addition, students' academic performance is shaped by their readiness for change, adaptability, ability to make complex decisions, capacity to learn from mistakes, shifts in perceived control beliefs, and the quality of their academic choices.

Level of academic performance of students in terms of test scores

The data presented in Table 3 shows the level of academic performance of students' test scores. Based on the result, the mean test score of the student is 20.34, indicating that the respondents got a very satisfactory descriptive equivalent. This implies that the students have a good academic performance in relation to the test score results.

Table 3
Test Score

Indicators	Mean	Descriptive Equivalent
Score	20.34	Very Satisfactory
Over all-Mean	**20.34**	**Very Satisfactory**

The level of academic performance of students meets expectations, which indicates that the academic performance of the students is very good.

The result is consistent with the study of Mustaq and Khan (2012), which identified multiple factors influencing academic performance, including parents' educational attainment and income, teachers' subject-matter knowledge, student truancy, availability and accessibility of textbooks, access to libraries and laboratory facilities, provision of school meals, and the integration of technology in education. Moreover, they emphasized that academic performance is also shaped by students' willingness to change, adaptability, complex decision-making skills, learning from mistakes, shifts in perceived control beliefs, and the quality of their academic choices.

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Table 4
Correlation Analysis between technology use and the academic performance of students

Independent Variable	Academic Performance of Students		
	r	p-value	Remarks
Technology Use	-0.158	0.016	Significant

The table shows that technology use correlated with the academic performance of students ($p<0.05$). Technology use towards academic performance of students has an r-value of -0.158, showing a very weak negative correlation. This indicates that higher technology use is associated with slightly lower academic performance. The results further imply that there is a significant relationship between teachers' interpersonal skills and students' academic performance.

The research investigated the connection between the use of technology by the students and their academic performance. From the data analysis, a correlation coefficient of -0.158 was obtained, meaning that there exists a weak negative relationship between the variables under consideration. This correlation was statistically significant with the p-value being 0.016. Consequently, the null hypothesis was rejected, implying that a significant relationship exists between students' technology use and their academic performance.

This finding agrees with the study by Zhu and Li (2022), which found that ICT usage in learning institutions is significantly associated with academic achievement; however, the connection is mostly negative when the usage of such technologies is not intentional within the process of learning. According to their study findings, the overreliance on ICT devices might negatively impact students' academic performance because it interferes with their cognitive engagement.
Moreover, Wang et al. (2024) conducted a meta-analysis and found that there existed a statistically significant relationship between students' use of technological devices and their academic performance. Evidence from the findings indicated a generally negative connection when the use of technology was not intentionally related to academic work. The study emphasizes that while technology can support learning, unregulated or excessive engagement may hinder students' academic productivity and achievement levels.

Table 5
Correlation analysis between student engagement and the academic performance of students

Independent Variable	Academic Performance of Students		
	r	p-value	Remarks
Student engagement	-0.155	0.018	Significant

The table shows that student engagement is associated with the academic performance of students ($p<0.05$). Student engagement towards academic performance of students has an r-value of -0.155, showing a very weak negative correlation. This indicates that higher student engagement is associated with slightly lower academic performance. The results further imply that there is a significant relationship between student engagement and academic performance of students.

The study examined the relationship between student engagement and academic performance. The results yielded a correlation coefficient of -0.155, indicating a weak negative relationship between the variables. This correlation was found to be statistically significant, with a p-value of 0.018 at the 0.05 level of significance. Therefore, the null hypothesis is rejected, implying that a significant relationship exists between student engagement and academic performance.

It is supported with Lei et al. (2018), in a meta-analysis of their study found that student engagement is moderately and positively correlated with academic achievement, indicating that higher levels of engagement are generally associated with better academic outcomes. This shows the importance of engagement as an element that enhances learning outcomes among students, despite the different relationships that may exist between the two variables.

In a similar vein, Chang, Chien, and Chou (2016) noted that student engagement was significantly related to academic performance, whereby both behavioral, emotional, and cognitive engagement were positively associated with the performance of students. The meta-analytic findings also highlighted that engaged learners tend to do well in their academic studies due to enhanced participation and effort.

Significant Influence of Technology Use and Student Engagement on Academic Performance of Students

Independent Variable	Unstandardized β Coefficients		Standardized Coefficients			
	B	Std. Error	Beta	t	p-value	Remarks
(Constant)	28.201	2.989	9.433		**<0.001**	
Technology Use	-1.079	0.884	-0.100	-1.221	0.223	Not Significant
Student Engagement	-1.116	0.990	-0.093	-1.128	0.261	Not Significant

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Table 14 below shows the result of the regression analysis performed on the dependent variables (technology use and student engagement) as predictors of academic performance among students.

The result indicates that neither of the variables is a predictor since the p-value for technology use was 0.223 and for student engagement is 0.261.

From the above result, it can be observed that technology use by the students and their level of engagement cannot be used to predict the performance of the students academically; therefore, the null hypothesis is not accepted.

This aligns with the constructivist learning theory of Piaget (1873) and Vygotsky (1978) stipulates that learning outcome is not influenced by one factor like technology access or student engagement but by effective cognitive processing and appropriate scaffolding within the learning environment. Thus, the non-significant results may imply that simply using technology or student engagement is insufficient to enhance performance unless these elements are meaningfully integrated into learning experiences that promote active construction of knowledge.

CONCLUSION

Some of the conclusions that are derived from this study are that Student Technology Use is high among the tertiary elementary education students. Student Engagement is also high among the tertiary elementary education students. The academic performance of the students is very satisfactory, indicating that they have a very good academic performance.

Moreover, a very weak negative correlation was found between students' technology use and the academic performance of tertiary elementary education students. Similarly, a very weak negative correlation was also observed between student engagement levels and the academic performance of the respondents.

Recommendations

The following recommendation is offered based on the results and findings presented:

1. Students are encouraged to use technology more purposefully by focusing on academic-related tasks and strengthening their cognitive and behavioral engagement in learning activities. Moreover, students should take greater responsibility in actively engaging with learning tasks by participating meaningfully in class activities, sustaining attention during instructional processes, and consistently applying effort in both individual and collaborative academic work.
2. Teachers should guide students in making effective use of digital tools by providing structured technology-based tasks and implementing strategies that enhance student engagement, such as collaborative activities and inquiry-based learning.
3. School administration is encouraged to facilitate this process by providing digital literacy training, setting policies for using ICT in a productive manner, and providing platforms for engagement and education through the use of information technology.
4. Subsequent research should consider other variables that affect academic success; employ a mixed method approach to shed light on what is happening in the negative correlations identified, and analyze particular types of technology use to ascertain how they specifically impact learning outcomes.

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