The Influence of Artificial Intelligence Usage and Learner Autonomy on Learning Engagement among General Academic Strand Students

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ABSTRACT

This study examined how artificial intelligence (AI) usage and learner autonomy influence the learning engagement of General Academic Strand students at Lorenzo S. Sarmiento Sr. National High School. Using a quantitative-correlational design, the research measured levels of AI usage, learner autonomy, and learning engagement, and analyzed the relationships among these variables. Data were gathered from GAS students and analyzed using mean, Spearman Rho correlation, and multiple regression. Results showed high levels of AI usage in terms of functionality, availability, and complexity. Learner autonomy was also rated high in both personal and educational aspects. Likewise, learning engagement was high across behavioral, emotional, and cognitive dimensions. Significant relationships were found between AI usage and learning engagement, and between learner autonomy and learning engagement, leading to the rejection of the null hypotheses. Certain domains of AI usage and learner autonomy were identified as significant predictors of learning engagement. Overall, the findings suggest that combining AI tools with autonomy-supportive strategies can effectively enhance student engagement and academic performance.

Keywords: General Academic Strand, Artificial Intelligence Usage, Learner Autonomy, Learning Engagement, Philippines

INTRODUCTION

In the global context, learning engagement was commonly defined as the interconnected cognitive, emotional, and behavioral dimensions that reflect a student's involvement and investment in the learning process (Skinner et al., 2021). Also, Wong and Liem (2022) offered a broader perspective, defining learning engagement as students' active participation in academic activities that also includes cognitive and emotional involvement in the learning process. However, in the United States, learning engagement has become a growing concern in higher education: more than 55% of undergraduates say they have difficulty staying interested in their courses, and 66% of instructors report challenges in keeping students engaged (Wiley, 2023). Additionally, student engagement in Pakistan was a major problem that influences scholarly experiences (Zafar and Nausheen, 2022). Also, the learning engagement among students remains to be an important issue in Singapore where students continued in manifesting disengagement (Wang et al., 2025).

In recent years, systematic reviews highlighted AI transformative potential in the education field through the ability to promote adaptive learning, improving engagement, improving outcomes and simplifying the teaching task (Mustafa et al., 2024). In line with this, Giray et al. (2024) drew from collective autoethnographic insights from nine Filipino instructors and administrators across Colegio de Muntinlupa, National University–Dasmariñas, Pangasinan State University, and Cavite State University–Silang Campus, revealing that AI is viewed as a transformative tool for enhancing teaching methods, streamlining administrative tasks, and boosting

research productivity. Similarly, a study by Capinding and Dumayas (2024) showed that 194 students at Nueva Ecija University of Science and Technology identified AI as an essential factor in personalized learning, enhancing motivation, self-directed learning facilitation, and development of critical thinking and academic success. In the same context, Villarino (2024) reported that AI tools were not difficult to operate and beneficial to students in rural Cebu, ChatGPT has turned out to be a useful tool in helping students learn. Furthermore, Huesca et al. (2024) asserted that AI applications, including ChatGPT, strengthen the connection between technology use and learning engagement as it promotes active learning, offering personal feedback and ideas, and facilitating the grading process, which promotes better learning outcomes in the end.

Moreover, Basilan and Berker (2024), in their research among senior high school learners in various campuses of the Lyceum of the Philippines revealed that learner autonomy is very strong, positively correlated with student profiles and technology use. According to Olobia (2024), college of Arts and Sciences in Leyte Normal university, learner autonomy has become very important in the disruptive age because students can control their own learning amidst technology-mediated learning environments. It was also similar to the findings of Parcon et al. (2023), that learner autonomy is central to enhancing participation and deep learning among junior high school students in Bacolod City. Further, Soliman and Gorospe (2024) emphasize that learner autonomy is an important factor in the development of language learning strategies among Filipino senior high school students in the Magsaysay District. Mammadov et al. (2023) noted that learner autonomy is critical in promoting student success because helping students feel they have a choice and sense of direction is essential to increase their persistence, motivation, and cognitive investment that contribute to better learning engagement.

In Region XI, poor or inconsistent learning engagement is one of the most significant challenges since it serves as the most crucial determinant of academic self-efficacy in learners (Cubero et al., 2023). In Davao City, learning engagement among high school students has become a significant concern (Orlanes et al., 2025). Additionally, learning engagement remained a significant challenge in rural public high schools in Don Marcelino, Davao Occidental (Alcotin et al. 2023). Moreover, in Davao del Norte, Grade 12 STEM students exhibited low levels of learning engagement. (Estrella et al. 2021). At Lorenzo S. Sarmiento Sr. National High School, researchers observed that there are students within the General Academic Strand who had problems with learning engagement. This discovery has prompted the researchers to examine the issue of how students' level of learning engagement is affected.

According to Baculanta et al. (2024), learning engagement in the sense of behavioral, cognitive, and emotional parameters was crucial in enhancing the academic performance of learners. Chen et al. (2025) also studied the use of artificial intelligence, particularly intelligent tutoring and adaptive learning have been shown to drive an increase in the levels of student learning engagement and can provide adaptive scaffold and personalized feedback. In addition, Han (2021) highlighted that learner autonomy, defined as the ability to set goals and regulate learning, strongly predicts higher motivation and more profound behavioral, cognitive, and emotional engagement. Similarly, Alm (2024) investigated AI tools can further reinforce learner self-directed practices and enhance autonomy when purposefully created to assist learners in decision-making instead of automation. On the same note, Mohammadi Zenouzagh et al. (2023) established that the greater learner autonomy of the learner, the more the learner will sustain the learning engagement in any learning environment.

Despite studies being conducted on learning engagement, learner autonomy, and the application of AI in education, there is a gap in research between the relationship of these three variables. There are no studies that analyze the contribution of Artificial intelligence usage and learner autonomy to learning engagement among GAS students in Lorenzo S. Sarmiento Sr. national high school. The objective of the current study is to examine the effects of AI tools and learner autonomy on the learning engagement of General Academic Strand students. Furthermore, the results of the present study will give the ideas of what should be done to enhance the engagement of students so that GAS students would become more active, motivated, and interested in learning.

Research Objectives

1. To determine the level of Artificial Intelligence usage among general academic strand students in terms of:

1.1 Functionality;

1.2 Availability; and

1.3 Complexity.

2. To determine the level of learner autonomy among general academic strand students in terms of:

2.2 Personal Autonomy; and

2.3 Educational Autonomy.

3. To determine the level of learning engagement among general academic strand students in terms of:

3.1. Behavioral Dimension;

3.2 Emotional Dimension; and

3.3 Cognitive Dimension.

4. To determine the significant relationship between Artificial Intelligence usage and Learning engagement among General Academic Strand students.

5. To determine the significant relationship between Learner autonomy and Learning engagement among General Academic Strand students.

6. To identify which domain in artificial Intelligence influenced learning engagement among General Academic Strand students.

7. To identify which domain in Learner autonomy influenced Learning engagement among General Academic Strand.

METHODOLOGY

This study employed a quantitative, non-experimental research design using a correlational technique to describe the possible relationship among artificial intelligence usage, learner autonomy, and learning engagement of General Academic Strand (GAS) senior high school students. This design was used to describe the condition of the variables as they existed during the time of the study and to determine the direction and degree of their relationship, if any existed. A correlational research design examines the association between variables without manipulating or controlling them (Cherry, 2023).

Correlational research was appropriate when the study involved multiple quantitative variables obtained from the same group of respondents and aims to examine their natural relationships (Curtis et al., 2016).

This survey dealt with quantitative data related to artificial intelligence usage, learner autonomy, and learning engagement. The quantitative approach was appropriate for gathering data from the target respondents using structured questionnaires. The questionnaires were used as the main instrument in collecting data from General Academic Strand students of Lorenzo S. Sarmiento Sr. National High School. The focus of the study was to determine how artificial intelligence usage and learner autonomy are related to students' learning engagement among senior high school students.

Population and Sample

Stratified random sampling was used in the selection of respondents. The subjects of the study were the 270 students from the General Academic Strand in Senior High School. General Academic Strand were chosen because they are actively engaged in academic activities where artificial intelligence usage and learner autonomy may influence their learning engagement. Since the study aims to examine the relationship between AI usage, learner autonomy, and learning engagement, focusing only on general academic strand students ensures that the

data gathered is specific and aligned with the objectives of the research. The study used stratefied random sampling in selecting the respondents. This method ensured that every general academic strand student section had an equal chance of being chosen, making the sample fair and unbiased.

For this study, out of a population of 270 general academic strand students from Lorenzo S. Sarmiento Sr. National High School, a stratified random sample of 159 respondents was selected. The sample size was computed using the Raosoft sample size calculator (Raosoft, 2004) and considered sufficient for structural equation modeling (Kline, 2005).

Statistical Tool

The statistical tools that were used for data analysis and interpretation were the following:

Mean. This statistical tool was used to determine the level of usage of Artificial Intelligence (AI) tools, the level of learner autonomy, and the learning engagement among General Academic Strand students.

Spearman rho. This statistical tool was used to determine the significance of the relationship between AI usage, learner autonomy, and the learning engagement of GAS students.

Multiple Regression Analysis. This statistical tool was used to determine the influence of artificial intelligence usage, learner autonomy, learning engagement of GAS students in Lorenzo S. Sarmiento Sr. National High School in Mawab, Davao de Oro.

RESULTS

Level of Artificial Intelligence Usage

The table 1 shows the mean scores for the indicators of Artificial Intelligence usage among the respondents with an overall mean of 3.49 and described as high, with a standard deviation of 0.60. The high level may be attributed to the consistently high ratings given by the respondents across all indicators. This implies that AI tools are widely utilized in terms of functionality, availability, and complexity. The level of Artificial Intelligence usage among the respondents is positively observed.

The cited overall mean score was derived from the computed mean scores arranged from highest to lowest: 3.56 or high for functionality with a standard deviation of 0.87, 3.54 or high for availability with a standard deviation of 0.74, and 3.36 or moderate for complexity with a standard deviation of 0.68.

Table 1. Level of Artificial Intelligence Usage

Indicators	**Mean**	**SD**	**Descriptive Equivalent**
Functionality	3.56	0.87	High
Availability	3.54	0.74	High
Complexity	3.36	0.68	Moderate
Overall	**3.49**	**0.60**	**High**

Level of Learner Autonomy

The table 2 shows the mean scores for the indicators of learner autonomy among Senior High School students in Lorenzo S. Sarmiento Sr. National High School with an overall mean of 3.13 and described as moderate with a standard deviation of 0.47. The moderate level could be attributed to the mixed ratings given by the respondents on all indicators of learner autonomy. This entails that the respondents' responses to the level of learner autonomy are moderately positive in terms of personal autonomy and educational autonomy.

The cited overall mean score was the result obtained from the following computed mean scores from highest to lowest: 3.51 or high for personal autonomy with a standard deviation of 0.55, and 2.75 or moderate for educational autonomy with a standard deviation of 0.48.

Table 2. Level of Learner Autonomy

Indicators	**Mean**	**SD**	**Descriptive Equivalent**
Personal Autonomy	3.51	0.55	High
Educational Autonomy	2.75	0.48	Moderate
Overall	**3.13**	**0.47**	**Moderate**

Level of Learning Engagement

Shown in Table 3 are the mean scores for the indicators of Learning engagement among Senior High School students in Lorenzo S. Sarmiento Senior National High School with an overall mean of 3.49 and described as high with a standard deviation of 0.65. The high level could be attributed to the high rating given by the respondents in all indicators. This entails that the respondent's responses to the level of learning engagement are very evident in terms of behavioral dimension, emotional dimension, and cognitive dimension.

The cited overall mean score was the result obtained from the following computed mean scores from highest to lowest: 3.89 or high for cognitive dimension with standard deviation of 0.65; 3.70 or high for emotional dimension with standard deviation of 0.61; and 3.56 or high for behavioral dimension with standard deviation of 0.55.

Table 3. Level of Learning Engagement

Indicators	**Mean**	**SD**	**Descriptive Equivalent**
Cognitive Dimension	3.89	0.65	High
Emotional Dimension	3.70	0.61	High
Behavioral Dimension	3.56	0.55	High
Overall	**3.49**	**0.60**	**High**

Significance of the Relationship between Artificial Intelligence Usage and Learning Engagement

The Spearman's rho value for the variables presented is 0.27, with a p-value of <.001, which indicates a weak significant positive correlation. The dependent variable is learning engagement, while the independent variable is artificial intelligence usage. This finding suggests that the level of students' engagement—cognitive, emotional, and behavioral—may be influenced by the extent to which artificial intelligence is integrated into the learning process.

Since the p-level for the relationship between AI usage and learning engagement is <.001, which is lower than the 0.05 significance threshold, therefore the null hypothesis, is rejected.

Table 4. Significance of the Relationships Between Artificial Intelligence Usage to Learning Engagement

	Spearman's Rho	p
Artificial Intelligence Usage—Learning Engagement	0.27*	<.001

Significance of the Relationship Between Learner Autonomy and Learning Engagement

The Spearman's rho value of the two variables is 0.60 with a p-value of <.001. The dependent variable is learning engagement, and the independent variable is learner autonomy. It suggests a moderate positive correlation between learner autonomy and learning engagement. This means that as the level of learner autonomy increases, learning engagement tends to increase as well. Similarly, when students demonstrate greater independence in setting goals, managing their learning strategies, and evaluating their progress, their level of engagement in academic activities also tends to improve.

It reveals that the overall result of the indicators in learner autonomy has a p-level of <0.001, which is significantly lower than the significance level of 0.05. Therefore, the null hypothesis stating that there is no significant relationship between learner autonomy and learning engagement among students, is rejected. The interdependence of the variables indicates that the indicators of learner autonomy have a significant relationship with learning engagement.

Table 5. Significance of the Relationships Between Learner Autonomy to Learning Engagement

	Spearman's Rho	p
Learner Autonomy—Learning Engagement	0.60*	<.001

Significance of the Influence of the Domains of Artificial Intelligence Usage on Learning Engagement

Using Multiple Regression Analysis, the data revealed that the influence of Artificial Intelligence usage on students' learning engagement among General Academic Strand students yielded an F-value of 1.85 with a corresponding significance p-value of 0.141, which was not significant.

This means that the usage of Artificial Intelligence tools does not significantly influence the learning engagement among General Academic Strand students at Lorenzo S. Sarmiento Sr. National High School, since the probability value exceeds 0.05. The R-squared value of 0.053 indicates that only 5.3% of the variance in students' learning engagement is explained by the combined domains of Artificial Intelligence usage like Functionality, Availability, and Complexity, while the remaining 94.7% is attributed to other factors not covered in this study.

Table 6. Significance of the Influence of the Domains of Artificial Intelligence Usage on Learning Engagement

Artificial Intelligence Usage	**Coefficients**	**t**	**p**	**Decision a=0.05**
Functionality	0.04	0.91	0.37	H_o is not rejected
Availability	0.08	1.35	0.18	H_o is not rejected
Complexity	0.06	0.88	0.38	H_o is not rejected
Dependent Variable: Students' Motivation				

*p ≤ 0.05 R=0.23 R^2=0.05 F-value=1.85 p-value< 0.14

Significance of the Influence of the Domains of Learner Autonomy on Learning Engagement

Using Multiple Regression Analysis, the data revealed that the influence of learner autonomy on learning engagement among General Academic Strand students yielded an F-value of 48.15 with a corresponding significance p-value of <.001, which is statistically significant.

This indicates that learner autonomy significantly influences learning engagement among General Academic Strand students at Lorenzo S. Sarmiento Sr. National High School, since the p-value is less than 0.05. The R-

squared value of 0.385 implies that 38.5% of the variance in learning engagement among these students is accounted for by the domains of learner autonomy specifically Personal Autonomy and Educational Autonomy, while the remaining 61.5% is attributed to other factors not included in this study.

Table 7. Significance of the Influence of the Domains of Learner Autonomy on Learning Engagement

Learner Autonomy	**Coefficients**	**t**	**p**	**Decision a=0.05**
Personal Autonomy	0.16*	2.27	0.025	H_o is rejected
Educational Autonomy	0.48*	5.91	< .001	H_o is rejected
Dependent Variable: Students' Motivation				

*p < 0.05 R= 0.62 $R^{2=}$0.39 F= 48.15 p-value =< .001

DISCUSSIONS

Level of Artificial Intelligence Usage

The findings revealed that students demonstrated a high level of Artificial Intelligence (AI) usage, indicating that AI tools are already integrated into their academic routines. Students perceive AI as functional and helpful in accomplishing school-related tasks such as research, writing, and problem-solving. The high rating in functionality suggests that learners view AI systems as efficient and supportive of their academic productivity. This observation aligns with Bancoro (2024), who emphasized AI's contribution to improving academic performance, and Collins et al. (2021), who described AI as capable of performing cognitive functions that assist learning and analytical thinking. From the students' perspective, AI serves as a practical tool that enhances the quality and speed of their academic work.

In addition, availability was rated high, implying that students generally have access to AI technologies and can use them when needed. The accessibility of AI tools plays a crucial role in shaping students' engagement and learning experiences. This supports the arguments of Holmes et al. (2022), who highlighted the transformative potential of accessible AI in education, and Wang et al. (2024), who underscored how AI availability enhances learning support systems. When students can readily access AI platforms, they are more likely to incorporate them into their study habits, thereby increasing efficiency and academic engagement.

However, complexity was rated at a moderate level, suggesting that while students find AI useful, some may encounter minor challenges when navigating advanced features or understanding system outputs. This finding is consistent with Ezeoguine and Eteng-Uket (2024), who discussed usability concerns in emerging technologies, and Ahmad et al. (2023), who noted that cognitive demands may influence how effectively students interact with AI tools. Overall, the high level of AI usage reflects its growing presence in students' academic lives. As McClain et al. (2025) observed frequent student engagement with AI tools and Dingal et al. (2024) reported a positive association between AI usage and academic performance, the results suggest that AI serves as a valuable educational resource. Nevertheless, proper guidance and responsible use remain essential to ensure that students maximize its benefits for meaningful academic growth.

Level of Learner Autonomy

The findings revealed that the level of learner autonomy among General Academic Strand students is moderate, indicating that autonomy is present but still developing. This suggests that students are gradually learning to take responsibility for their academic tasks while continuing to rely on teacher guidance and structured learning

environments. Notably, personal autonomy was rated high, whereas educational autonomy was described as moderate, highlighting a distinction between students' ability to manage their personal learning behaviors and their capacity to independently direct broader academic decisions. These results imply that while students demonstrate internal control in certain aspects of learning, full independence in managing their overall educational experience has not yet been fully achieved.

The high level of personal autonomy indicates that students are capable of recognizing their strengths and weaknesses, setting personal learning goals, and demonstrating responsibility in completing academic tasks. They appear to exercise self-discipline and confidence when handling assignments and responding to challenges. This finding supports Rahmasari (2024), who emphasized that students who actively set goals, monitor their progress, and take ownership of outcomes tend to develop stronger autonomy. The present results suggest that students have cultivated a sense of internal accountability and personal initiative, reflecting growth in self-regulated learning behaviors.

In contrast, the moderate level of educational autonomy suggests that students still depend on instructional support when making more complex academic decisions, such as planning long-term learning strategies or evaluating their own performance comprehensively. O'Connor et al. (2023) explained that moderate autonomy reflects a transitional stage in which learners begin to demonstrate independence but continue to benefit from institutional guidance. Similarly, Hassan et al. (2024) noted that learners at this level may apply self-regulated strategies yet still require structured direction for higher-level academic tasks. This perspective aligns with Ahmed's (2023) view of learner autonomy as a developmental continuum progressing from dependence to independence. Overall, the findings indicate that students are in a developmental phase where personal autonomy is relatively strong, while educational autonomy continues to evolve within the support of the academic environment.

Level of Learning Engagement

The findings revealed that the level of learning engagement among General Academic Strand students at Lorenzo S. Sarmiento Sr. National High School is high, indicating that students are actively involved in their academic tasks across cognitive, emotional, and behavioral dimensions. The high overall engagement suggests that students invest effort in understanding lessons, maintain positive feelings toward learning, and consistently participate in classroom activities. This supports the assertion of Gan et al. (2024) that strong engagement is closely associated with improved academic achievement. Moreover, the integration of technology in learning environments may further contribute to this active participation. Villaver et al. (2025) reported that AI-supported tools enhance students' involvement by deepening their cognitive processing and encouraging more meaningful task engagement, which aligns with the present findings.

The high level of cognitive engagement indicates that students are mentally invested in learning, demonstrating focus, strategic thinking, and persistence in challenging tasks. Qin et al. (2025) explained that students with strong self-efficacy are more likely to exert sustained effort and apply deeper learning strategies. Similarly, Deng and Yang (2025) emphasized that inquiry-based and student-centered activities foster critical thinking and prolonged academic attention. These perspectives suggest that when students perceive themselves as capable and are exposed to stimulating learning experiences, they become more cognitively engaged, which contributes to their overall academic development.

In terms of emotional and behavioral dimensions, the results indicate that students generally display positive feelings toward school and consistently participate in academic activities. Hiver et al. (2021) found that motivation and perceived teacher support significantly enhance students' emotional connection to learning, while Heo (2021) noted that positive classroom experiences strengthen students' interest and commitment. Behavioral engagement is likewise reinforced when students regularly attend classes and complete academic tasks. Hartt (2025) observed that consistent participation predicts better academic outcomes, and both Cubacub (2025) and Shao (2025) identified persistence and task completion as key indicators of strong behavioral engagement. Overall, these studies support the present finding that students demonstrate high engagement across cognitive, emotional, and behavioral domains, reflecting a learning environment that encourages active and sustained participation.

Significance of the Relationship Between Artificial Intelligence Usage and Learning Engagemnet

The findings revealed a significant positive relationship between artificial intelligence (AI) usage and learning engagement among students, indicating that greater use of AI tools is associated with higher levels of academic involvement. This suggests that when students actively utilize AI in their learning processes, they are more likely to demonstrate stronger cognitive effort, emotional investment, and behavioral participation. The result supports Liang and Reiss (2025), who found that students with favorable attitudes toward AI technologies tend to exhibit deeper thinking, increased motivation, and more active participation in learning tasks. The present finding implies that AI, when meaningfully integrated into students' academic routines, can serve as a supportive tool that enhances overall engagement.

Furthermore, the significant association may be explained by how AI-powered systems provide personalized feedback and adaptive learning experiences that sustain student interest and involvement. Hao et al. (2025) emphasized that interaction with AI-driven platforms promotes continuous engagement by tailoring instructional support to learners' needs. Similarly, Wang and Guo (2025) reported through meta-analytic evidence that the appropriate use of generative AI tools enhances engagement across cognitive, emotional, and behavioral dimensions. These perspectives suggest that AI does not merely function as a technical aid but also as a mechanism that stimulates active and sustained participation when aligned with learners' goals and classroom demands.

In addition, Wang et al. (2024) underscored the importance of aligning AI technologies with clear pedagogical objectives to maximize their educational value. Their work highlights that AI in education is interdisciplinary and must be implemented thoughtfully to ensure meaningful academic applications. The significant relationship observed in this study reinforces this perspective, indicating that students' engagement improves when AI tools are used responsibly and strategically within instructional contexts. Overall, the findings demonstrate that AI usage plays a meaningful role in strengthening learning engagement, provided that appropriate guidance and educational support systems are maintained.

Significance of the Relationship Between Learner Autonomy and Learning Engagement

The findings of the study revealed that learner autonomy has a significant relationship with learning engagement, indicating that students who are capable of managing and directing their own learning tend to demonstrate stronger academic involvement. This suggests that when students take responsibility for setting goals, selecting appropriate learning strategies, and monitoring their progress, they are more likely to participate actively across cognitive, emotional, and behavioral dimensions of engagement. The rejection of the null hypothesis therefore confirms that learner autonomy plays a meaningful role in shaping students' active participation within the learning environment. As students develop greater independence, their commitment and investment in academic tasks also increase.

This result is consistent with previous research emphasizing that autonomy enhances meaningful engagement in learning. Okumuş Ceylan (2021) explained that learners who display strategic and motivated behaviors are more capable of sustaining engagement over time. Similarly, Rahmasari (2024) highlighted that students who practice goal setting and effectively utilize learning resources tend to demonstrate higher levels of participation. Nguyen et al. (2021) further noted that self-efficacy and positive learner attitudes strengthen both autonomy and collaborative engagement, reinforcing the idea that independent learners are more academically involved. These perspectives support the present finding that autonomy contributes significantly to students' learning engagement.

Moreover, the relationship can be understood through the lens of self-regulated learning and autonomy-supportive environments. Zhong (2023) emphasized that the use of cognitive and metacognitive strategies by autonomous learners promotes deeper academic involvement. In addition, Cullen (2024) found that autonomy-supportive contexts enhance students' enjoyment, performance, and overall engagement. Taken together, these studies affirm that learner autonomy is a key determinant of sustained learning engagement. The present findings therefore underscore the importance of fostering independent learning skills among students to strengthen their active and meaningful participation in academic activities.

Significance of the Influence of the Domains of Artificial Intelligence Usage on Learning Engagement

The results of the multiple regression analysis revealed that artificial intelligence (AI) usage does not significantly predict learning engagement among General Academic Strand students. Although AI usage showed a significant positive correlation with learning engagement, the combined domains of functionality, availability, and complexity did not significantly influence students' engagement when examined simultaneously. The regression model was not statistically significant, and the proportion of variance explained was minimal. This indicates that while AI usage is associated with engagement at a correlational level, it does not independently account for meaningful changes in students' cognitive, emotional, or behavioral involvement in learning.

This finding suggests that students' engagement cannot be attributed solely to their use of AI tools. Even if students perceive AI platforms as functional and accessible, these technological features alone may not be sufficient to drive deeper academic involvement. The weak predictive power of AI usage implies that engagement is likely shaped by broader instructional, motivational, and contextual factors. As emphasized by Holmes and Tuomi (2022), the effectiveness of AI in education depends largely on how it is pedagogically integrated rather than on its mere presence in the learning environment. Similarly, Wang et al. (2024) highlighted that AI must be aligned with clear instructional objectives to meaningfully support student learning processes.

Moreover, this result underscores the importance of internal learner characteristics, such as motivation, self-regulation, and autonomy, in sustaining engagement. While AI tools may enhance efficiency and provide academic assistance, students' active participation appears to rely more heavily on personal and environmental factors than on technological exposure alone. Therefore, AI integration should be strategically guided and embedded within autonomy-supportive and well-designed instructional practices. In doing so, AI can function as a complementary resource rather than being viewed as a primary determinant of students' learning engagement.

Significance of the Influence of the Domains of Learner Autonomy on Learning Engagement

The results of the multiple regression analysis revealed that learner autonomy has a significant influence on students' learning engagement in Mawab District Secondary Schools. The overall regression model was statistically significant, indicating that learner autonomy meaningfully predicts the level of students' engagement. A substantial proportion of the variance in learning engagement was explained by learner autonomy, demonstrating its strong predictive power. Both personal autonomy and educational autonomy significantly contributed to the model, suggesting that students' ability to manage their own learning behaviors as well as make broader academic decisions plays an important role in enhancing their cognitive, emotional, and behavioral involvement. Consequently, the null hypothesis was rejected, confirming that learner autonomy significantly influences learning engagement.

Specifically, educational autonomy emerged as a stronger predictor compared to personal autonomy, indicating that students' capacity to independently plan, evaluate, and direct their overall learning experiences has a greater impact on engagement. While personal autonomy reflects self-discipline and responsibility in completing tasks, educational autonomy encompasses higher-level decision-making and strategic control over learning processes. This suggests that when students are empowered to make meaningful academic choices and take ownership of their educational direction, their engagement becomes more sustained and purposeful. The findings highlight that structured independence, rather than mere task completion, plays a critical role in fostering deeper academic involvement.

These results are consistent with prior research emphasizing the importance of learner ownership in promoting engagement. Han (2021) found that students who set goals and regulate their learning demonstrate higher motivation and active participation. Similarly, Mammadov et al. (2023) reported that autonomy enhances persistence, motivation, and cognitive investment, which are essential components of engagement. Rahmasari (2024) further explained that strategy-based instruction strengthens students' sense of responsibility and deepens their involvement in learning tasks. Taken together, these studies reinforce the present findings, underscoring learner autonomy as a fundamental factor in cultivating classrooms where students feel capable, motivated, and meaningfully engaged in their academic journey.

CONCLUSION

Based on the findings of the study, it can be concluded that Artificial Intelligence (AI) usage among General Academic Strand students is generally high in terms of functionality, availability, and complexity. Learner autonomy is moderate overall, with personal autonomy rated higher than educational autonomy. Learning engagement among students is high across behavioral, emotional, and cognitive dimensions.

Correlation analysis revealed that both AI usage and learner autonomy have significant positive relationships with learning engagement. However, regression analysis showed differing predictive strengths. Artificial Intelligence usage does not significantly predict learning engagement when its domains are examined collectively. In contrast, learner autonomy significantly influences learning engagement and explains a substantial proportion of its variance. These outcomes indicate that while AI tools are widely utilized and positively associated with engagement, learner autonomy plays a more critical role in sustaining students' academic involvement. Therefore, strengthening autonomy-supportive practices may be more effective in enhancing engagement than relying solely on technological integration.

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