ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 12| Issue: 5| May 2026|| Journal DOI: 10.36713/epra2013 ||SJIF Impact Factor 2026: 8.753 || ISI Value: 1.188

INFLUENCE OF STUDY HABITS AND MATHEMATICAL CURIOSITY ON SELF-DIRECTED LEARNING READINESS AMONG SENIOR HIGH SCHOOL STUDENTS

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Article DOI: https://doi.org/10.36713/epra27870
DOI No: 10.36713/epra27870

ABSTRACT

Inadequate self-directed learning readiness remains a challenge in education. This study examined study habits and mathematical curiosity as determinants of self-directed learning readiness among 185 STEM students. Utilizing diagnostic design, stratified random sampling, survey technique, and multiple regression analysis, it was revealed that only mathematical curiosity manifested a significant contribution, partly and partially supporting Self-Determination Theory. Future research may explore additional factors explaining the remaining 46.9% of the variance in self-directed learning readiness. Educational resources for study habits may be reallocated for the use of developing mathematical curiosity.

KEYWORDS: *Influence of study habits, mathematical curiosity, self-directed learning readiness, senior high school students*

INTRODUCTION

Problem and Its Scope

Globally, senior high school students face challenges in developing readiness for self-directed learning, as it requires high levels of autonomy, motivation, and adaptability (Chen et al., 2021). Recent research indicates that many students exhibit low levels of preparedness for independent learning, particularly in managing their study routines and maintaining motivation when external supervision is limited (Desabayla & Gueta, 2022). Furthermore, A significant number of learners globally demonstrate low readiness of self-directed learning (Abdelsalam & Eltwansy, 2023).

In India, found that many students face challenges in self-directed learning readiness (Pillai et al., 2025). Additionally, in Saudi Arabia, students exhibited low levels of self-directed learning readiness across all measured dimensions (Alkorashy & Alotaibi, 2023). Moreover, in Indonesia, many students continue to exhibit low levels of self-directed learning readiness (Bontisesari et al., 2022).

Recent research in the Philippines continues to highlight the problem of inadequate self-directed learning readiness among students. In Region 10, Northern Mindanao, senior high school students exhibited limited readiness to manage their own learning (Maglangit & Limpot, 2022). Likewise, students from a private higher education institution in Cebu City demonstrated insufficient self-directed learning readiness (Yao, 2021). Furthermore, the study reveals that students from several public senior high schools in Davao del Sur demonstrated low levels of self-directed learning readiness (Tagose Jr. & Limpot, 2025).

Although numerous studies have explored self-directed learning readiness worldwide and, in the Philippines, limited research has examined the factors influencing its development among senior high school students. Most existing studies merely describe the level of readiness (Tagose Jr. & Limpot, 2025) without analyzing how students' study habits and mathematical curiosity contribute to it. With the growing demand for independent learning skills in modern education, there is an urgent need to identify the factors that strengthen students' readiness to learn autonomously. Hence, this study seeks to address this gap and provide insights that can support the development of more self-directed learners.

Despite the emphasis on independent learning, limited Philippine research simultaneously examines behavioral (study habits) and motivational (mathematical curiosity) influencers of self-directed learning readiness among senior high school students. This gap may result in incomplete instructional approaches that hinder the development of autonomous learning. Hence, identifying and integrating these factors is essential to strengthening students' readiness for independent and lifelong learning.

Significance of Study

This study supports SDG 4 (Quality Education) by promoting self-directed learning readiness through improved study habits and strengthened mathematical curiosity, which help develop autonomous and lifelong learners. By focusing on curiosity, discipline, and motivation, the study contributes to equitable and high-quality education that prepares students for critical thinking and adaptability. The findings provide school administrators with insights for designing programs that foster independent learning and resilience, while teachers may refine instructional strategies and incorporate curiosity-driven activities. Students may benefit

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by improving study routines, motivation, and self-regulation. Furthermore, future research may use this study as a reference to explore other factors influencing self-directed learning readiness or developing interventions that enhance curiosity and effective study habits in mathematics education.

Statement of the Problem

This research aims to determine the significance of the influence of study habits and mathematical curiosity as determinants of self-directed learning readiness.

1. To determine the levels of study habits in terms of notetaking, use of library, and time allocation to study; mathematical curiosity in terms of exploration, absorption, epistemic curiosity, perceptual curiosity; and self-directed learning readiness in terms of self-management, desire for learning, and self-control.
2. To determine the significance of the correlation between study habits and, mathematical curiosity, and self-directed learning readiness.
3. To determine the significance of the individual and combined influence of study habits and mathematical curiosity on self-directed learning readiness.

Research Hypotheses

The following were tested at a 0.05 level of significance.

H_{01}: There is no significant relationship between study habits, mathematical curiosity and self-directed learning readiness.

H_{02}: There is no significant individual and combined influence of study habits and mathematical curiosity on self-directed learning readiness.

Theoretical Framework

This study is anchored on Self-Determination Theory (Deci & Ryan, 2000), which posits that human motivation and behavior are influenced by the fulfillment of three basic psychological needs: autonomy, competence, and relatedness. When these needs are satisfied, individuals tend to demonstrate higher intrinsic motivation, self-regulation, and effective engagement in learning tasks. In this context, SDT explains how learners develop self-management, initiative, and responsibility in their academic performance.

In this study, the study habits were represented through note-taking, library use, and time allocation, which contribute to self-regulation, organization, and effective learning management (Follmer et al., 2022). Furthermore, mathematical curiosity was characterized by exploration, absorption, epistemic curiosity, and perceptual curiosity, which support active engagement, knowledge-seeking and independent problem-solving (Cheng et al., 2022). Additionally, self-directed learning readiness was described through self-management, desire for learning, and self-control, which strengthen learners' abilities for independent and lifelong learning (Kumar et al., 2021). The relatedness component of the theory was not included in this study. Hence, this study was partly anchored.

Conceptual Framework

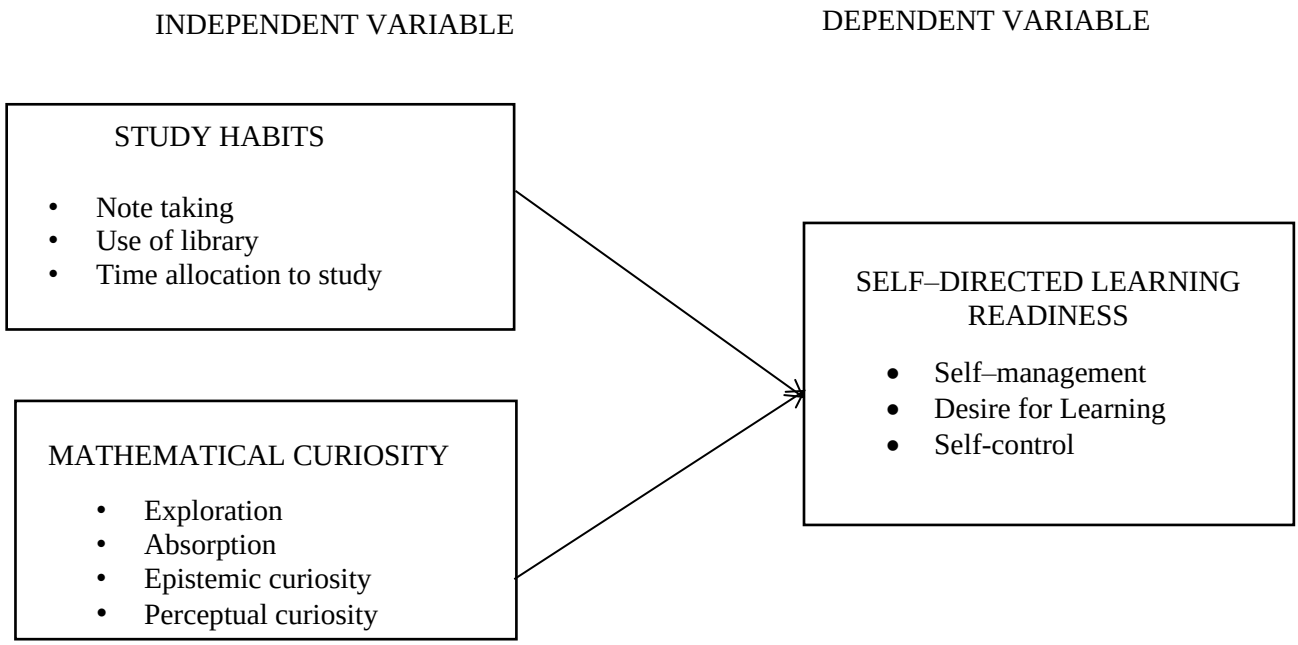

Figure 1. Conceptual Framework. Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior.

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METHODOLOGY

This chapter presents the research design, locale of the study, respondents, sampling technique, data gathering technique, data analysis procedure, and ethical considerations of the study.

Research Design

This study employed diagnostic research design. This design is appropriate because it allows the researcher to describe the current levels of the variables and examine how they are related without manipulating the respondents' natural setting (Best & Kahn, 2016). Moreover, it is a structured and problem-oriented research design used to examine present conditions, identify relevant patterns or relationships, and describe the strength of the determinant factor to influence the outcome (Wisenthige, 2023).

Locale of the Study

This study was conducted in three selected private educational institutions in Davao City offering Senior High School STEM programs. These institutions were chosen as the locale of the study due to their provision of a relevant academic environment where students are actively engaged in mathematics-oriented and analytical learning activities. Such setting is deemed appropriate for examining the relationship among study habits, mathematical curiosity, and self-directed learning readiness among STEM students.

Sample and Sampling Technique

A sample of 185 Senior High School STEM students from three private educational institutions in Davao City during the School Year 2025–2026 served as the respondents of this study. This group was selected due to their direct engagement in mathematics-intensive subjects, making them appropriate participants for examining study habits, mathematical curiosity, and self-directed learning readiness. The sample size was determined using Slovin's formula with a 5% margin of error. In addition, Raosoft, as highlighted by Lopez and Garcia (2021), was utilized as a reference for sample size determination based on population size, thereby enhancing the validity of the study and minimizing sampling errors. Students who were absent, officially excused, or chose not to participate during the data collection period were not included in the study.

Stratified random sampling was employed in this study. The population was first categorized into homogeneous subgroups or strata, and respondents were then randomly selected from each stratum. This technique is suitable for heterogeneous populations as it ensures proportional representation of all subgroups within the sample. Its use improves representativeness, reduces sampling bias, and increases the precision of results compared to simple random sampling (Şanlı, 2023).

Data Gathering Technique

The survey technique was used in gathering data. It is a method of data collection that uses questionnaires or structured interviews to obtain standardized information about respondents' attitudes, perceptions, or behaviors (LibreTexts, 2021). It is particularly useful in descriptive and correlational studies because survey research involves systematically collecting data from a sample population to describe characteristics and examine relationships among variables (McCombes, 2025). It is advantageous for large populations because it produces quantifiable data for statistical analysis, supports generalization of findings, enables efficient data collection, and ensures consistency through standardized procedures (WAC Clearinghouse, 2021).

Three adapted and modified survey questionnaires were used in this study. A 4-point Likert scale was used to evaluate participants' responses across the three research instruments, ranging from 1 (strongly disagree) to 4 (strongly agree), to reduce central tendency bias and encourage clearer response choices (Joshi et al., 2015). The first instrument, the study habits questionnaire, was adapted from Sakirudeen and Sanni (2017). It consisted of three indicators: note-taking, use of the library, and time allocation to study. Likewise, it consists of 15 items with a Cronbach's alpha of 0.863.

The second instrument, the mathematical curiosity questionnaire, was adapted from Belecina and Ocampo (2016). It consisted of three indicators: note-taking, use of library, and time allocation to study. It also consists of 31 items with a Cronbach's alpha of 0.941.

The third instrument, the Self-directed learning readiness questionnaire, was adapted from Fisher and King (2009). The instrument covered three indicators: self-management, desire for learning, and self-control. It consists of 29 items with a Cronbach's alpha of 0.937.

Data Analysis Technique

In this study, the data analysis techniques used were descriptive statistics, correlation analysis, and multiple linear regression analysis. Descriptive statistics are commonly used to organize, summarize, and present quantitative data in a meaningful manner, allowing researchers to identify patterns and interpret results effectively (Kotronoulas et al., 2023). In this study, the mean and standard deviation were utilized to describe the levels and variability of the variables. Furthermore, correlation analysis determines the strength and direction of the relationship between continuous variables (Schober et al., 2018). Specifically, the Pearson Product-Moment Correlation Coefficient was employed to examine the relationships among the variables in the study. Moreover, multiple linear regression analysis was used to examine the combined and individual influence of several independent variables on a dependent variable and to estimate the extent of their influence on the outcome variable (James et al., 2021). Unstandardized and standardized beta coefficients were

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likewise utilized to determine the magnitude and direction of the influence of the predictor variables on the criterion variable, guided by Akoglu (2018) to support interpretation and theory testing.

The following matrix contains the descriptive levels and corresponding interpretations assigned to each variable involved in this study.

Range of Mean	Level	Study Habits	Mathematical Curiosity	Self-Directed Learning Readiness
3.26 – 4.00	Very High	Very Good	Very Good	Very Good
2.50 – 3.25	High	Good	Good	Good
1.75 – 2.49	Low	Poor	Poor	Poor
1.00-1.74	Very Low	Very Poor	Very poor	Very poor

To measure and interpret the standard deviation, the following scheme is followed.

Range	Description	Interpretation
SD < 0.50	Highly Consistent Responses	Strong and uniform perception
SD = 0.51 – 1.00	Moderately Consistent Responses	Acceptable consistency
SD = 1.01 – 1.50	Low Consistency Responses	Differing views or experiences
SD > 1.5	Very Low Consistency Responses	High variability and lack of consensus

In this study, the significance of the correlation is tested at 0.05 confidence level. The following is the standard measure for the interpretation scale of the r-value.

Computed r	Descriptive Interpretation
+/- 1.00	Perfect Correlation
Between +/- 0.75 - +/- 0.99	High correlation
Between +/- 0.51 - +/- 0.74	Moderately high correlation
Between +/- 0.31 - +/- 0.50	Moderately low correlation
Between +/- 0.01 - +/- 0.30	Low Correlation
0.00	No Correlation

In terms of scale of Beta Coefficients Strength, the following scheme as proposed by Akoglu (2018) was used:

β Value Range	Strength of Influence
$\pm 0.00 - \pm 0.09$	Very Weak
$\pm 0.10 - \pm 0.29$	Weak
$\pm 0.30 - \pm 0.49$	Moderate
$\pm 0.50 - \pm 0.69$	Strong
± 0.70 *and above*	Very Strong

Ethical Considerations

The study followed proper ethical standards to protect the respondents and ensure the accuracy and reliability of the results, while showing utmost respect to the policies of the Department of Education (DepEd) and school administrators. This was ensured through a systematic process that included securing ethical clearance from the appropriate review committee, complying with the guidelines of the Holy Cross of Davao College – Society for Moral Integrity and Legal Ethics (SMILE), and observing the provisions of the Data Privacy Act of 2012. Permission to conduct the study was obtained from school authorities before data collection, with coordination from school heads to ensure proper implementation. Informed consent from parents or guardians and assent from minor respondents were secured after clearly explaining the study's purpose, procedures, and their rights, including voluntary participation and withdrawal at any time. Confidentiality and anonymity were strictly maintained by avoiding the collection of personally identifiable information, and all data were handled with privacy, honesty, and objectivity using validated and reliable instruments to ensure consistency and accuracy of results.

RESULTS

Included in this chapter are the descriptive, correlation, and regression tabular presentation, and the corresponding analysis and interpretation of the statistical results. This chapter ends with a summary of findings.

Descriptive Results

Shown in Table 1 are the descriptive statistical results of the study. It contains the variables namely, study habits, mathematical curiosity, and self-directed learning readiness with their respective indicators. It also includes the sample size, computed means, standard deviations, and the corresponding descriptive interpretation.

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Table 1. Descriptive Analysis. ***(N = 185)***

Variables	SD	Mean	Descriptive Level
Study Habits (IV_1)	***0.47***	***3.12***	***High***
Note Taking	0.47	3.34	Very High
Use of the Library	0.64	2.90	High
Time Allocation to Study	0.57	3.12	High
Mathematical Curiosity (IV_2)	***0.38***	***3.30***	***Very High***
Exploration	0.45	3.34	Very High
Absorption	0.50	3.22	High
Epistemic Curiosity	0.43	3.28	Very High
Perceptual Curiosity	0.42	3.36	Very High
Self-Directed Learning Readiness (DV)	***0.33***	***3.30***	***Very High***
Self-Management	0.40	3.14	High
Desire For Learning	0.36	3.43	Very High
Self-Control	0.38	3.34	Very High

Very High - (3.26 – 4.00); High - (2.50 – 3.25); Low – (1.75 – 2.49); Very Low – (1.00 – 1.74)

Table 1 specifically shows that the study habits variable had a mean of 3.12, describes as high. This indicates that the study habits of the respondents were good. One of the indicators is described as very high, and the other two are described as high. The standard deviation of 0.47 implies that they generally demonstrate effective and stable learning practices in note-taking, use of the library, and time allocation for studying. Furthermore, the mathematical curiosity variable had a mean of 3.30, described as very high. This indicates that the mathematical curiosity of the respondents were very high. One of the indicators is described as very high, and the other two are described as high. Three of the indicators were described as very high, and one was described as high. A standard deviation of 0.38, which signifies that they actively engage in exploration, epistemic inquiry, and perceptual interest in mathematics. Additionally, the self-directed learning readiness variable had a mean of 3.30, described as very high. It indicates that students are highly capable of managing and taking responsibility for their own learning. Most of the indicators were described as very high, and one was described as high. The standard deviation of 0.33 denotes that they demonstrate strong self-management, desire for learning, and self-control.

The findings reveal that study habits are at a high level, while both mathematical curiosity and self-directed learning readiness are at very high levels, indicating that students demonstrate stronger engagement in curiosity and independent learning than in their study practices.

Correlation Results

Table 2 shows a correlation table, the determinant and the criterion variable. It includes the r-value, p-value, decision on the null hypothesis, and its interpretation.

Table 2. Correlation Analysis. ***(N = 185)***

Variables	*Self-Directed Learning Readiness (DV)*			
	r	**p-value**	**Decision on Ho @ 0.05 level of significance**	**Interpretation**
Study Habits (IV_1)	0.536	0.000	Reject Ho	Significant Moderately High Positive Correlation
Mathematical Curiosity (IV_2)	0.724	0.000	Reject Ho	Significant Moderately High Positive Correlation

Table 2 specifically shows the correlation between study habits and self-directed learning readiness variables, which obtained a p-value of 0.000. Such a value is less than the 0.05 level of significance. Hence, the null hypothesis was rejected. It indicates that the correlation is significant. The r-value of 0.536 reflects a moderately high correlation. This implies that when students' study habits change, their self-directed learning readiness also changes. Likewise, mathematical curiosity obtained a p-value of 0.000, which is less than the 0.05 level of significance. Hence, the null hypothesis was rejected. It indicates that the correlation is significant. The r-value of 0.724 reflects a moderately high correlation. This implies that higher levels of mathematical

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curiosity are associated with higher levels of self-directed learning readiness among students.

The findings reveal that both study habits and mathematical curiosity have significant relationships with self-directed learning readiness, with mathematical curiosity showing a stronger association compared to study habits.

Regression Results

Presented in Table 3 are the results of the regression analysis. It contains the unstandardized beta, beta coefficient, t-value, p-value, decision on null hypothesis and the corresponding interpretation.

Table 3. Regression Analysis. ***(N = 185)***

	Self-Directed Learning Readiness (DV)						
	Unstandardized Coefficients		**Standardized Coefficients**				
	B	**Std. Error**	**Beta**	**t**	**p value**	**Decision on Ho**	**Interpretation**
Constant	1.225	0.146		8.392	0.000		
Study Habits (IV_1)	0.071	0.047	0.102	1.507	0.133	Fail to reject Ho	Not significant
Mathematical Curiosity (IV_2)	0.563	0.058	0.657	9.716	0.000	Reject Ho	Significant

$R = 0.728$; $R^2 = 0.531$; Adjusted $R^2 = 0.525$; F-value = 102.8; p-value = 0.000
Level of Significance: 0.05
Decision rule: Reject H_0 if $p<0.05$

Table 3 specifically shows that the influence of study habits determinant obtained a standardized beta coefficient of 0.102. It signifies that the influence of study habits on self-directed learning readiness is weak. With a corresponding p-value of 0.133, which is greater than the 0.05 level of significance, the null hypothesis was accepted. This implies that for every unit change in study habits, there is no corresponding change in self-directed learning readiness. Additionally, the influence of mathematical curiosity on the variable obtained a standardized beta coefficient of 0.657. It indicates that the influence of mathematical curiosity on the criterion is strong. With a corresponding p-value of 0.000, which is less than the 0.05 level of significance, the null hypothesis was rejected. It denotes that the influence of mathematical curiosity on self-directed learning readiness is significant. This implies that for every unit change in mathematical curiosity, there is a corresponding 0.657 unit change in self-directed learning readiness.

The table also shows an R^2 value of 0.525, indicating a strong combined influence of determinants on the criterion variable. With a corresponding p-value of 0.000, which is less than the 0.05 level of significance, the null hypothesis was rejected. It indicates that the combined influence of study habits and mathematical curiosity on self-directed learning readiness is statistically significant. This implies that for every unit change in the combined influence of the determinant variables, there is 0.525 unit change in the criterion variable.

Mathematical curiosity shows a strong and significant influence on self-directed learning readiness, while study habits exhibit a weak and non-significant effect on the same variable. The combined influence of the two determinants is significant, with mathematical curiosity emerging as the more dominant predictor of self-directed learning readiness compared to study habits.

Summary of Findings

Based on statistical results, it was specifically found that:

1. Study habits and mathematical curiosity significantly correlate with self-directed learning readiness.
2. Study Habits and Mathematical curiosity have significant collective influence on self-directed learning readiness, though individually only mathematical curiosity shows a significant influence on the criterion variable.

DISCUSSIONS

In this chapter, the findings of the study are discussed. Likewise, the conclusion and recommendations are presented.

Study Habits, Mathematical Curiosity, and Self-Directed Learning Readiness

The finding reveals that both study habits and mathematical curiosity are significantly correlated with self-directed learning readiness. Study habits such as time management and effort regulation are associated with better self-directed learning and academic performance (Oducado, 2021). Similarly, this current finding aligns with the idea that curiosity has been shown to support intrinsic motivation and deeper engagement in learning processes (Ryan & Deci, 2020). In mathematics education, positive learning attitudes and curiosity are linked with improved self-directed learning skills (Ten et al., 2021). These findings suggest that students who demonstrate curiosity and strong study habits are more likely to develop self-directed learning readiness. On the contrary, the current finding negates the study of Lim et al. (2021), who found that self-regulated learning does not

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consistently translate into effective outcomes due to difficulties in applying strategies. However, Lim et al.'s study involved only 29 participants, and similar research had a limited scope, which reduced its generalizability. In comparison, the current study included 185 respondents, providing a broader basis for analysis.

Self-Directed Learning Readiness as Influenced by Study Habits and Mathematical Curiosity

The current study reveals that self-directed learning readiness is more strongly influenced by mathematical curiosity than by study habits. The finding supports that curiosity promotes knowledge-seeking, engagement, attention, memory, persistence, and independent learning (Ten et al., 2021). It also enhances cognitive engagement and learning exploration through information-seeking behavior (Kidd & Hayden, 2021), which supports deeper learning processes and autonomous learning development (Kang et al., 2009). Furthermore, the present study corroborates the view that curiosity is associated with increased intrinsic motivation, active participation in learning tasks, and independent learning behaviors that are essential characteristics of self-directed learners (Ryan & Deci, 2020).

In contrast, the current finding undermines the claim that self-regulated learning strategies and study habits support academic structure and performance, but their effectiveness depends on motivation, context, and environmental support (Broadbent et al., 2021), and they do not always independently predict learning readiness (Karlen et al., 2021).

CONCLUSION

Based on the findings of the study, it was concluded that study habits and mathematical curiosity have a significant combined influence on self-directed learning readiness; nevertheless, only mathematical curiosity manifests a significant contribution on the criterion. This result partly supports Self-Determination Theory, which posits that human motivation and behavior are influenced by the fulfillment of three basic psychological needs: autonomy, competence, and relatedness.

RECOMMENDATIONS

Based on the findings of the study, future research may explore other factors, such as mathematical self-efficacy, digital literacy, and teacher-student relationships to explain the remaining 46.9% of the variance in self-directed learning readiness among STEM students. Meanwhile, education practitioners may enhance self-directed learning readiness among STEM students by promoting inquiry-based instruction, strengthening study habits and curiosity, and providing supportive, resource-rich learning environments.

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ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
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