



Journal of Frontiers in Multidisciplinary Research

Examining the Relationships between Learning Resources, Digital Self-Efficacy, Motivation, Support System, and Learning Outcomes in Online Learning Among College Students in Camiguin

Michael A Velez

Researcher, Doctor of Philosophy, Educational Management, Philippines

* Corresponding Author: **Michael A Velez**

Article Info

E-ISSN: 3050-9726

P-ISSN: 3050-9718

Impact Factor (RSIF): 8.10

Volume: 07

Issue: 01

Received: 19-11-2025

Accepted: 22-12-2025

Published: 24-01-2026

Page No: 87-100

Abstract

The study investigated the relationships among learning resources, digital self-efficacy, motivation, support systems, and learning outcomes in online learning environments among college students in Camiguin, Philippines. With the rapid shift to online education accelerated by the COVID-19 pandemic, understanding these dynamics is crucial for enhancing student experiences and success in remote learning. This research employed a quantitative multivariate approach, surveying 223 college students to analyze how these variables interact and influence learning outcomes. A regression analysis was conducted to examine the influence of learning resources on learning outcomes, revealing a significant positive relationship. Learning resources explained approximately 18.7% of the variance in learning outcomes, with each unit increase in learning resources associated with a 0.418-unit increase in learning outcomes. Mediation analyses were performed to assess the mediating roles of support system and motivation in the relationship between learning resources and learning outcomes. The results showed that support system partially mediated this relationship, with learning resources having both a direct positive effect on learning outcomes ($\beta = 0.362$) and an indirect effect through support system ($\beta = 0.258$). Similarly, motivation partially mediated the relationship, with learning resources directly influencing learning outcomes ($\beta = 0.314$) and indirectly through motivation ($\beta = 0.306$). Digital self-efficacy was found to have a significant direct positive effect on learning outcomes ($\beta = 0.541$), even after accounting for the mediating effects of support system and motivation. The total effects of learning resources on learning outcomes, including both direct and indirect effects, were significant ($\beta = 0.620$). Findings indicate that adequate learning resources and strong support systems significantly enhance students' digital self-efficacy and motivation, which in turn positively affect their academic performance. The study offers valuable insights for higher education institutions and policymakers to improve online education strategies, particularly in underserved regions.

DOI: <https://doi.org/10.54660/JFMR.2026.7.1.87-100>

Keywords: Learning Resources, Support System, Motivation, Digital Self-Efficacy, Learning Outcomes, Mediation Analysis

Introduction

The rapid advancement of technology and the COVID-19 pandemic have accelerated the adoption of online learning modalities in higher education institutions worldwide (Huang *et al.*, 2022) ^[15]. This shift has presented both challenges and opportunities for college students, particularly those in underserved or geographically isolated districts like the island province of Camiguin in the Philippines.

At the international level, recent studies have highlighted the critical role of key variables such as learning resources, digital self-efficacy, motivation, support systems, and learning outcomes in shaping students' experiences and success in online learning environments (Liew *et al.*, 2014; Nawaz & Khan, 2010; Zimmerman, 2000) ^[19, 22, 25]. Researchers have found that students' beliefs in their ability to use digital technologies (digital self-efficacy) and their access to necessary resources can significantly impact their academic performance and overall learning outcomes in online courses (Ali, 2021; DeTure, 2004; Jan, 2015) ^[2, 16].

In the Philippine context, limited research has been conducted on the online learning experiences of college students, particularly in smaller island provinces like Camiguin (Farid *et al.*, 2014; Din & Jabeen, 2014) ^[11-12]. Understanding the unique challenges and opportunities faced by this population is crucial for informing institutional policies, resource allocation, and support systems to ensure equitable access to quality education. A recent study by Bughio *et al.* (2014) ^[6] explored the challenges and opportunities of online learning among students at Central Mindanao University during the COVID-19 pandemic, highlighting the need for further investigation in similar settings.

The purpose of this study is to examine the relationships between learning resources, digital self-efficacy, motivation, support system, and learning outcomes in the online learning experiences of college students in Camiguin, Philippines. By exploring these key variables, the study aims to provide valuable insights that can guide higher education institutions, policymakers, and researchers in addressing the digital divide and enhancing the effectiveness of remote/hybrid learning modalities in underserved regions.

This research will contribute to the growing body of knowledge on the complexities of transitioning to online education, particularly in the Philippine context, and offer practical recommendations for improving the overall quality and accessibility of technology-enabled learning for college students in Camiguin and similar settings.

Theoretical Framework

The theoretical foundation for this study on examining the relationships between learning resources, digital self-efficacy, motivation, support system, and learning outcomes in online learning among college students in camiguin is grounded in several established learning theories and frameworks.

The social cognitive theory proposed by Bandura (1986) ^[4] provides a relevant lens for understanding the role of digital self-efficacy in online learning. This theory posits that an individual's beliefs about their capabilities to use digital technologies effectively can significantly influence their motivation, behavior, and ultimately, their learning outcomes (Chiu & Tsai, 2014) ^[7]. Additionally, the self-determination theory (Deci & Ryan, 2000) ^[9] offers insights into the impact of intrinsic and extrinsic motivation on student engagement and performance in online learning environments.

The community of inquiry (CoI) framework developed by Garrison *et al.* (2000) ^[13] highlights the importance of social, cognitive, and teaching presence in facilitating meaningful

online learning experiences. This framework underscores the crucial role of support systems, including instructor guidance and peer interaction, in fostering a sense of community and enhancing learning outcomes (Kauffman, 2015) ^[18]. Furthermore, the multimodal model for online education proposed by Picciano (2017) ^[23] provides a comprehensive theoretical lens that integrates various learning theories and emphasizes the importance of aligning pedagogical approaches with the unique needs and characteristics of online learners.

Conceptual Framework

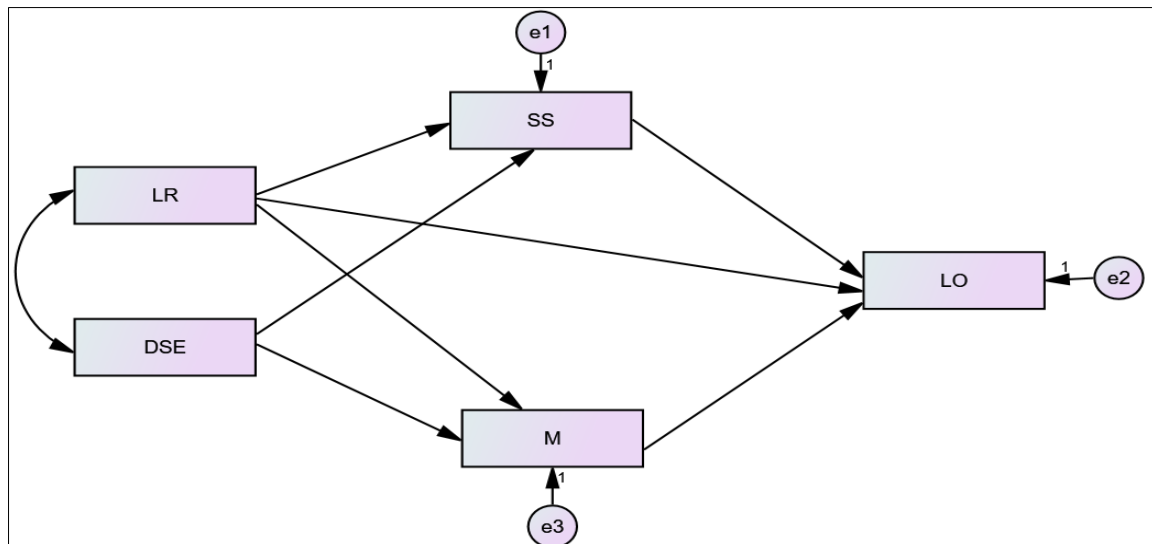
Based on the theoretical foundations and the key variables identified in this study, the conceptual framework illustrates the interrelationships among the factors that influence the challenges and opportunities experienced by college students in Camiguin during their engagement with online learning modality.

The availability and accessibility of appropriate learning resources, such as digital devices, internet connectivity, and online learning materials, serve as the foundational elements that enable students to participate in online learning (Bączek *et al.*, 2021; Toquero, 2020) ^[3, 24]. Students' digital self-efficacy, or their belief in their ability to effectively utilize digital technologies, can significantly impact their motivation, engagement, and ultimately, their learning outcomes (Bandura, 1986; Chiu & Tsai, 2014) ^[7].

The support system, which includes academic advising, technical assistance, and emotional support from instructors and peers, plays a crucial role in facilitating student success in online learning (Kauffman, 2015; Bączek *et al.*, 2021) ^[18, 3]. Both intrinsic and extrinsic motivation influence student engagement and performance in online learning environments (Deci & Ryan, 2000; Cho & Heron, 2015) ^[9, 8]. Finally, the learning outcomes, which encompass the knowledge, skills, and attitudes acquired through the online learning process, serve as the ultimate measure of the effectiveness of the online learning modality (Means *et al.*, 2013; Bączek *et al.*, 2021) ^[21, 3].

Furthermore, the conceptual framework suggests that digital self-efficacy may mediate the relationship between learning resources and learning outcomes, while the support system may moderate the impact of motivation on learning outcomes (Bandura, 1986; Garrison *et al.*, 2000) ^[4, 13]. These hypothesized relationships provide a comprehensive understanding of the complex interplay between the key variables in the context of online learning among college students in Camiguin.

Structural Equation Model Diagram



Objectives of the Study

This study investigated the perceived challenges and opportunities in online learning modality among the college students in Camiguin. More specifically, this sought answers to the following research questions:

1. Do learning resources influence learning outcomes?
2. Does the support system mediate the influence of learning resources on learning outcomes?
3. Does motivation mediate the influence of learning resources on learning outcomes?
4. Does digital self-efficacy influence learning outcomes through the mediation of support system and motivation?

Hypotheses

1. Learning resources influence learning outcomes.
H0: Learning resources do not influence learning outcomes.
H1: Learning resources positively influence learning outcomes.
2. Support system mediates the influence of learning resources on learning outcomes.
H0: Support system does not mediate the influence of learning resources on learning outcomes.
H1: Support system positively mediates the influence of learning resources on learning outcomes.
3. Motivation mediates the influence of learning resources on learning outcomes.
H0: Motivation does not mediate the influence of learning resources on learning outcomes.
H1: Motivation positively mediates the influence of learning resources on learning outcomes.
4. Digital self-efficacy influences learning outcomes through support system and motivation.
H0: The influence of digital self-efficacy on learning outcomes is not mediated by support system and motivation.
H1: The influence of digital self-efficacy on learning outcomes is positively mediated by support system and motivation.

Significance of the Study

This study on the relationships between learning resources, digital self-efficacy, support systems, motivation, and

learning outcomes in the context of online learning among college students in Camiguin aimed to contribute to the growing body of research on the effectiveness and inclusivity of online education in the Philippine setting. The findings of this study will be valuable for Higher Education Institutions, Students, Regional/National Education Policymakers, Future Researchers Educators, and Stakeholders in designing and implementing more effective and responsive online learning programs that cater to the unique needs and circumstances of students in Camiguin and similar settings.

Higher Education Institutions: The findings can provide valuable insights to higher education institutions in Camiguin on the specific challenges and opportunities faced by their students in the online learning environment. This can inform the development of targeted policies, resource allocation, and support systems to address the identified issues and leverage the opportunities.

Students: Understanding the students' perspectives on the key variables impacting their online learning can help institutions design more effective and engaging remote/hybrid learning programs. Addressing the challenges related to learning resources, digital self-efficacy, motivation, and support systems can improve overall student learning outcomes.

Regional/National Education Policymakers: The study's findings on the unique challenges and opportunities in Camiguin's online learning context can inform education policymakers at the regional and national levels. This can contribute to the development of more inclusive and responsive remote/hybrid learning policies and support systems for students, especially in underserved or geographically isolated areas.

Future Researchers: There is limited research on the experiences of college students in online learning, particularly in the Philippine context and in smaller island provinces like Camiguin. This study would add valuable empirical evidence to the growing body of knowledge on the complexities of transitioning to remote/hybrid education modalities.

Educators: The study would shed light on the digital technology access and competency gaps experienced by college students in Camiguin. This can guide interventions to improve digital infrastructure, provide technological devices, and enhance digital literacy training to ensure equitable online learning opportunities.

Scope and Delimitation

This study examined the variables of:

Learning Resources

Availability and accessibility of digital devices, internet connectivity, and online learning platforms for college students in Camiguin

Digital Self-Efficacy

Students' confidence and competence in using digital technologies for remote learning

Motivation

Factors that influence students' engagement and persistence in online learning

Support System

Role of family, peers, and institutions in providing academic, technical, and emotional support to students

Learning Outcomes

Impact of the online learning modality on students' academic performance, knowledge acquisition, and overall learning experiences

The study investigated how these variables shaped the challenges and opportunities faced by college students in Camiguin during the implementation of online learning.

The study was delimited to:

1. College students currently enrolled in higher education institutions located in the island province of Camiguin, Philippines
2. The time period covering 2023-2024 when online learning modality were adopted
3. Quantitative data collection through survey questionnaire via google forms and personal administration with a sample of college students to gain a detailed, first-hand understanding of their experiences

The study did not include:

1. Students from other educational levels (e.g. elementary, secondary)
2. Institutions or students located outside of Camiguin province
3. Quantitative performance data or comparative analysis with face-to-face learning

The focus was on exploring the nuanced, lived experiences of college students in Camiguin to uncover the key challenges and opportunities presented by the online learning modality.

Definition of Terms

Online Learning: It refers to the process of engaging in educational activities and acquiring knowledge through digital platforms, such as the internet, mobile devices, and other electronic media. This mode of learning involves the use of digital tools and resources to facilitate instruction,

communication, and assessment, often replacing or complementing traditional face-to-face classroom settings.

Modality: It refers to the specific method or approach used to deliver educational content. In the case of online learning, modality encompasses the various ways in which educational materials are presented, such as through video lectures, interactive simulations, online discussions, and other digital formats.

Learning Resources: These are the materials, tools, and technologies used by students to support their learning process. These resources include, but are not limited to:

Digital Devices: Computers, laptops, tablets, and smartphones used for accessing online learning platforms.

Internet Connectivity: Reliable and consistent access to the internet, enabling students to participate in online classes and activities.

Learning Materials: Online textbooks, course materials, and other educational content provided by instructors.

Software and Tools: Applications and software used for learning, such as learning management systems, video conferencing tools, and educational apps.

Digital Self-Efficacy: It is the confidence an individual has in their ability to use digital technologies effectively to achieve their learning goals. It encompasses the belief that one can successfully navigate and utilize digital tools, platforms, and resources to engage in online learning activities.

Motivation: It refers to the internal and external factors that drive students to engage in learning activities. These factors can be intrinsic (personal interest, enjoyment, and satisfaction) or extrinsic (external rewards, recognition, and pressures). Effective motivation can enhance student engagement and performance in online learning environments.

Support System: It includes the various mechanisms and resources that facilitate student success. These can be:

Technical Support: Assistance with technical issues related to digital devices and internet connectivity.

Academic Support: Guidance from instructors, tutors, and peers on academic matters.

Emotional Support: Encouragement and support from peers and instructors to manage stress and anxiety related to online learning.

Social Support: Opportunities for social interaction and community building with peers and instructors through online forums, discussion boards, and other social platforms.

Learning Outcomes: These are the measurable and observable results of the learning process. These outcomes can be:

Knowledge Acquisition: The extent to which students acquire new knowledge and skills.

Skill Development: The improvement in specific skills such as problem-solving, critical thinking, and communication.

Attitude Change: The impact on students' attitudes, values, and behaviors as a result of the learning experience.

Literature Review

The sudden shift to online learning has been met with mixed reactions from students, with some embracing the flexibility and convenience it offers, while others struggle with the lack of face-to-face interaction and the demands of self-directed learning (Adnan & Anwar, 2020) ^[1]. One of the primary challenges identified in the literature is the availability and accessibility of appropriate learning resources for online instruction (Bączek *et al.*, 2021) ^[3]. Students in remote areas like Camiguin may face additional barriers in accessing reliable internet connectivity and digital devices necessary for effective participation in online classes (Toquero, 2020) ^[24].

Digital self-efficacy, defined as an individual's belief in their ability to use digital technologies effectively, has been recognized as a crucial factor in successful online learning (Bandura, 1997) ^[5]. Students with higher levels of digital self-efficacy tend to engage more actively in online learning activities and demonstrate better learning outcomes (Chiu & Tsai, 2014) ^[7]. However, not all students may possess the necessary digital skills and confidence to thrive in online learning environments, highlighting the need for targeted support and training (Bączek *et al.*, 2021) ^[3].

The importance of support systems in facilitating online learning cannot be overstated. Effective support systems include not only technical assistance but also academic advising, tutoring, and emotional support from peers and instructors (Kauffman, 2015) ^[18]. Students who perceive a strong support system are more likely to persist in their studies and achieve better learning outcomes (Bączek *et al.*, 2021) ^[3]. In the context of Camiguin, where access to resources may be limited, the role of support systems becomes even more critical in ensuring equitable opportunities for students to succeed in online learning.

Motivation is another key factor that influences student engagement and performance in online learning (Cho & Heron, 2015) ^[8]. Intrinsic motivation, driven by personal interest and enjoyment, and extrinsic motivation, driven by external rewards or pressures, both play a role in sustaining student engagement in online learning (Deci & Ryan, 2000) ^[9]. Factors such as course design, instructor feedback, and peer interaction can impact student motivation and, consequently, their learning outcomes (Cho & Heron, 2015) ^[8].

Finally, learning outcomes, which encompass the knowledge, skills, and attitudes acquired through the learning process, are

the ultimate measure of the effectiveness of online learning (Means *et al.*, 2013) ^[21]. While some studies have found no significant differences in learning outcomes between online and face-to-face instruction (Means *et al.*, 2013) ^[21], others have highlighted the importance of considering contextual factors such as student characteristics, course design, and support systems in determining the effectiveness of online learning (Bączek *et al.*, 2021) ^[3].

The challenges and opportunities of online learning modality among college students in Camiguin are multifaceted, involving a complex interplay of learning resources, digital self-efficacy, support systems, motivation, and learning outcomes. By examining these factors, this study aims to contribute to the growing body of research on online learning in the Philippine context and provide practical recommendations for improving the quality and accessibility of online education for students in Camiguin and similar settings. The findings of this study will be valuable for policymakers, educators, and stakeholders in designing and implementing more effective and inclusive online learning programs that cater to the unique needs and circumstances of students in Camiguin.

Methods

The study employed a quantitative, multivariate approach using an adopted survey-based investigation that examined the relationships between learning resources, digital self-efficacy, motivation, support systems, and learning outcomes among 223 college students (117 females and 106 males) in Camiguin engaged in online learning. A multi-stage sampling technique was used, starting with purposive selection of the largest higher education institutions with the highest online course enrollment, followed by stratified random sampling to proportionally select students from each academic program, and finally simple random sampling within each stratum. Data was collected through an adopted survey instrument (via google forms) designed to gather information on the key variables affecting online learning experiences. The survey likely included questions aimed at assessing students' perceptions of learning resources, digital self-efficacy, motivation, support systems, and learning outcomes. The gathered data was analyzed and interpreted using descriptive statistics, Pearson's correlation analysis examined relationships, multiple regression to model the combined effects of the variables, and ANOVA that compared mean differences across student groups. This comprehensive statistical approach provided insights into the complex interplay between the key factors influencing online learning outcomes in the Camiguin.

Results and Discussion

The data analysis and interpretation are presented in this portion. The data was organized in a tabular fashion based on the specified queries.

Profile of the Respondents

Table 1: Frequencies for Age (n= 223)

Gender	Frequency	Percent
Female	117	52.466%
Male	106	47.534%
Missing	0	0.000%
Total	223	100.000%

The age distribution of the sample consists of 223 individuals. The data reveals the number of participants in each age category, along with their corresponding percentages. The age distribution shows a strong

concentration of participants at age 18, which may suggest that this age group is particularly relevant to the context of the study, possibly indicating a focus on early college students.

Table 2: Frequencies for Gender (n= 223)

Gender	Frequency	Percent
Female	117	52.466%
Male	106	47.534%
Missing	0	0.000%
Total	223	100.000%

Females make up just over half of the sample, indicating a slight majority. Males represent a significant portion but are slightly outnumbered by females. The gender distribution is

relatively balanced, with a slight predominance of females. This could be relevant for understanding gender dynamics in the context of the study.

Table 3: Frequencies for Year Level (n= 223)

Year Level	Frequency	Percent
1st Year	128	57.399%
2nd Year	95	42.601%
Missing	0	0.000%
Total	223	100.000%

The data indicates a strong representation of first-year students, which might reflect the study's focus on

introductory experiences or challenges faced by new students in an academic environment.

3.2. Students' Perceived Challenges and Opportunities in Online Learning Modality

3.2.1. Do Learning Resources Influence Learning Outcomes?

Table 4: Model Summary – LO

Model	R	R ²	Adjusted R ²	RMSE	Autocorrelation	Statistic	p
H ₀	0.000	0.000	0.000	0.675	0.171	1.634	0.006
H ₁	0.433	0.187	0.184	0.610	0.120	1.749	0.058

The regression analysis was conducted to examine the influence of learning resources on learning outcomes. The results indicate a significant relationship between the two variables. The model summary shows that the regression model (H₁) has an R² value of 0.187, suggesting that approximately 18.7% of the variance in learning outcomes

can be explained by the learning resources. The adjusted R² value of 0.184 indicates a slight adjustment for the number of predictors in the model, which remains significant. The Durbin-Watson statistic of 1.749 suggests that there is no significant autocorrelation in the residuals, as values close to 2 indicate independence.

Table 5: ANOVA

Model	Source	Sum of Squares	df	Mean Square	F	p
H ₁	Regression	18.941	1	18.941	50.897	<.001
	Residual	82.244	221	0.372		
	Total	101.185	222			

The ANOVA results further support the significance of the regression model. The regression sum of squares (SS) was 18.941 with 1 degree of freedom, yielding a mean square of

18.941. The F-statistic was 50.897, which is significant at p <.001. This indicates that the model significantly predicts learning outcomes based on learning resources.

Table 6: Coefficients

Model	Predictor	Unstandardized	Standard Error	Standardized	t	p	Lower	Upper
H ₀	(Intercept)	6.189	0.045		136.892	<.001	6.100	6.278
H ₁	(Intercept)	3.642	0.359		10.133	<.001	2.933	4.350
	LR	0.418	0.059	0.433	7.134	<.001	0.303	0.534

The coefficients table reveals that the intercept for the model (H₁) is 3.642 (SE = 0.359, t = 10.133, p <.001), indicating the expected value of learning outcomes when learning resources are zero. The coefficient for learning resources (LR) is 0.418 (SE = 0.059, standardized β = 0.433, t = 7.134, p <.001). This positive coefficient suggests that for each unit increase in

learning resources, learning outcomes increase by approximately 0.418 units. The 95% confidence interval for this coefficient ranges from 0.303 to 0.534, indicating that this effect is statistically significant and not likely due to chance.

Table 7: Descriptives

Variable	N	Mean	SD	SE
LO	223	6.189	0.675	0.045
LR	223	6.087	0.698	0.047

Descriptive statistics for the variables indicate that the mean learning outcome (LO) is 6.189 (SD = 0.675) based on a

sample size of 223. The mean learning resources score (LR) is slightly lower at 6.087 (SD = 0.698).

Table 8: Residuals Statistics

Statistic	Minimum	Maximum	Mean	SD	N
Predicted Value	5.370	8.768	6.189	0.292	223
Residual	-2.888	1.380	5.539×10^{-18}	0.609	223
Std. Predicted Value	-2.803	8.831	1.332×10^{-15}	1.000	223
Std. Residual	-5.898	2.309	-0.006	1.030	223

The residuals statistics show a mean of approximately zero (5.539×10^{-18}), indicating that the model fits the data well. The standard deviation of the residuals is 0.609, suggesting a reasonable spread around the predicted values.

The analysis indicates that learning resources significantly influence learning outcomes, with a positive correlation between the two variables. The results suggest that enhancing learning resources could lead to improved learning outcomes in educational settings.

Assumptions

The significant F-statistic ($F = 50.897$, $p < .001$) and the positive coefficient for learning resources ($\beta = 0.418$, $p < .001$) suggest a linear relationship between the variables.

Homoscedasticity assumes that the variance of the residuals is constant across all levels of the independent variable. The Durbin-Watson statistic of 1.749 is close to 2, indicating no significant autocorrelation in the residuals. The normality assumption states that the residuals are normally distributed. The mean of the residuals is approximately zero (5.539×10^{-18}), suggesting that the residuals are centered around zero. The independence of errors assumption assumes that the residuals are independent of one another. The Durbin-Watson statistic of 1.749 suggests no significant autocorrelation, indicating that this assumption is likely met. Based on the provided results, it appears that all assumptions have been met.

3.2.2. Does the support system mediate the influence of learning resources on learning outcomes?

Table 9: Direct effects

Predictor	Outcome	Estimate	Std. Error	z-value	p	Lower	Upper
LR	LO	0.362	0.078	4.633	<.001	0.152	0.852

Note: Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

The direct effect of learning resources on learning outcomes was significant ($\beta = 0.362$, $SE = 0.078$, $z = 4.633$, $p < .001$, 95% CI [0.152, 0.852]). This indicates that learning resources have a positive direct influence on learning outcomes, such

that higher levels of learning resources are associated with better learning outcomes, even after accounting for the mediating effect of support system.

Table 10: Indirect effects

Predictor	Mediator	Outcome	Estimate	Std. Error	z-value	p	Lower	Upper
LR	SS	LO	0.258	0.054	4.806	<.001	0.080	0.475

Note: Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

The indirect effect of learning resources on learning outcomes through support system was also significant ($\beta = 0.258$, $SE = 0.054$, $z = 4.806$, $p < .001$, 95% CI [0.080, 0.475]). This suggests that support system partially mediates

the relationship between learning resources and learning outcomes. Higher levels of learning resources are associated with greater support system, which in turn is associated with better learning outcomes.

Table 11: Total effects

Predictor	Outcome	Estimate	Std. Error	z-value	p	Lower	Upper
LR	LO	0.620	0.086	7.166	<.001	0.246	1.191

Note: Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

The total effect of learning resources on learning outcomes, which includes both the direct and indirect effects, was significant ($\beta = 0.620$, $SE = 0.086$, $z = 7.166$, $p < .001$, 95%

CI [0.246, 1.191]). This indicates that learning resources have a strong positive influence on learning outcomes, both directly and indirectly through support system.

Table 12: Path coefficients

Predictor	Outcome	Estimate	Std. Error	z-value	p	Lower	Upper
SS	LO	0.513	0.055	9.394	<.001	0.348	0.649
LR	LO	0.362	0.078	4.633	<.001	0.152	0.852
L	SS	0.503	0.090	5.593	<.001	0.142	1.030

Note: Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

The path from support system to learning outcomes was significant ($\beta = 0.513$, $SE = 0.055$, $z = 9.394$, $p < .001$, 95% CI [0.348, 0.649]), indicating that higher levels of support system are associated with better learning outcomes. The path from learning resources to learning outcomes was also significant ($\beta = 0.362$, $SE = 0.078$, $z = 4.633$, $p < .001$, 95% CI [0.152, 0.852]), as well as the path from learning resources to support system ($\beta = 0.503$, $SE = 0.090$, $z = 5.593$, $p < .001$, 95% CI [0.142, 1.030]).

Table 13: R-Squared

Variable	R ²
LO	0.418
SS	0.123

The R-squared values indicate that learning resources and support system explain 41.8% of the variance in learning

outcomes ($R^2 = 0.418$), and learning resources explain 12.3% of the variance in support system ($R^2 = 0.123$).

The results suggest that support system partially mediates the influence of learning resources on learning outcomes. Learning resources have both a direct positive effect on learning outcomes and an indirect effect through support system. These findings highlight the importance of both learning resources and support system in promoting positive learning outcomes.

Assumptions

The linearity assumption appears to be met given the significant relationships indicated by the path coefficients. The significant path coefficients (all $p < .001$) suggest that the relationships are likely linear. The significant z-values and p-values suggest that the model is appropriately specified thus independence of errors is likely met.

3.2.3. Does motivation mediate the influence of learning resources on learning outcomes?

Table 14: Direct effects

Predictor	Outcome	Estimate	Std. Error	z-value	p	Lower	Upper
LR	LO	0.314	0.081	3.873	<.001	0.052	0.807

Note: Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

The direct effect of learning resources on learning outcomes was significant ($\beta = 0.314$, $SE = 0.081$, $z = 3.873$, $p < .001$, 95% CI [0.052, 0.807]). This indicates that learning resources have a positive direct influence on learning outcomes, such

that higher levels of learning resources are associated with better learning outcomes, even after accounting for the mediating effect of motivation.

Table 15: Indirect effects

Predictor	Mediator	Outcome	Estimate	Std. Error	z-value	p	Lower	Upper
LR	M-mean	LO	0.306	0.056	5.445	<.001	0.171	0.521

Note: Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

The indirect effect of learning resources on learning outcomes through motivation was also significant ($\beta = 0.306$, $SE = 0.056$, $z = 5.445$, $p < .001$, 95% CI [0.171, 0.521]). This suggests that motivation partially mediates the relationship

between learning resources and learning outcomes. Higher levels of learning resources are associated with greater motivation, which in turn is associated with better learning outcomes.

Table 16: Total effects

Predictor	Outcome	Estimate	Std. Error	z-value	p	Lower	Upper
LR	LO	0.620	0.086	7.166	<.001	0.263	1.156

Note: Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

The total effect of learning resources on learning outcomes, which includes both the direct and indirect effects, was significant ($\beta = 0.620$, $SE = 0.086$, $z = 7.166$, $p < .001$, 95%

CI [0.263, 1.156]). This indicates that learning resources have a strong positive influence on learning outcomes, both directly and indirectly through motivation.

Table 17: Path coefficients

Predictor	Outcome	Estimate	Std. Error	z-value	p	Lower	Upper
M-mean	LO	0.517	0.057	9.147	<.001	0.360	0.666
LR	LO	0.314	0.081	3.873	<.001	0.052	0.807
LR	M	0.592	0.087	6.776	<.001	0.300	1.058

Note: Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

The path from motivation to learning outcomes was significant ($\beta = 0.517$, $SE = 0.057$, $z = 9.147$, $p < .001$, 95% CI [0.360, 0.666]), indicating that higher levels of motivation are associated with better learning outcomes. The path from learning resources to learning outcomes was also significant ($\beta = 0.314$, $SE = 0.081$, $z = 3.873$, $p < .001$, 95% CI [0.052, 0.807]), as well as the path from learning resources to motivation ($\beta = 0.592$, $SE = 0.087$, $z = 6.776$, $p < .001$, 95% CI [0.300, 1.058]).

The results suggest that motivation partially mediates the influence of learning resources on learning outcomes. Learning resources have both a direct positive effect on learning outcomes and an indirect effect through motivation. These findings highlight the importance of both learning

resources and motivation in promoting positive learning outcomes.

Assumptions

The significant path coefficients (all $p < .001$) suggest that the relationships between learning resources, motivation, and learning outcomes are likely linear. Moreover, visual inspection of scatterplots provided a more definitive assessment of linearity. For the independence error the significant z-values and p-values suggest that the model is appropriately specified, and is likely met. The homoscedasticity also examined the residual plots, the spread of residuals is consistent across levels of the independent variable, and the assumption is likely met.

3.2.4. Does digital self-efficacy influence learning outcomes through the mediation of support system and motivation?

Table 18: Direct Effects

Predictor	Outcome	Estimate	Std. Error	z-value	p	Lower	Upper
DSE	LO	0.541	0.099	5.474	<.001	0.356	0.775

Note: Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

The direct effect of digital self-efficacy on learning outcomes was significant ($\beta = 0.541$, $SE = 0.099$, $z = 5.474$, $p < .001$, 95% CI [0.356, 0.775]). This indicates that digital self-efficacy has a positive direct influence on learning outcomes,

such that higher levels of digital self-efficacy are associated with better learning outcomes, even after accounting for the mediating effects of support system and motivation.

Table 19: Indirect effects

Predictor	Mediator	Outcome	Estimate	Std. Error	z-value	p	Lower	Upper
DSE	SS	LO	0.251	0.057	4.406	<.001	0.143	0.374
DSE	M	LO	0.248	0.064	3.872	<.001	0.130	0.395

Note: Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

The indirect effect of digital self-efficacy on learning outcomes through support system was significant ($\beta = 0.251$, $SE = 0.057$, $z = 4.406$, $p < .001$, 95% CI [0.143, 0.374]). The indirect effect through motivation was also significant ($\beta = 0.248$, $SE = 0.064$, $z = 3.872$, $p < .001$, 95% CI [0.130, 0.395]). This suggests that both support system and

motivation partially mediate the relationship between digital self-efficacy and learning outcomes. Higher levels of digital self-efficacy are associated with greater support system and motivation, which in turn are associated with better learning outcomes.

Table 20: Total Effects

Predictor	Outcome	Estimate	Std. Error	z-value	p	Lower	Upper
DSE	LO	1.041	0.083	12.508	<.001	0.836	1.230

Note: Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

The total effect of digital self-efficacy on learning outcomes, which includes both the direct and indirect effects, was significant ($\beta = 1.041$, $SE = 0.083$, $z = 12.508$, $p < .001$, 95% CI [0.836, 1.230]). The total indirect effect was also significant ($\beta = 0.499$, $SE = 0.076$, $z = 6.567$, $p < .001$, 95%

CI [0.361, 0.652]). These results indicate that digital self-efficacy has a strong positive influence on learning outcomes, both directly and indirectly through support system and motivation.

Table 21: Residual Covariances

Variable 1	Variable 2	Estimate	Std. Error	z-value	p	Lower	Upper
SS	M	0.205	0.046	4.442	<.001	0.116	0.321

Note: Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

The residual covariance between support system and motivation was significant ($\beta = 0.205$, $SE = 0.046$, $z = 4.442$, $p < .001$, 95% CI [0.116, 0.321]), indicating that there is a

positive relationship between the two variables not accounted for by digital self-efficacy.

Table 22: Path Coefficients

Predictor	Outcome	Estimate	Std. Error	z-value	p	Lower	Upper
SS	LO	0.283	0.057	4.935	<.001	0.160	0.405
M	LO	0.250	0.061	4.109	<.001	0.134	0.385
DSE	LO	0.541	0.099	5.474	<.001	0.356	0.775
DSE	SS	0.888	0.091	9.782	<.001	0.692	1.084
DSE	M	0.993	0.086	11.582	<.001	0.818	1.188

Note: Delta method standard errors, bias-corrected percentile bootstrap confidence intervals, ML estimator.

The paths from support system to learning outcomes ($\beta = 0.283$, $SE = 0.057$, $z = 4.935$, $p < .001$, 95% CI [0.160, 0.405]) and from motivation to learning outcomes ($\beta = 0.250$, $SE = 0.061$, $z = 4.109$, $p < .001$, 95% CI [0.134, 0.385]) were both significant. The paths from digital self-efficacy to support system ($\beta = 0.888$, $SE = 0.091$, $z = 9.782$, $p < .001$, 95% CI [0.692, 1.084]) and from digital self-efficacy to motivation ($\beta = 0.993$, $SE = 0.086$, $z = 11.582$, $p < .001$, 95% CI [0.818, 1.188]) were also significant.

The results suggest that both support system and motivation partially mediate the influence of digital self-efficacy on learning outcomes. Digital self-efficacy has a direct positive effect on learning outcomes and indirect effects through support system and motivation. These findings highlight the importance of digital self-efficacy, support system, and motivation in promoting positive learning outcomes.

Assumptions

The significant path coefficients (all $p < .001$) suggest that the relationships between digital self-efficacy, support system, motivation, and learning outcomes are likely linear. The independence of errors is likely met, because the significant z-values and p-values suggest that the model is appropriately specified. The spread of residuals is consistent across levels of the independent variable; the assumption is likely met. A histogram or Q-Q plot of the residuals was also assessed; they are normally distributed.

Summary of Findings

The regression analysis revealed a significant positive relationship between learning resources and learning outcomes, with learning resources explaining approximately 18.7% of the variance in learning outcomes. The results indicate that for each unit increase in learning resources, learning outcomes increase by 0.418 units.

The mediation analysis showed that support system partially mediates the influence of learning resources on learning outcomes. Learning resources have both a direct positive effect on learning outcomes ($\beta = 0.362$) and an indirect effect through support system ($\beta = 0.258$). The total effect of learning resources on learning outcomes, including both direct and indirect effects, was significant ($\beta = 0.620$).

Similarly, motivation was found to partially mediate the relationship between learning resources and learning outcomes. Learning resources have a direct positive effect on learning outcomes ($\beta = 0.314$) and an indirect effect through motivation ($\beta = 0.306$). The total effect of learning resources on learning outcomes was significant ($\beta = 0.620$).

Digital self-efficacy was found to have a significant direct positive effect on learning outcomes ($\beta = 0.541$), even after accounting for the mediating effects of support system and

motivation.

Conclusion

The findings suggest that learning resources, support system, motivation, and digital self-efficacy are important factors influencing learning outcomes. Learning resources have a direct positive effect on learning outcomes and also influence them indirectly through support system and motivation. Digital self-efficacy also has a direct positive effect on learning outcomes.

Recommendations

Based on the findings, the following recommendations can be made:

Enhance learning resources. Investing in and improving learning resources, such as educational materials, technology, and infrastructure, can lead to better learning outcomes.

Strengthen support systems. Providing adequate support systems, including academic advising, tutoring, and mentoring, can help mediate the influence of learning resources on learning outcomes.

Foster motivation. Implementing strategies to enhance student motivation, such as setting clear learning goals, providing meaningful feedback, and creating engaging learning environments, can further improve learning outcomes.

Develop digital self-efficacy. Offering training and support to help students develop their digital skills and confidence in using technology can directly contribute to better learning outcomes.

Adopt a holistic approach. Considering the interplay between learning resources, support system, motivation, and digital self-efficacy can help educational institutions develop comprehensive strategies to optimize learning outcomes.

Instrument

Dear Respondent,

Greetings!

The researcher would like to respectfully request you to honestly fill-in the needed data and information on this study. Rest assured that confidentiality of the information gathered will be strictly kept confidential as well as the anonymity of the identity of the respondent.

Thank You Very Much.

Waiver Consent Form

I (Name) _____ of (Address) _____ understand the rationale of the study and agrees voluntarily to supply the needed information with the assurance that this will be kept confidential and solely use for the purpose of this study.

Signature

Date

The Questionnaire**Demographic questionnaire**

Please provide the following demographic information. All responses will be kept strictly confidential.

Name (Optional): _____

Age: _____

Gender/Sex: _____

Grade/Year: _____

Treatment of Data

Arbitrary Value	Description	Symbol	Interval/Range	Interpretation
1	Strongly Disagree	SD	1.00-1.85	The respondent completely disagrees with the statement or has a very negative opinion about the item being measured.
2	Disagree	D	1.86-2.71	The respondent disagrees with the statement or has a negative opinion about the item.
3	Somewhat Disagree	Sd	2.72-3.57	The respondent leans towards disagreeing with the statement or has a slightly negative opinion about the item.
4	Neither Agree nor Disagree	Na/d	3.58-4.43	The respondent is neutral and does not have a strong opinion in either direction about the statement or item.
5	Somewhat Agree	Sa	4.44-5.29	The respondent leans towards agreeing with the statement or has a slightly positive opinion about the item.
6	Agree	A	5.30-6.15	The respondent agrees with the statement or has a positive opinion about the item.
7	Strongly Agree	SA	6.16-7.00	The respondent completely agrees with the statement or has a very positive opinion about the item being measured.

Direction: Please read the following statements carefully and indicate the extent to which each statement applies to you.

Check the column that best represents your response.

A. Students' Perceived Challenges in Odln

Indicators	7	6	5	4	3	2	1
Motivation							
1. Initiative to study							
2. Motivated to attend classes							
3. Willing to carry out tasks							
4. Interact actively							
5. Finish tasks on time							
6. Feel a sense of belongingness							
7. Competent to perform							
Support System							
1. Help to understand the lessons (teachers)							
2. Facilitate on how to utilize learning resources (teachers)							
3. Provide academic monitoring, counseling, and/or remediation (teacher)							
4. Assist to set schedules (family)							
5. Provide needs (family)							
6. Supply nutritious food (family)							
7. Provide conducive space at home (family)							
8. Help to accomplish school tasks (peers)							
9. Assist during group works (peers)							
10. Provide moral and emotional support							
Learning Resources							
1. Textbooks and modules							
2. Stable internet connection							
3. Device or equipment for synchronous classes							
4. Supplementary materials and references							
5. Online libraries and digital repositories							
6. Basic materials (pen, paper, ruler, etc.)							
7. Support materials (printer, camera, scanner)							
8. Audiovisual technology							
Digital Self-Efficacy							
1. Utilize virtual classroom							
2. Interact using social media and messaging tools							
3. Engage in online discussion							

4.Adapt with the advanced technologies									
5.Use video and photo editing applications									
6.Do tasks using office productivity tools									
7.Select, evaluate, and use online resources									
8.Familiarize with cyber ethics and issues									
9.Apply minimum troubleshooting skills									

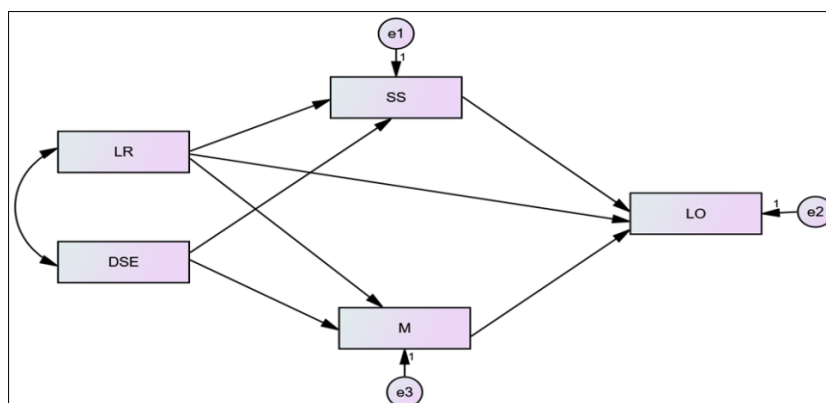
B. Students' Perceived Opportunities in Odln

Indicators	7	6	5	4	3	2	1
Self-Directed Learning							
1. Set learning goals							
2. Look for learning resources							
3. Manage time							
4. Find ways to simplify tasks							
5. Evaluate my own performance							
6. Seek assistance							
7. Respond positively on learning experiences							
8. Apply knowledge and skills in real life context							
9. Consider peers' and teachers' feedback							
Learning Outcomes							
1. Get high scores							
2. Accomplish tasks productively							
3. Develop effective communication skills							
4. Manifest creativity and resourcefulness							
5. Develop self-discipline							
6. Work cooperatively							
7. Make sound decisions							
8. Utilize technology responsibly							
Convenience and Ease of Learning							
1. Save time							
2. Can be implemented even when the school is closed							
3. Do not require to leave the place							
4. Get important announcements instantly							
5. Provide clear and understandable lessons							
6. Has no hassles							
7. Can do school tasks at own pace							
Accessibility							
1. Access information easily							
2. Collaborate with peers anytime							
3. Participate in classes anytime/anywhere							
4. Use multimedia resources readily							
5. Enter the virtual classroom anytime							

Evaluating Model Fit (Spss Amos)

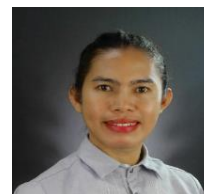
Model	χ^2	df	χ^2/df	p	GFI	AGFI	NFI	IFI	TLI	CFI	RMSEA
Critical Value		>0	<3	>.05	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	<.05
My Version			21.147	.000	.929	.469	.906	.910	.542	.908	.301

Structural Equation Model Diagram



CURRICULUM VITAE**Personal Background**

Name	Michael A. Velez
Date of Birth	May 24, 1989
Place of Birth	Yumbing, Mambajao, Camiguin
Sex	Male
Citizenship	Filipino
Religion	Roman Catholic
Office	DepED Camiguin Division Office
Office Address	Government Center, Lakas, Mambajao Camiguin
Mobile Phone No.	09525233017
Mother's Name	Aline Ariata Alegria
Father's Name	Rodrigo Exchaure Veloz
Address	Purok 1-B De La Paz Village, Yumbing, Mambajao, Camiguin
Siblings	Allan, Jayver, Rodrigo Jr., Princess Mae, April king & Harah Marie
Home Address	Yumbing, Mambajao, Camiguin

**Educational Attainment**

Graduate	Doctor of Philosophy-Educational Management Capitol University, Cagayan de Oro City Master of Arts in Education (MAED) Camiguin Polytechnic State College Balbagon, Mambajao, Camiguin 2013-2014
College	Bachelor of Secondary Education (BSED) Camiguin Polytechnic State College Balbagon, Mambajao, Camiguin 2010-2011
Secondary	Yumbing National High School Yumbing, Mambajao, Camiguin 2004-2005
Elementary	Yumbing Elementary School Yumbing, Mambajao, Camiguin 1999-2000

Eligibility	PRC License No. 1130556 Licensed Professional Teacher Place taken: Cagayan de Oro City
--------------------	--

Professional Experiences

Secondary School Teacher 2018-Present	Yumbing National High School Yumbing, Mambajao, Camiguin
Secondary School Teacher 2017-2018	Lawigan-Bura National High School Lawigan, Catarman, Camiguin
Secondary School Teacher 2017-2018	EUP - National High School Bonbon, Sagay, Camiguin
Secondary School Teacher 2016-2017	Lawigan-Bura National High School Lawigan, Catarman, Camiguin
Secondary School Teacher 2014-2016	Fatima College of Camiguin, Inc Lumad Poblacion, Mambajao, Camiguin

Membership in Civic / Educational / Professional Organization

President	Koryo Kamiguin Camiguin Choreographers Association 2018 - Present
-----------	---

Member/Representative

Civil Society Organization
LGU-Mambajao
2018 - Present

References

- Adnan M, Anwar K. Online learning amid the COVID-19 pandemic: students' perspectives. Online Submission. 2020;2(1):45-51.
- Ali S. E-learners' self-efficacy for online courses: self-efficacy for IT use as predictor for academic self-efficacy. Pak J Distance Online Learn. 2021;7(2):87-104.
- Bączek M, Zagańczyk-Bączek M, Szpringer M, Jaroszyński A, Woźakowska-Kapłon B. Students' perception of online learning during the COVID-19 pandemic: a survey study of Polish medical students. Medicine (Baltimore). 2021;100(7):e24821.
- Bandura A. Social foundations of thought and action: a social cognitive theory. Englewood Cliffs (NJ): Prentice-Hall; 1986.
- Bandura A. Self-efficacy: the exercise of control. New York: Freeman; 1997.
- Bughio QA, Abro AHA, Rashdi PS. Challenges and opportunities of online learning among students of Central Mindanao University, Philippines during COVID-19 pandemic. ResearchGate; 2014. Available from: <https://doi.org/10.13140/RG.2.2.16192.12161>
- Chiu YL, Tsai CC. The roles of social factor and Internet self-efficacy in nurses' web-based continuing learning. Nurse Educ Today. 2014;34(3):446-50.
- Cho MH, Heron ML. Self-regulated learning: the role of motivation, emotion, and use of learning strategies in students' learning experiences in a self-paced online mathematics course. Distance Educ. 2015;36(1):80-99.
- Deci EL, Ryan RM. The "what" and "why" of goal pursuits: human needs and the self-determination of behavior. Psychol Inq. 2000;11(4):227-68.
- DeTure M. Cognitive style and self-efficacy: predicting student success in online distance education. Am J Distance Educ. 2004;18(1):21-38. doi:10.1207/s15389286ajde1801_3
- Din N, Jabeen S. Challenges of implementing e-learning in a Pakistani university. Knowl Manag E-Learn. 2014;6(3):310-24.
- Farid A, Ahmad R, Niaz IA, Arif M, Shamshirband S, Khattak HA. Identification and prioritization of critical issues for the promotion of e-learning in Pakistan. Comput Human Behav. 2015;51:161-71. doi:10.1016/j.chb.2015.04.037
- Garrison DR, Anderson T, Archer W. Critical inquiry in a text-based environment: computer conferencing in higher education. Internet High Educ. 2000;2(2-3):87-105.
- Hodges CB. Self-efficacy in the context of online learning environments: a review of the literature and directions for research. Perform Improv Q. 2008;20(3-4):7-25. doi:10.1002/piq.20001
- Huang Y, Hu C, Zeng Y, Xiong N, Wang T. A review on the modelling of wave-structure interactions based on OpenFOAM. OpenFOAM J. 2022;2. doi:10.51560/ofj.v2.65
- Jan SK. The relationships between academic self-efficacy, computer self-efficacy, prior experience, and satisfaction with online learning. Am J Distance Educ. 2015;29(1):30-40. doi:10.1080/08923647.2015.994366
- Joo YJ, Bong CH, Kim SY. The determinants of behavioral intention to use web-based instruction. Int J Instr Media. 2000;27(3):229.
- Kauffman H. A review of predictive factors of student success in and satisfaction with online learning. Res Learn Technol. 2015;23.
- Liew TW, Tan SM, Seydali R. The effects of learners' differences on variable manipulation behaviours in simulation-based learning. J Educ Technol Syst. 2014;43(1):13-40.
- Lin WS, Wang CH, Lin CH. The psychology of using online videos to enhance self-efficacy in an online program. Int Rev Res Open Distrib Learn. 2013;14(4):202-24. doi:10.19173/irrodl.v14i4.1548
- Means B, Toyama Y, Murphy R, Baki M. The effectiveness of online and blended learning: a meta-analysis of the empirical literature. Teach Coll Rec. 2013;115(3):1-47.
- Nawaz A, Khan S. The predictors of success for e-learning in higher education institutions (HEIs) in N.W.F.P. Pakistan. J Inf Syst Technol Manag. 2010;7(3):545-78.
- Picciano AG. Theories and frameworks for online education: seeking an integrated model. Online Learn. 2017;21(3):166-90.
- Toquero CM. Challenges and opportunities for higher education amid the COVID-19 pandemic: the Philippine context. Pedagog Res. 2020;5(4):em0063.
- Zimmerman BJ. Self-efficacy: an essential motive to learn. Contemp Educ Psychol. 2000;25(1):82-91.

How to Cite This Article

Velez MA. Examining the relationships between learning resources, digital self-efficacy, motivation, support system, and learning outcomes in online learning among college students in Camiguin. J Front Multidiscip Res. 2026;7(1):87-100. doi:10.54660/JFMR.2026.7.1.87-100.

Creative Commons (CC) License

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.