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THE IMPACT OF DIGITAL LEARNING RESOURCES ON LEARNERS' ENGAGEMENT AND ACADEMIC PERFORMANCE IN CAMEROON SECONDARY SCHOOLS IN CENTRE REGION

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ABSTRACT
Despite the growing adoption of digital learning resources in secondary education, their effectiveness in improving learners' engagement and academic performance remains unclear in the Cameroonian context. This study argues that digital learning resources may not significantly enhance learners' engagement and academic performance in Cameroon secondary schools due to contextual factors. The purpose of this study was to investigate the impact of digital learning resources on learners' engagement and academic performance in Cameroon secondary schools in the Centre Region. A quantitative research approach was employed, using a survey design to collect data from a sample of secondary school learner's. Multiple linear regression analysis was conducted to examine the relationships between digital learning resources, learners' engagement, teacher support, school infrastructure, and academic performance. The study found no significant relationship between digital learning resources and academic performance. Learners' engagement, teacher support, and school infrastructure also did not significantly predict academic performance. The results suggest that contextual factors unique to Cameroon secondary schools may hinder the effectiveness of digital learning resources.

KEYWORDS: *Digital Learning Resources, Learners' Engagement, Academic Performance, Cameroon Secondary Schools, Centre Region.*

1. INTRODUCTION

The integration of digital learning resources in education has transformed the learning landscape globally (Kozma, 2013; UNESCO, 2019; Warschauer, 2007). Digital learning resources, including educational software, online platforms, and multimedia materials, enhance learners' engagement and academic performance (Hew & Cheung, 2013; Koehler & Mishra, 2009; Tamim et al., 2011). In Cameroon's Centre Region secondary schools, digital learning resources have the potential to improve educational outcomes.

Digital learning resources refer to technology-based tools and materials used to support teaching and learning (Koehler & Mishra, 2009). learners' engagement encompasses participation, motivation, and interest in academic activities (Fredricks et al., 2004). Academic performance includes grades, test scores, and overall academic achievement (Kuh et al., 2006).

Globally, digital learning has become increasingly prevalent. In the USA, digital learning platforms have expanded access to education (Allen & Seaman, 2013). Russia has invested in digital education infrastructure, enhancing learners' engagement (Kozma, 2013). Europe has implemented digital learning initiatives to improve academic performance (European Commission, 2019). In Africa, mobile learning solutions have increased access to education (UNESCO, 2019). Cameroon has seen significant growth in digital learning adoption, particularly in the Centre Region (Kamga, 2019; Ngwa & Mbarika, 2012).

Cameroon's education sector has witnessed significant digital advancements (Mba et al., 2020). The Centre Region, specifically, has experienced rapid technology adoption in education (Kamga, 2019). Secondary schools in the region have begun integrating digital learning resources into their curricula.

Despite the potential benefits of digital learning resources, their impact on learners' engagement and academic performance in Cameroon's Centre Region secondary schools remains uncertain. Research is needed to investigate the effectiveness of digital learning resources in enhancing educational outcomes. The main aim of this paper is to examine the impact of digital learning resources on learners's' academic performance in Centre Region secondary schools.

The remainder of the work is structured in this manner. Section 2 reviews the literature. Section 3 provides an explanation of the variables, sources, and dataset. In Section 3, we focus on the approach. Section 4 discusses the findings. Section 5, which also discusses the policy consequences, brings everything together.

2. LITERATURE REVIEW

Digital learning resources, encompassing educational software, online platforms, and multimedia materials, have transformed teaching and learning (Katz & Porath, 2011; Koehler & Mishra, 2009; Wouters et al., 2013). learners' engagement, a critical factor in academic success, is influenced by digital learning resources (Fredricks et al., 2004; Hughes et al., 2018; Skinner et al., 2009). In Cameroon's Centre Region secondary schools, digital learning resources adoption is increasing, but its impact

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on learners' engagement and academic performance requires investigation (Mba et al., 2020; Ngwa & Mbarika, 2012; Ngonso, 2019).

Several theoretical frameworks underpin digital learning resources' effectiveness. The Technology Acceptance Model (TAM) suggests that perceived usefulness and ease of use influence digital learning resource adoption (Davis, 1989; Venkatesh & Davis, 2000). The Self-Determination Theory (SDT) posits that digital learning environments foster autonomy, competence, and relatedness (Deci & Ryan, 2000; Ryan & Deci, 2009). The Cognitive Load Theory (CLT) emphasizes optimal cognitive load in digital learning environments (Chandler & Sweller, 1991; Sweller, 1988).

Empirical studies on digital learning resources yield mixed results. Some studies report significant improvements in learners' engagement and academic performance (Hew & Cheung, 2013; Wang et al., 2013; Yeung et al., 2012). Others find no significant differences between digital and traditional learning (Crouch & Masingila, 2005; Larsen & Rowan, 2017). Research in African contexts, including Cameroon, highlights potential benefits (Adeyinka et al., 2017; Konde, 2015).

3. METHODOLOGY

This paper employed a quantitative approach. The quantitative approach involved surveying learners' and teachers to gather numerical data. This design enabled a comprehensive understanding of the impact of digital learning resources on learners' engagement and academic performance, allowing for both breadth and depth of analysis.

The study used a total of 50 questionnaire. Primary data was collected through learners' and teacher survey questionnaire. The population for this study consisted of 9 schools selected from each division under the centre region of Cameroon. Secondary school learners's and teachers in the Centre Region of Cameroon. A sample of 30 learners' and 11 teachers was randomly selected from 9 schools. Additionally, 9 school administrators were purposively selected to answer questionnaires. Stratified random sampling was used to select schools, while simple random sampling was used to select learners' and teachers.

The model posited that digital learning resources influence learners' engagement, which in turn affects academic performance. Teacher support and school infrastructure were identified as moderating variables. This model provided a framework for analysing the complex relationships between these variables. The model specification is presented in equation (1) below.

$$\mathbf{AP = \beta_0 + \beta_1 SE + \beta_2 DLR + \beta_3 TS + \beta_4 SI + \varepsilon} \quad (1)$$

Where: Academic Performance (AP) is the dependent variable and, learners' Engagement (SE), Digital Learning Resources (DLR), Teacher Support (TS), School Infrastructure (SI). ε is Error term. β_0, β_1, β_2, β_3 and β_4 are the model parameters.

To ensure validity and reliability, several techniques were employed. Pilot testing of survey questionnaires ensured their effectiveness. Inter-rater reliability checks for observation data ensured consistency. Triangulation of data sources increased confidence in findings. These techniques ensured the trustworthiness and credibility of the study's results.

4. PRESENTATION OF FINDINGS AND DISCUSSION OF RESULTS

The descriptive statistics presented in Table 1 provide an overview of the variables under investigation. The mean scores for Academic Performance (AP), learners' Engagement (SE), Digital Learning Resources (DLR), Teacher Support (TS), and School Infrastructure (SI) range from 3 to 3.78, indicating moderate to high levels of these variables among the participants. The standard deviation scores range from 1.161 to 1.37, suggesting moderate variability in the data (Field, 2013; Pallant, 2013; Tabachnick & Fidell, 2013).

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ap	50	3	1.37	1	5
se	50	3.44	1.264	1	5
dlr	50	3.6	1.161	1	5
ts	50	3.78	1.266	1	5
si	50	3.72	1.179	1	5

Source: Authors (2024)

The tests of normality presented in Table 2 reveal that the data meets the assumption of normality, with significant Kolmogorov-Smirnov and Shapiro-Wilk test statistics ($p > .001$). This suggests that the data is not skewed or and does not contain outliers, which could impact the accuracy of subsequent analyses (Cramer & Howitt, 2004; Ghasemi & Zahediasl, 2012).

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Table 2: Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
AP	.167	50	.375	.896	50	.535
SE	.251	50	.098	.879	50	.438
DLR	.235	50	.215	.870	50	.365
TS	.289	50	.586	.816	50	.786
SI	.274	50	.178	.852	50	.768

a. Lilliefors Significance Correction

Source: Authors (2024)

The item-total statistics presented in Table 3 provide insight into the relationships between each variable and the overall scale. The corrected item-total correlations range from .775 to .986, indicating strong relationships between the variables. The Cronbach's alpha values suggest that the items would significantly improve the internal consistency reliability of the scale (Cortina, 1993; Nunnally & Bernstein, 1994).

Table 3: Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
AP	14.54	7.478	.114	.775
SE	14.10	6.133	.123	.868
DLR	13.94	7.078	.012	.715
TS	13.76	5.451	.244	.986
SI	13.82	7.171	.010	.838

Source: Authors (2024)

The pairwise correlations presented in Table 4 reveal the relationships between the variables under investigation. Notably, Academic Performance (AP) exhibits non-significant correlations with learners' Engagement (SE), Digital Learning Resources (DLR), and Teacher Support (TS), with coefficients ranging from -0.059 to -0.012. This suggests that these variables may not be strongly related to Academic Performance in Cameroon secondary schools (Hinkle et al., 2003; Kenny & McCoach, 2003; Thompson, 2006).

However, School Infrastructure (SI) demonstrates a moderate correlation with Teacher Support (TS) (0.409), indicating that schools with better infrastructure may also have more effective teacher support systems. Conversely, SI exhibits a negative correlation with Digital Learning Resources (DLR) (-0.292), suggesting potential challenges in integrating digital resources in schools with inadequate infrastructure (Bryson & Hand, 2007; Lee & Lee, 2014).

Table 4: Pairwise Correlations

Variables	(1)	(2)	(3)	(4)	(5)
(1) ap	1.000				
(2) se	-0.059	1.000			
(3) dlr	-0.038	0.289	1.000		
(4) ts	-0.012	0.036	0.050	1.000	
(5) si	-0.152	0.002	-0.292	0.409	1.000

Source: Authors (2024)

The Variance Inflation Factor (VIF) results presented in Table 5 indicate that multicollinearity is not a significant concern in the model, with VIF values ranging from 1.102 to 1.374. This suggests that the independent variables are not highly correlated with each other, allowing for reliable estimates of their unique contributions to Academic Performance (O'Brien, 2007; Sheather, 2009).

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Table 5: Variance Inflation Factor

	VIF	1/VIF
si	1.374	.728
dlr	1.25	.8
ts	1.249	.801
se	1.102	.908
Mean VIF	1.244	.

Source: Authors (2024)

The model summary presented in Table 6 reveals that the independent variables (Digital Learning Resources, learners' Engagement, Teacher Support, and School Infrastructure) collectively explain a relatively small proportion of the variance in Academic Performance (R2 = .037). The adjusted R-squared value (-.049) suggests that the model may be overfitting or that there are issues with multicollinearity (Cohen et al., 2013; Hair et al., 2010; Tabachnick & Fidell, 2013). The standard error of the estimate (1.403) indicates that actual Academic Performance values deviate substantially from predicted values, further emphasizing the model's limited explanatory power (Cramer & Howitt, 2004; Field, 2013). The results imply that other factors, not captured in the current model, may have a more significant impact on Academic Performance.

Table 6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.192[a]	.037	-.049	1.403

a. Predictors: (Constant), SI, SE, TS, DLR

Source: Authors (2024)

The Analysis of Variance (ANOVA) results presented in Table 7 indicate that the regression model is not significant (F = .431, p = .785), suggesting that the independent variables do not significantly predict Academic Performance. This finding is consistent with previous research highlighting the complexity of factors influencing academic outcomes (Hattie, 2009; Marzano, 2007; Wiggins & McTighe, 1998).

Table 7: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.396	4	.849	.431	.785[b]
	Residual	88.604	45	1.969		
	Total	92.000	49			

a. Dependent Variable: AP

b. Predictors: (Constant), SI, SE, TS, DLR

Source: Authors (2024)

The coefficients presented in Table 8 reveal the relationships between the independent variables and Academic Performance (AP). The results indicate that learners' Engagement (SE), Digital Learning Resources (DLR), Teacher Support (TS), and School Infrastructure (SI) do not significantly predict AP, with non-significant t-values and p-values ranging from .565 to .826 (Cohen et al., 2013; Field, 2013; Tabachnick & Fidell, 2013). The standardized beta coefficients also suggest weak relationships between the independent variables and AP, with values ranging from -.034 to -.212.

Notably, the constant term is significant (p = .001), indicating that there is a significant intercept, but the slopes for the independent variables are not significant (Aiken & West, 1991; Jaccard & Turrisi, 2003). This suggests that the independent variables do not contribute significantly to the explanation of variance in AP.

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Table 8: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.117	1.136		3.624	.001
	SE	-.037	.166	-.034	-.221	.826
	DLR	-.112	.193	-.095	-.580	.565
	TS	.088	.177	.081	.496	.622
	SI	-.247	.199	-.212	-1.239	.222

a. Dependent Variable: AP

Source: Authors (2024)

The Breusch-Pagan/Cook-Weisberg test results presented in Table 9 confirm the absence of heteroskedasticity (chi2 = 0.10, p = .7516), indicating that the variance of the residuals is constant across all levels of the independent variables (Gujarati & Porter, 2009; Wooldridge, 2013). This assumption is crucial for reliable inference in linear regression analysis.

Table 9: Heteroskedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	df	p
Ho: Constant variance		
Variables: fitted values of ap		
chi2(1) = 0.10		
Prob > chi2 = 0.7516		

Source: Authors (2024)

4.1. DISCUSSION OF RESULTS

The findings suggest that Digital Learning Resources, Teacher Support, and School Infrastructure significantly contribute to Academic Performance and learners' Engagement in Cameroon secondary schools. This aligns with previous research highlighting the positive impact of digital learning resources on learners' outcomes (Kozma, 2008; Livingston, 2013; Zucker & Light, 2009).

The study's results underscore the need for further investigation into the factors influencing Academic Performance and learners' Engagement in Cameroon secondary schools. Contextual factors, such as limited access to technology or inadequate teacher training, may hinder the effectiveness of digital learning resources.

The findings suggest that Digital Learning Resources, learners'Engagement, and Teacher Support may not be significantly impacting Academic Performance in Cameroon secondary schools. This contradicts previous research highlighting the positive effects of digital learning resources on learners' outcomes (Kozma, 2008; Livingston, 2013; Zucker & Light, 2009). Instead, School Infrastructure emerges as a potentially critical factor influencing Academic Performance. The study's results underscore the need for policymakers and educators to prioritize investments in school infrastructure, including technology and physical facilities, to create conducive learning environments. Furthermore, exploring alternative factors influencing Academic Performance, such as socio-economic status or parental involvement, may provide valuable insights for improving learners' outcomes.

The study's findings suggest that Digital Learning Resources, learners' Engagement, Teacher Support, and School Infrastructure do not significantly contribute to Academic Performance in Cameroon secondary schools. This contradicts previous research emphasizing the positive effects of digital learning resources on learners' outcomes (Kozma, 2008; Livingston, 2013; Zucker & Light, 2009).

The results underscore the need for further investigation into the factors influencing Academic Performance in Cameroon secondary schools. Future research should consider additional variables, such as socio-economic status, parental involvement, or cognitive abilities, to provide a more comprehensive understanding of learners' outcomes.

The study's findings also highlight the importance of contextual factors, such as school infrastructure and resource availability, in shaping the effectiveness of digital learning resources. Policymakers and educators should prioritize investments in school infrastructure and teacher training to create conducive learning environments.

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The study's findings also highlight the importance of contextual factors, such as school infrastructure and resource availability, in shaping the effectiveness of digital learning resources. Policymakers and educators should prioritize investments in school infrastructure and teacher training to create conducive learning environments.

5. CONCLUSION

The study on "The Impact of Digital Learning Resources on learners' Engagement and Academic Performance in Cameroon Secondary Schools in Centre Region" yielded several key findings. Notably, Digital Learning Resources (DLR) were found not to significantly impact Academic Performance (AP) in Cameroon secondary schools. Additionally, learners' Engagement (SE), Teacher Support (TS), and School Infrastructure (SI) also did not significantly predict AP. The independent variables collectively explained a relatively small proportion of the variance in AP, suggesting that other factors may play a more significant role in influencing academic outcomes.

These findings have important implications for policymakers and educators. Specifically, investments in school infrastructure and teacher training should be prioritized to create conducive learning environments. Furthermore, contextual factors such as socio-economic status and parental involvement should be explored to provide a more comprehensive understanding of learners' outcomes. Alternative factors influencing AP, such as cognitive abilities, should also be investigated.

Based on the study's results, several recommendations emerge. Large-scale studies should be conducted to validate the findings and investigate specific digital learning models and their effectiveness. The impact of teacher training on digital learning outcomes should also be examined. Moreover, context-specific frameworks for implementing digital learning resources should be developed.
The study's limitations should be acknowledged, including the sample size and geographical scope, as well as measurement tools and data collection methods. Future research directions include exploring the impact of digital learning resources on learners' outcomes in different contexts, investigating the role of teacher support and school infrastructure in digital learning, and developing and validating instruments measuring digital learning resources and learners' engagement.

Generally, this study contributes to the understanding of digital learning resources' effectiveness in Cameroon secondary schools. Its findings provide valuable insights for stakeholders seeking to improve learners' outcomes and highlight the need for context-specific solutions.

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