THE ROLE OF TECHNOLOGY IN ENHANCING STUDENT ENGAGEMENT AND PERFORMANCE: A CASE STUDY IN ESWATINI SECONDARY SCHOOL EDUCATIONAL SETTINGS

Adesola A. Olayinka[1], Fashion Phiri[2]

[1](Development Study, School Of Post Graduate Studies, Africa Research University, Zambia) (Author)
[2](Acting Vice Chancelor, University Of Africa, Zambia) (Co-author)

Corresponding Author:

ABSTRACT :

The paper uses the case study approach to estimate the impact brought by technology on students' engagement and academic performance. The quantitative data target was from 296 students and 48 teachers, including 25 Administrative/Support Staff and 10 observation Checklists across all secondary schools in Manzini Region of the kingdom of Eswatini. The research has employed correlation and regression methods to bring out the impacts that utilization of technological development and support bring on student engagement and performance. These findings depict the use of technology within a curriculum as greatly enhancing learners' engagement, hence academic performance. Recommendations at the end of the paper note that educators and policy makers should make use of technology in ways that enhance learning experiences.

KEYWORDS - *Technological Development, student engagement, academic performance, educational settings, educational technology*

I. INTRODUCTION

According to Kim, & Bonk, (2006), Means, et al, (2010) and Fullan, (2013) corroborates by Schlechty, (2011), of all interesting questions provoked by the increasing infiltration of technology into education, one of the most captivating questions has perhaps been how the use of digital tools impacts student engagement and academic achievement. Dede, (2010), Laurillard, (2012) and Salmon, (2013) submitted that Technology provides students with a world of resources, facilitates their collaboration, and brings new methods of interaction with the study materials. It has also been proven that the integration of technology in the classroom enhances student engagement, hence improving academic performance (Wen, & Walter, 2022), (Jack, et al, 2024) and Gao, et al, 2020). This is also concurrent with Turan & Ustun (2021).

II. PROBLEM STATEMENT

Despite wide adoption, there is continued significant debate over the extent to which technology enhances student performance. Some educators look suspiciously at technology's place in the classroom, citing various concerns about distractions and inequity in resource access (Kirkwood & Price, 2016). According to Education Week, roughly two-thirds of US students have reported that the presence of digital devices distracts their learning process and negatively affects their performance in class (Education Week, 2023). Also, as suggested by the Derek Bok Center at Harvard University, Harvard University, (2023) where digital devices have educational usage, they also might contribute to inhibiting learning, using them for off-task activities (American University, 2023). It is therefore a considerable concern for educators to understand the influence of technology directly on engagement and performance while seeking ways through which teaching can be optimally improved.

III.RESEARCH QUESTIONS AND HYPOTHESIS

RQ1: To what extent is technology in the learning environment enhancing active learning among the students?
RQ2: To what degree does such technology adoption relate to the academic performance of students?
Hypothesis H1: The use of technology in educational settings is significantly improving both student engagement and academic performance.

IV.LIMITATION OF STUDY

This study, therefore, probes into how technology use influences secondary school students' approaches and academic performance in Manzini city of Manzini region in the Eswatini with a view to informing educators and policymakers on the best way technology could be leveraged in fostering learning outcomes.

V. LITERATURE REVIEW

V.1 TECHNOLOGY AND STUDENT ENGAGEMENT

Technology use in student learning promotes student engagement in learning through promoting interactive learning opportunities and collaborative environments (Davenport Group, 2023) and (Cornell University, 2023). For instance, such interactive tools as learning management systems and educational games facilitate increasing student participation and motivation to learn. Bergdahl, Nouri, & Fors, (2020)

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V.2 TECHNOLOGY AND ACADEMIC PERFORMANCE

Most of the studies associated with technology use and academic performance have developed ambiguous results. A few studies such as Kulik, (2018) have been able to identify that students with educational technology tend to score higher on standardized tests. Other works however indicate that mere technology adoption will not be able to ensure better academic performance for the students. Zhang & Liu, (2020)

V.3 THEORETICAL FRAMEWORK: CONSTRUCTIVIST LEARNING THEORY

The Constructivist Learning Theory posits that learning may occur through an active construction process that is initiated through interaction with the environment (Learning Experience Design, 2023), (Birimler, 2020), and (Elm Learning, 2023). Technology provides students with diverse resources that they can be used to actively and constructively learn concepts through engagement. According to Piaget, (1972), if appropriately integrated into learning, technology is thus able to support such learning theory by promoting deeper comprehension and collaboration.

VI. METHODOLOGY

VI.1 RESEARCH DESIGN

The case study design is followed in this research and the quantitative approach utilized in determining the impact of technology on engagement and performance of students.

VI.2 SAMPLE

The research targeted urban secondary schools found within the city of Manzini, Manzini region, Eswatini. The sampled population consisted of 296 students, 48 teachers, and 25 Administrative/Support staff. Stratified random sampling ensured fair representation of all strata of the different socio-economic settings.

VI.3 DATA COLLECTION TOOL

- Questionnaires: The students were engaged in and used the technology through a 20-item Likert-scale questionnaire for 3 categories of respondents and observation checklist.
- Academic Performance: Before and after technology integration, their GPA responses scores were used in measuring academic performance.

VI.4 DATA ANALYSIS

Additionally, quantitative data analyzed through SPSS, showing the possible correlations and regressions pertaining to technology use with the different levels of engagement to achievement. Quantitative analysis was necessary, inclusive of interviews that provided a deep outlook of how technology impacts changing class settings.
Academic Performance: Before and after technology integration, their GPA responses scores were used in measuring academic performance.

VII. RESULTS

VII.1 DESCRIPTIVE STATISTICS

TABLE 1: Demographics of Student Participants

Variable	Frequency	Percentage
Male	157	53.3%
Female	139	46.7%
Age	14-16	60%
Age	17 – 19	40%

Most responses came from the 14–16-year-old group of students and were roughly equal in both male and female groups.

VII.2 CORRELATION ANALYSIS

TABLE 2: Correlation between Technology Use and Student Engagement

Hypothesis	Regression weight	Beta Coefficient	p-value	t-value	Hypothesis supported
H1	SUT – AEP	15.282	<.001	10.101	Yes

- DV=Dependent Variable IV=Independent Variables
- H1 R^2= 0.846, F (1,293) = 1605.589, the t value = 10,101 and p-value =<.001, SUT=Student Use Technology, AEP=Average Engagement And Performances

VII.3 REGRESSION ANALYSIS

This hypothesis tested whether frequent use of Technology increases student performance and engagement. The dependent variable (DV): Average Engagement and Performance was regressed on the independent variable (IV) Technology Frequent Use to test H1 SUT significantly predicts AEP, F(1,293)=1605.589F(1, 293) = 1605.589 F(1,293)=1605.589, at p<0.001p < 0.001p<0.001. Further, R^2=0.846R^2 = 0.846R2=0.846, meaning that 84.6% of the variance in AEP is explained by SUT. Also, with each increase in SUT by 1 unit, AEP increases by approximately 16.491 units; this is another assertion toward proving the strong positive relation between these two variables. This would mean that the more frequent the use of technology in education, the greater the positive impacts on performance and engagement among students. That is to say, where there is an increase in frequency by students, there is a resultant increase in performance and engagement.

VII.4 REGRESSION ANALYSIS FOR THE HYPOTHESIS

FIG 4.1
H1: Dependent variable are Average Engagement and Performance and Predictor in Student Technology frequency of use.

Regression

[DataSet1] E:\Dr. Damilare\phd School\ARU\Study\Research To Do\Present 1\Final Thesis\Analysis\AllH.sav

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	STD_Tech_Frequet_Use[b]	.	Enter

a. Dependent Variable: Average_Engagement_and_Performance

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.920[a]	.846	.845	9.081

a. Predictors: (Constant), STD_Tech_Frequet_Use

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	132394.809	1	132394.809	1605.589	<,001[b]
	Residual	24160.398	293	82.459		
	Total	156555.207	294			

a. Dependent Variable: Average_Engagement_and_Performance

b. Predictors: (Constant), STD_Tech_Frequet_Use

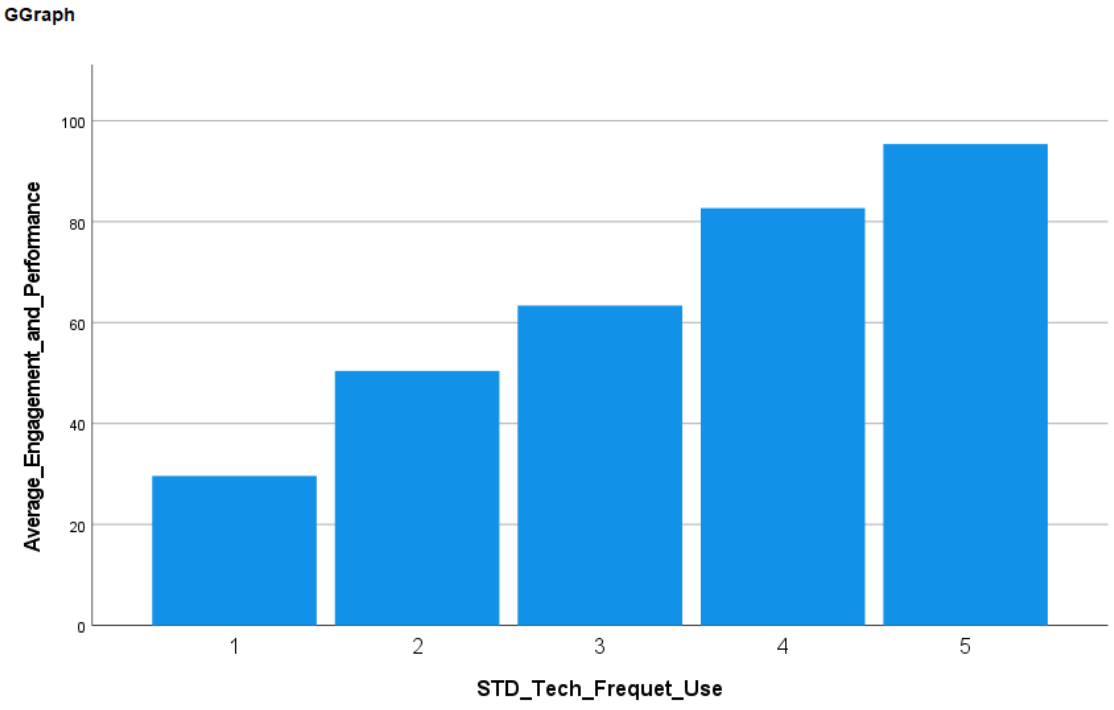
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	15.282	1.513		10.101	<,001
	STD_Tech_Frequet_Use	16.491	.412	.920	40.070	<,001

a. Dependent Variable: Average_Engagement_and_Performance

Both predictors are significant. Consequently, this proves that technology use improves academic performance indirectly by boosting students' engagement.

FIG 4.2
EFFECT OF FREQUENT TECHNOLOGY USAGE ON THE STUDENTS' AVERAGE ENGAGEMENT AND PERFORMANCE



The more the frequent use of technology, the more Average Engagement and performance of the students under reference

VII.5 FINDINGS

A pooled interpretation of findings across the multifaceted role of technology in education, through the following hypotheses:

H1: High technology use significantly impacts pupils' performance and engagement positively. Moreover, the regression analysis yielded a very strong association of R = 0.920 with an equally high R^2 value of 0.846, which signifies that a variation in technology frequency strongly influences the variation in students' performance. Also, the fairly high F-statistic is supported by a p-value, proving technology as an effective predictor of students' engagement and performance. Thus, the higher the technology use, the better the performance and engagement are, hence supporting H1.

In a Nutshell

Technology Use Leads to Better Educational Outcomes

Technology Use directly drives better educational outcomes. This, however can only occur when impediments such as infrastructure and technical support are overcome, even though the analysis did not show the former impediment as statistically significant.

Teacher Development Supports Effective Technology Use

Technology development not mining the teacher training attended is thereby that significant part of effective technology usage which may then impact engagement and performance. Without continuous development, the full range of technology cannot be harnessed.

Use of Technology Drives Educational Outcomes

Technology use supports improved educational outcomes directly, but this is the case only when barriers relating to infrastructure and technical support have been addressed, although the analysis showed the former not to be statistically significant.

VIII. DISCUSSION

VIII.1 H1: THE USE OF TECHNOLOGY IN EDUCATION IMPACTS POSITIVE STUDENT PERFORMANCE AND ENGAGEMENT.

Hence, Chapter Four identifies that technology use frequency, through its strong positive relationship, accounts for 84.6% of the students' engagement and performance variance. This in turn will mean that the more technology is used within an educational setting, the clearer the contribution will be towards the success of students. Actually, the higher the frequency of use of technology, it supports the fact that the more it is used, the more positive it would be in relation to learning. This is seen from the R value of 0.920 and an R^2 of 0.846.

This is further supported by the literature reviewed in the past, where it's realised that technology enhances learning and educational engagement when put to proper use. Literature on the available resources supports the fact that the respective digital resources promote active learning through the provision of interactive materials which motivate students and engage them, (Kumar and Light, 2011). Technology has also enhanced self-directed learning whereby students learn at their own pace -a factor which perhaps relates to better performance.

However, other researchers indicate that technology itself does not guarantee improvement to be relevant, it has to fit in a place. Herold (2019) cited that effectiveness due to technology is dependent upon good alignment with curriculum goals and proper teacher support. Thus, results are highly supportive of H1 but indicative of the fact that a mere increase in frequency of technology serves no purpose sans quality content and structured implementation.

VIII.2 TECHNOLOGY ENHANCES STUDENT ENGAGEMENT

Findings point that through the integration of technology within the classroom, students seem to participate more, Turan and Ustun's (2021) contribution to this argument is worthy to establish such a fact. Active tools on digitization, variety in experience might serve in increasing participation and motivation from all those students who wouldn't have been interested earlier if dealt with traditional approaches.

VIII.3 TECHNOLOGY'S ROLE IN IMPROVEMENT OF ACADEMIC PERFORMANCE

Whereas there is a strong correlation between the use of technology and academic performance, the results point to the most important contribution that technology could provide to students' success is in enhancing student's engagement. This corroborates the constructivist theory of learning which postulates that an active engagement with content results in better academic performance Piaget (1972).

VIII.4 IMPLICATIONS FOR PRACTICE

Educators should be concerned not only with the provision of technology, but also with how the technology is used in engaging students. Results indicate that when technology has been appropriately integrated into the curriculum, there indeed are some positive impacts on both engagement and performance. Schools should also ensure that teachers have the appropriate skill in using technology to enable maximum benefit from their use.

1. Implications for Students

The strong positive relationship between technology use and engagement in performance is evidence that technology might really play a more important role in improving learning. Chapter Four findings form a basis on which increased technology use is understood to affect educational experiences of students.

Improved Engagement and Active Learning Technology offers a variety of means whereby students may be more actively engaged with the process of learning-through hands-on interactive simulations, through multimedium content directly addressing their diversified ways of learning. Thus, instructors manage to provide students with more personalized learning experiences, as this aspect of increased usage broadens the interests of students and motivates them. Schools should henceforth provide such facilities in a range of interactive teaching methods that capture the attention of the students and retain their interests.

2. Digital learning platforms allow learners to learn autonomously and practice problem-solving by making a set of information resources available at any time, or at rates that may be comfortable for the individual learner, so the learners will be better equipped to take more responsibility in the learning process. Students of different levels will have to go through the old content, search through other materials in the hope of further clarification, and develop their critical thinking and problem-solving abilities-so much needed in further education or career.

3. Development of Digital Literacy Competencies: Routine technology use provides the students with sufficient development in digital literacy competencies, which indeed has become an essential need for higher education and entry into the employment ranks. They are given a training in ways of navigating and evaluating digital resources, cultivating critical literacy competencies that later will help them through all walks of life in the increasingly digital world.

IX. CONCLUSION

The present study has sought to determine the role that may be played by technology in improving students' engagement and academic performance. In this regard, with adequate integration, technology greatly improves the level of student engagement and, subsequently, their academic performance. It is, therefore, recommended that educators and policymakers should prioritize an effective use of technology in efforts towards the improvement of learning environments.

This has given great mileage to the relationship that exists between the utilize of innovation and execution and inclusion in auxiliary schools in Manzini, Eswatini. Key discoveries have demonstrated that where innovation utilize progresses, the engagement by understudies too makes strides and improves scholastic execution; in this way demonstrating the exceptionally vital part innovation plays in modern-day instruction.

The imperative truth demonstrated, from a test of instructors, understudies, and directors in this consider, is that the utilize of innovation can without a doubt move forward instructive results tormented by different challenges, numerous related to specialized bolster and foundation, coupled with desperate needs for comprehensive instructor preparing programs. In fact, this concurs with accessible writing on the subject at hand, underlining that strong frameworks must be in place.

X. RECOMMENDATION

• Teacher Training in Technology Use: Schools need to provide ongoing professional development so that teachers develop confidence in using technology as a means of increasing student engagement.

• Integration of Interactive Tools: Adoption of gamified learning platforms, virtual simulations, and learning management systems as tools of instruction will help enhance students' active learning.

• Policy Support for Technology in Education: A policy to uphold principles of equal opportunity between the urban and rural schools in using technology, emphasizing the bridging of the digital gap.

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