DIGITAL LEARNING PLATFORMS ON ACADEMIC ACHIEVEMENT

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Abstract: This study used academic achievement as the dependent variable, digital platform and student engagement as the independent variables, and Time on platforms as the mediating variable. The core conceptual framework was established through demographic variables such as gender and grade level. The following hypotheses were formulated in this study: 1. There is a positive relationship between digital platforms and student engagement and academic achievement; 2. Time on platforms significantly moderates the relationship between digital platforms and student engagement and academic achievement; 3. In this paper, 336 questionnaires were distributed and 325 valid questionnaires were returned to all the students of secondary school A as a case study.

This study found that 1) there is a positive relationship between digital learning platforms and student engagement and academic achievement; 2) time on platforms did not significantly moderate the relationship between digital platforms and student engagement and academic achievement. This study A secondary school students as the research population regarding the relationship between digital learning platforms and student engagement and academic achievement provides practical recommendations for educators, administrators and policy makers to effectively utilize digital learning platforms to support student engagement and academic achievement.

Keywords: Digital Platforms, Student Engagement, Academic Achievement, Time on Platforms

Introduction

Digital learning platforms have become increasingly prevalent in educational settings, offering a wide array of resources and tools to facilitate learning experiences (Anderson, 2016; Wang & Baker, 2019). These platforms encompass various online systems and tools designed to support and enhance educational delivery, ranging from learning management systems to interactive multimedia resources. The integration of digital learning platforms into academic settings has sparked considerable interest among researchers and educators due to their potential to reshape traditional teaching and learning practices (Means, et al., 2018).

The emergence of digital learning platforms has brought about a paradigm shift in the way education is delivered and accessed (Zawacki-Richter, et al., 2020). With the advent of technology,

students now have access to a plethora of resources and opportunities for interactive learning experiences outside the confines of the traditional classroom (Firmin, et al., 2019). Digital platforms offer flexibility in terms of access to educational content, allowing students to engage with learning materials at their own pace and convenience (Luo, et al., 2021). Moreover, these platforms often incorporate features such as multimedia elements, gamification, and social learning tools, which can enhance student engagement and motivation.

In recent years, there has been a growing body of research examining the impact of digital learning platforms on academic achievement (Hao, et al., 2021). Scholars have sought to explore the effectiveness of these platforms in improving student learning outcomes across various academic disciplines and educational levels (Vural, 2018). Furthermore, researchers have investigated the factors that influence students' engagement with digital platforms and their subsequent effects on academic achievement (Wang & Baker, 2019).

Despite the increasing popularity and widespread adoption of digital learning platforms, there remains a need for further empirical research to elucidate their impact on academic achievement . While some studies have reported positive associations between digital platform usage and academic outcomes, others have yielded mixed or inconclusive findings . Moreover, the mechanisms underlying the relationship between digital platforms and academic achievement remain poorly understood.

One key area that warrants investigation is the role of student engagement in mediating the relationship between digital platform usage and academic achievement (Oh, et al., 2020). Student engagement encompasses the extent to which students are actively involved and invested in their learning experiences, including their interactions with digital learning materials and resources (Zawacki-Richter et al., 2020). Prior research has suggested that higher levels of student engagement are associated with improved academic achievement (Anderson, 2016). However, the extent to which digital platforms contribute to student engagement and, subsequently, academic achievement remains unclear.

Furthermore, the influence of time on digital platforms as a mediating variable in the relationship between platform usage and academic achievement requires closer examination (Hao et al., 2021). While some studies have suggested that increased time on digital platforms may be associated with better academic outcomes, others have raised concerns about the potential for excessive screen time to detract from learning effectiveness (Firmin, et al., 2019). Thus, it is essential to explore how the amount of time students spend on digital platforms influences their engagement with learning materials and, ultimately, their academic achievement.

In light of these considerations, this study aims to investigate the relationship between digital learning platforms, student engagement, time on platforms, and academic achievement among university students. By examining these interrelated variables within the context of higher education,

this research seeks to provide insights into the potential benefits and challenges associated with the integration of digital technologies in learning environments. Additionally, this study aims to inform educational practitioners and policymakers about effective strategies for leveraging digital platforms to enhance student learning outcomes.

Research Objective (s)

Objective 1. To achieve this overarching goal, the study aims to accomplish the following specific objectives: Explore the Impact of Digital Learning Platforms on Academic Achievement: The first objective is to examine how the use of digital learning platforms influences students' academic achievement. This involves assessing the extent to which engagement with digital platforms, including accessing course materials, participating in online discussions, and completing assignments, correlates with students' academic achievement, as measured by grades, test scores, and overall academic success.

Objective 2. Investigating the mediating role of time on platforms: The second aim is to investigate the mediating role of time spent on digital learning platforms in the relationship between platform use and academic achievement. This entails investigating whether the amount of time students spend on digital platforms moderates the impact of platform use on academic achievement. Specifically, this study aims to determine whether increased time on platforms leads to improved academic achievement or whether other factors intervene in this relationship.

Objective 3. Examine the Relationship Between Student Engagement and Academic Achievement: The third objective is to examine the relationship between student engagement and academic achievement. This involves assessing the extent to which students' active participation, interest, and involvement in learning activities contribute to their academic success. By exploring this relationship, the study aims to identify the role of student engagement as a predictor of academic achievement and its potential interaction with digital learning platforms.

Literature Review

Overseas countries deployed work on the development of education informatization at an early stage, attaching great importance to digital learning and teaching, to the expansion of learning resources and learning spaces, and to supporting the creation of informatized educational environments. Teachers' teaching methods are constantly being improved, and online assessment, online learning, online interaction and online lectures have long been on track. The construction of digital campus is the basic platform of education informatization, and the construction of digital learning platform is the core part of digital campus. The application of foreign digital learning platforms in teaching has been very mature, and the current development of education informatization focuses on the efficient use of mobile terminal equipment in teaching, the research and development of information technology tools that

provide assistance for higher education teaching and research, and the promotion of paperless exams.

The application fields of digital learning platforms in China involve a relatively wide range, covering all walks of life, among which, most of them are concentrated in the disciplines of computer software and application, higher education, education theory and education management. In the process of literature collation and reading, it is also found that most of the research articles on digital learning platforms in the subject areas are more inclined to the level of platform construction, technology exploration, system module development, functional design and implementation, etc., and are less involved in the exploration of applications in the field of education and teaching.

Digital learning platforms include a wide range of technological tools, software applications, and online environments designed to support teaching and learning activities in digital form. These platforms provide educators and learners with educational resources, multimedia content, interactive tools, and communication channels that enable flexible, personalized, and collaborative learning experiences. Digital learning platforms may include learning management systems (LMS), virtual learning environments (VLEs), educational websites, mobile applications, and social media platforms. One of the main benefits of digital platforms in education is their ability to increase student engagement and motivation. Gamified learning platforms, such as Kahoot, Quizizz, and Classcraft, utilize game design principles and mechanics to engage learners, incentivize participation, and promote skill development (Hamari, Koivisto, & Sarsa, 2014). By integrating elements such as points, badges, leaderboards and challenges, these platforms make learning more enjoyable, competitive and immersive.

The term "participation" is commonly used in people's daily activities, usually as a second or third party to a collective event or activity. Participation is the English equivalent of "engagement or involvement", which refers to an individual's emotional and intellectual investment in a collective activity, and Fredricks (2004) focuses on deeper aspects beyond behavior and emotion. He believes that learning engagement should contain three types: behavioral engagement, cognitive engagement, and emotional engagement. In conclusion, student engagement is a dynamic, multidimensional concept that includes the cognitive, affective, and behavioral dimensions of student engagement in learning activities. It involves students' active participation, emotional engagement, and behavioral commitment to academic pursuits that promote meaningful learning experiences and positive educational outcomes. Student engagement is influenced by a complex interplay of personal, interpersonal, and institutional factors. By understanding and addressing these factors, educators can create supportive learning environments that promote active participation, motivation, and success for all students.

In digital learning environments, time on platforms refers to the amount of time learners spend accessing educational materials, resources and activities through digital platforms. This metric reflects the extent to which students interact with digital content, participate in online discussions, complete

assignments, and engage in other learning-related activities in a digital learning environment. Time on the platform includes both synchronous and asynchronous interactions, including real-time participation in live lectures, discussions or collaborative activities, as well as self-paced learning activities undertaken independently by students.

The concept of time on platforms intersects with research on online learning behaviors and digital engagement models. Research on students' online learning behaviors has identified factors that influence the amount of time students spend on platforms, including motivation, task characteristics, interface design, and instructional strategies (Joo, Lim, & Kim, 2017; Picciano, 2017). By understanding and analyzing time spent on platforms, educators and researchers can gain insights into students' learning behaviors, preferences, and interaction patterns in digital learning environments, which can inform instructional designs, teaching strategies, and interventions aimed at improving student engagement and learning outcomes.

A growing body of empirical research has explored the impact of digital platforms on student engagement in learning activities. For example, one study investigated the effectiveness of learning management systems (LMS) in facilitating students' interaction with course materials, communication with peers and instructors, and participation in collaborative activities (Hung, Chou, & Chen, 2018). Findings suggest that well-designed LMS platforms can increase student engagement by providing easy access to resources, facilitating communication and collaboration, and supporting personalized learning experiences. Research on the relationship between the amount of time students spend on digital platforms and academic achievement provides valuable insights into the temporal dynamics of student learning behaviors. Longitudinal studies have tracked the amount of time students spend engaged on digital platforms and examined their predictive power for subsequent academic achievement (Wu, Tschannen-Moran, & Hoy, 2018). Findings suggest that students who spend more time actively engaging with learning materials, completing assignments, and participating in online discussions tend to achieve higher grades and demonstrate greater academic success.

In optimizing digital learning environments, the impact of time spent on the platform on student engagement and academic achievement should also be considered. By analyzing students' engagement patterns, usage behaviors, and time dynamics on digital platforms, educators can identify factors that facilitate or impede students' learning experiences and adjust instructional interventions accordingly.

Empirical evidence on the relationship between digital platforms, student engagement, time on platforms, and academic achievement provides valuable insights into the mechanisms underlying effective learning experiences in digital environments. The literature review reveals the intricate relationship between digital platforms, student engagement, platform time, and academic achievement in contemporary educational settings. By synthesizing empirical evidence and theoretical frameworks, we provide valuable insights into the mechanisms underlying effective learning experiences in digital

environments. Educators, researchers, and policymakers must continue to explore innovative ways to utilize digital technologies to increase student engagement, promote academic achievement, and foster lifelong learning. Through the transformative potential of digital platforms, we can create inclusive, engaging, and empowering learning environments that enable all students to thrive and succeed in the 21st century.

Methodology

The "Digital Platform and Student Engagement Scale" questionnaire used in this study was revised from the questionnaires of Kim & Frick (2020), Davis (2019), Luo & Cai (2021). The "Academic Achievement Scale" was revised from the scales of Bandura (2018), Pintrich & De Groot (2021). "Time on platforms" was modified from questionnaires of related studies by Wang & Han, (2020), Twenge & Campbell, (2018), Maki & Buchanan, (2018) and other scholars.

The study was conducted with a total sample of all the students of a secondary school A. From the information published on the school's website, the school has a current enrollment of 2,135 students.

With probability-based sampling methods, the sample size can be determined through the population collection process. For example: the sample size suitable for calculation, the sample size used in the study was determined using The Taro Yamane Sample Size Formula (1973) and the sample size was determined using a 95% confidence level and a permissible value. The sampling error is 5% or 0.05. The overall sample is 2135 individuals. When n = number of samples used in the study . N = size of the population, e = random sample error is set to 0.05 .

Sample sizes and formulas for calculations are listed below:

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{2135}{1 + 2135 \text{ X } 0.05^2}$$

$$n = 336.88$$

In order to increase the accuracy of the findings and generalizability of the conclusions, a questionnaire study was conducted on the students of A secondary school. A total of 336 questionnaires were distributed and 325 valid questionnaires were returned with a recovery rate of 96.7%.

In order to confirm the address and contact person of the school, to make sure that the sample can meet the proportion of the mother group and whether the sample size represents the main population, and to ensure the recovery rate of the questionnaire, the school was asked whether it was willing to assist in distributing the questionnaire of this study, and after the school agreed, the questionnaire was delivered in person or by post to the school that administered the test, and then asked the contact person of the school to distribute it on behalf of the school to fill in the questionnaires, and a total of 325 valid questionnaires were obtained for the study. A total of 325 valid questionnaires were obtained and analyzed for the study.

Descriptive statistical analysis, regression analysis, Coefficients analysis, and moderated effect test were used to ensure the reliability and validity of the results of the study.

Results

Of the 325 respondents in this study, 160 (49.2%) were male and 165 (50.8%) were female. The grade levels were 122 (37.5%) for seniors, 120 (36.9%) for sophomores, and 83 (25.5%) for juniors. The latest semester's achievement rankings were 121 students (37.2%) at the passing level, 159 students (48.9%) at the intermediate level, and 45 students (13.8%) at the excellent level.

In the regression analysis of the effect of digital learning platform and student engagement on academic achievement, the adjusted R-square was 0.882. digital learning platform and student engagement (independent variable) explained 88.2% of the variance in academic achievement (dependent variable). In the test of variance, the F-value is 2419.465 and the p-value of significance is .000b less than 0.01, which means that the regression model is highly significant at the 0.01 level and the model is usable and meaningful. After analyzing the coefficients we found that the unstandardized coefficient of digital learning platforms and student engagement is 0.981 and the standardized coefficient is 0.939 with a p-value of 0.000, which means that there is a positive correlation between the digital learning platforms and student engagement and academic achievement.

After a hierarchical regression analysis of the post-centering data, the significant level of the coefficient of the interaction term between the independent variable of the post-centering (digital learning platform and student engagement) and the moderator variable (time on platforms). In this case, the significance level of the coefficient of the interaction term between the centered independent variable and the moderating variable is 0.492, which is greater than 0.05, indicating that the coefficient is not significant, i.e., the time on platforms did not significantly moderate the relationship between digital platforms and students' engagement and academic achievement.

Discussion

This study aimed to explore the association between digital learning platforms and student achievement, focusing on the link between engagement and academic achievement to provide insights. The results show that the use of digital platforms exhibits a significant positive correlation with student engagement and academic achievement, highlighting the potential of digital technologies to enhance the learning experience in education. This is consistent with previous findings that digital learning platforms provide opportunities for interactive, personalized, and self-directed learning that can promote students' active engagement with course materials and contribute to their academic success (Hew & Cheung, 2014; Jaggars & Xu, 2016).

A key finding of the research findings is that students must be encouraged to actively participate

in digital learning platforms to maximize their impact on academic achievement. While correlation analyses suggest a positive relationship between overall platform usage and student engagement and academic achievement, it is important to recognize that not all forms of engagement are equally beneficial. For example, passive consumption of content without meaningful interaction or reflection may not produce significant learning outcomes (Anderson, 2016). Therefore, educators and instructional designers should aim to create learning environments that encourage active participation, collaboration, and critical thinking in order to realize the full potential of digital platforms for student learning.

Furthermore, the moderating effect of time on platforms was not significant, suggesting that the quality, rather than the quantity, of engagement is a more critical factor in influencing student learning outcomes in digital learning environments. This finding highlights the need to shift attention away from mere exposure to digital technologies to facilitating deeper, more meaningful interactions with these tools (Richardson et al., 2017). Educators should prioritize designing engaging and interactive learning activities that encourage students to actively construct knowledge, engage in peer collaboration, and receive timely feedback in order to enhance their learning experience and academic achievement.

The findings of this study have multiple theoretical implications for understanding the role of digital learning platforms in educational settings. First, the observed positive correlations between digital platforms and student engagement and academic achievement support the principles of constructivist and sociocultural learning theories that emphasize the importance of active participation, social interaction, and meaningful contexts in the learning process (Picciano, 2017). Digital platforms provide learners with opportunities to collaboratively construct knowledge, engage in authentic tasks, and receive guidance from peers and teachers, thus facilitating deeper learning experiences. Second, the moderating effect of time on platforms was not significant, challenging the assumption that "the more exposure to digital technology, the better the learning". This finding highlights the need to adopt a more nuanced perspective that considers the quality of engagement as well as individual and contextual factors to shape the effectiveness of digital learning interventions. Future theoretical frameworks should take into account the multifaceted nature of student engagement with digital platforms and the complex interplay of factors that influence learning processes and outcomes in digital learning environments.

In summary, the results of this study highlight a significant positive correlation between digital learning platforms and student engagement and academic achievement. By promoting active student engagement with digital technologies and prioritizing pedagogical approaches that promote deep learning, educators can maximize the potential of digital platforms to improve student achievement in educational settings.

Based on the findings of the study, the following instructional strategies are recommended to

optimize the use of digital learning platforms to improve student engagement and academic achievement: a learner-centered approach to course design that incorporates interactive and collaborative activities, such as the flipped classroom model, to promote active participation in digital platforms; integrating formative assessment strategies into digital learning environments to provide timely feedback and support student learning; exploring the use of self Adaptive learning technologies to personalize instruction and meet individual learning needs; Provide professional development and support to equip educators with the knowledge, skills and competencies needed to integrate digital technologies into their teaching practices; Optimize the design of digital learning platforms to be user-friendly, intuitive, easy to access, and to provide multi-media resources, interactive tools, and collaborative features; Incorporate analytics and data visualization tools to provide insights into student learning behaviors, preferences, and achievement, and to provide a better understanding of student learning behaviors, preferences, and achievement. learning behaviors, preferences, and achievement to support teaching decisions.

Conclusions

1. The relationship between digital learning platforms and student engagement and academic achievement:

The purpose of this study was to investigate the relationship between digital learning platforms (DLPs) and student achievement, with a particular focus on student engagement and academic achievement. The results of the study showed that there was a significant positive correlation between the use of digital learning platforms and student engagement and academic achievement. Data analysis showed that the frequency of students' use of digital learning platforms was closely related to their level of engagement in academic activities. Those students who used digital learning platforms for their studies were typically more engaged in a variety of academic tasks, such as participating in class discussions, completing assignments on time, and gaining a deeper understanding of course material. These results are consistent with previous research findings and underscore the effectiveness of digital learning platforms in promoting student engagement by providing interactive and personalized learning experiences.

In addition, the study found a positive correlation between students' use of digital learning platforms and their academic achievement. Those students who were more engaged on digital learning platforms tended to demonstrate better academic achievement and a deeper understanding of course content. This finding highlights the potential of digital learning platforms to positively impact student achievement by facilitating access to educational resources, promoting active learning strategies, and enabling personalized feedback and assessment.

Taken together, the results of this study support the positive relationship between digital

learning platforms and student engagement and academic achievement, emphasizing the critical role of digital learning platforms in influencing student engagement in academic tasks and subsequent academic achievement.

2. Time on platforms as a moderator:

In addition to directly exploring the relationship between digital learning platforms and student engagement and academic achievement, this study also examined the moderating effect of time on platforms on this relationship. However, contrary to expectations, the results of the analysis revealed that time on platforms did not significantly moderate the relationship between digital platforms and student engagement and academic achievement.

Specifically, although students' overall use of digital learning platforms was positively related to their engagement and academic achievement, time on platforms did not significantly affect this relationship. This suggests that the impact of students' academic achievement may depend more on how effectively they utilize digital platforms rather than just the amount of time spent. Therefore, the quality of student engagement may be more important, which includes active participation in learning content, interaction with peers and teachers, and strategic use of available resources.

Overall, although there was a positive relationship between digital learning platforms and student engagement and academic achievement, the duration of platform use failed to significantly moderate this relationship. This result highlights the complexity of the factors that influence the relationship between digital learning platforms and student achievement and emphasizes the importance of the need to consider multiple factors when designing and implementing effective digital learning interventions.

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