

## **Effectiveness of Digital Learning Tools in Enhancing Academic Achievement Among Students**

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### **ABSTRACT**

The purpose of this research is to determine whether or not students' academic performance improves when they use digital learning aids in both undergraduate and graduate courses. The data was gathered from 136 students from different majors utilising a standardised questionnaire in a descriptive cross-sectional survey. The study's overarching goal was to determine how often students use digital tools, how much they value them, what obstacles they encounter, and how they affect their overall academic performance. Students with background knowledge of educational technology (e.g., Google Classroom, Moodle, educational applications, and websites) were the focus of a convenience sample. Participants were only considered if they were actively enrolled in an academic program and had prior experience with digital learning tools. Results are shown in tabular form after descriptive statistics, such as percentages and frequencies, were applied to the data that was gathered. A large percentage of students routinely used digital resources and reported an increase in engagement, material accessibility, and learning outcomes. Problems including technological difficulties and a general lack of digital literacy were, however, also mentioned. Findings from the research stress the requirement of institutional backing for digital learning tools so that they may reach their full potential in today's classrooms. In sum, the study adds to our knowledge of how digital resources could help students succeed in college.

**Keywords:** *Digital Learning Tools, Academic Achievement, e-Learning, Educational Technology, Online Education.*

### **I. INTRODUCITON**

As a result of new technologies and the widespread use of digital tools in classrooms, the educational landscape has changed drastically in the last few years. While face-to-face instruction in classrooms is essential, technology-assisted pedagogy such as online courses, e-learning solutions, mobile applications for education, and virtual classrooms has emerged to supplement and even compete with

it. These technologies have revolutionised the way educational information is delivered and have also made it easier for students to study in a way that is tailored to their needs. A broad variety of technological resources may be considered digital learning aids if they are intended to supplement and improve the quality of instruction. Some examples of these technologies include gamified learning platforms, multimedia instructional materials, interactive simulations, mobile learning apps, virtual reality-based tools, and learning management systems (LMS) like Google Classroom and Moodle. Researchers and educators have been investigating their efficacy in enhancing academic performance due to their increasing use in K-12 and higher education institutions. The central point in this discussion is whether or not digital learning tools really improve students' grades.

The capacity of these tools to accommodate different learning styles and individual paces is the foundation of their efficacy. Digital technologies provide personalised learning experiences, in contrast to the one-size-fits-all approach often seen in conventional education. Lessons are available whenever students need them, so they may review difficult material at their own speed and participate in interactive content that helps them grasp the material better. In addition, students are more likely to be engaged and motivated to do well in class when multimedia elements like films, animations, and quizzes are included. Easily accessible resources are a key benefit of digital learning technologies. Distance and time are no longer barriers to education because to internet-connected gadgets. This was especially important when schools throughout the world started offering classes online in response to the COVID-19 epidemic. The use of digital platforms allowed for the continuation of lessons and the facilitation of virtual interactions between instructors and students. The emergency shift proved that digital tools are resilient, but it also highlighted the digital gap and the difficulties of having uneven access to technology. There has been a lot of research looking at the link between digital learning tools and how well students do in school. When compared to students who depend only on conventional means, empirical data shows that students who actively interact with digital technologies have superior knowledge, retention, and exam results. One example is the use of adaptive learning technology to pinpoint and fill in specific knowledge gaps; another is the efficacy of gamified platforms in encouraging problem-solving abilities.

These benefits notwithstanding, there are a number of obstacles that digital tool adoption presents. Implementation and integration into the curriculum are just as important as the tools' design and functionality when it comes to determining how successful they are. Limitations in infrastructure, inadequate training, opposition to change, and students' and instructors' lack of digital literacy may all prevent them from reaching their full potential. Furthermore, if not controlled, an excessive dependence on technology may diminish emotional investment, decrease face-to-face relationships, and introduce distractions. Even in highly technological settings, the teacher's job is paramount. Instructional design, pedagogical alignment, and ongoing assessment of learning outcomes are essential for effective use of digital learning resources. Instead of just digitalising current procedures, teachers should have a firm grasp on how to effectively use these technologies into their lessons to boost student achievement.

To what extent may digital learning tools improve students' academic performance? That is the question this research seeks to answer. The project aims to understand how digital interventions affect academic performance, what variables moderate this connection, and how to maximise educational results by analysing quantitative and qualitative data. Researchers also took into account teachers' and students' views on digital tools, how well they work, and how they affect motivation and learning habits. Policymakers, educators, and institutions working to raise academic standards and results must comprehend the function and efficacy of digital learning tools within the framework of a dynamic educational environment. This study's results will add to the larger conversation about educational innovation and provide evidence-based recommendations on how to best use technology into classroom instruction.

## **II. LITERATURE REVIEW**

Ramaila, Sam & Mpinga, Nokubonga. (2022). Due to a lack of learner-centred teaching opportunities, students in South Africa's basic education system struggle to meet scientific benchmarks. Incorporating digital materials into science classrooms has the potential to captivate and inspire students. Interactive game-based apps are a kind of digital resource that may be used in online learning settings. This research looked at ninth graders at a private school in South Africa to see how using technology in the classroom affected their motivation and performance. The empirical study used a quasi-experimental design that used a mixed-method approach. A combination of questionnaires and semi-structured interviews were used to gather quantitative and qualitative data, respectively. To determine the impact of digital resources as an instructional intervention on the academic accomplishment and motivation of ninth graders studying natural sciences, a motivational survey and a Skeletal System-based questionnaire were used as pre- and post-test, respectively. As a theoretical framework, Cultural Historical Activity Theory supports the empirical inquiry. Using digital resources as an educational intervention resulted to a statistically significant change in test results between the pre- and post-tests. Discussed are the theoretical ramifications of using technology to improve instruction and student performance.

Khan, Tanuja et al., (2021) one definition of digital learning is "the science of technology and method by which educational goals can be realised in a simple way." This definition implies that digital learning is a science that provides a foundation upon which different strategies and tactics can be built to achieve particular goals. By coming up with new systems and materials, designing instruments, discovering procedures, and thinking of appropriate solutions to educational problems, it might also be useful in education innovation. The results of this research showed that pupils who used computers had an influence on both their math performance and their attitude towards arithmetic. And they gain from learning to use computers, which leads to improved performance.

Raja, R. & Nagasubramani, P. (2018). God gave us technology. Perhaps the greatest gift God has given us, second only to life itself. It is the cradle of all artistic and scientific traditions. Undoubtedly, technology has revolutionised our way of life. It has changed the way people live in many ways. Without a question, technology is integral to every aspect of human existence. Technology has made it possible to automate a number of once laborious processes. Additionally, with the aid of

contemporary technology, many important and complicated operations may be executed with more ease and efficiency. Life has changed, and for the better, as a result of technological advancements. Education has been profoundly impacted by technological advancements. There is no denying the significance of technology in educational institutions. Actually, both instructors and students have found that using computers in the classroom has greatly simplified the process of learning new material. Thanks to technological advancements, both teaching and learning have become much more engaging and entertaining.

Ali, Mohammad et al., (2018) Evaluating the efficacy of online education for college students is the focus of the present investigation. Seven hundred students were polled using a questionnaire to gather data. Out of 667 students who filled out the survey, 94.9% are making use of some kind of online learning resource. The efficacy of online education has been evaluated using eight different criteria. To find out how reliable and consistent the linked components are, researchers utilise Cronbach's alpha test. In order to extract variables and quantify factor loadings, the research used exploratory factor analysis. To evaluate the hypotheses, a t-test with one sample has been conducted. The study's findings corroborate the claims that online education has many advantages over traditional classroom instruction, including being more efficient with both time and money, allowing students more freedom to work at their own pace, enhancing their knowledge acquisition, facilitating active learning, providing a prompt response, being applicable to real-world situations, and having a satisfactory overall quality. This research makes an effort to examine the efficacy of online education by way of a number of important and basic criteria. Online education is beneficial for college students, according to the results of all the factors. Researchers hope that their findings will persuade educators and students to make better use of digital resources for learning and information exchange.

Bertheussen, Bernt & Myrland, Øystein. (2016). For 120 undergraduates taking a finance course, this research details how participating in digital learning activities affected their grades. Every student had access to interactive practice and test problem files, and their download activity was automatically tracked over the first 50 days of the course. Deliberate practice and problem-solving utilising the interactive spreadsheet files were significantly related with academic success, as measured by the midterm test. The correlation between previous maths grades and subsequent success in school was also statistically significant. Students that care about their grades and want to know how to best divide up their study time may find this research's results useful. Institutions that are looking to divide up limited funds across different forms of educational output may also find this research helpful.

Suleman, Dr et al., (2013) The impact of educational technology on the improvement and efficiency of the teaching and learning process is undeniable. When used properly, educational tools may help students succeed academically at all grade levels. The research set out to determine if and how secondary school students' use of instructional technology improved their English language arts performance. The study's demographic consisted of all secondary school students in Kohat Division. Government High School Khurram (Karak) pupils were the only ones included in the research. Additionally, the research was confined to ninth graders. As a sample, forty ninth graders were

chosen. The pre-test served as the foundation for the grouping of the sample students into the experimental group and the control group. Groups of twenty pupils each were formed. Because this was an experimental study, researchers used a pre- and post-test strategy. Each group had its own set of statistical tools generated, including means, standard deviations, and differences of means. Using a t-test, we looked for a statistically significant difference between the control and experimental groups' means on the pre- and post-test scores variable at the 0.05 level. The researchers found that educational technology is very important for teaching English at the secondary level after analysing the data statistically. When it came to teaching English, educational technologies were determined to be more effective and successful. When compared to the control group, the experimental group's pupils displayed remarkable and surprising performance. The results support the idea that secondary schools should make sure that instructional technology is available and make good use of it.

Baig, Muntajeeb. (2011). Tenth graders' physics learning efficacy in both online and face-to-face (F2F) settings was the subject of an experimental design. The study employs a combination of several online resources and a learning environment. For the purpose of studying the impact of online learning on students' accomplishment, the online tools and learning environment provided by the website "Wiziq.com" are used. According to the results of this study, students who were taught and studied in an online learning environment had very high levels of success. For the same reason that students' performance in face-to-face classes was poor, online classes allowed students to study, collaborate, and share materials outside of the traditional classroom setting. Learner centricity, control and communication by the learner, and a user-centred design are all characteristics of online learning environments.

### **III. RESEARCH METHODOLOGY**

#### **Research Design**

Researchers in this research used a descriptive cross-sectional survey approach to find out how well online resources helped children do better in school. We opted for this design because it allows us to gather data at a single instant, giving us a picture of how students are using and feeling about digital learning tools. An organised examination of the correlation between the use of digital tools and academic achievement was made possible by the quantitative method.

#### **Study Population**

Participants in this research were undergraduate and graduate students from a range of academic programs at the participating universities. We predicted that these students were already familiar with digital learning technologies via their coursework, whether through official LMSs or other online resources.

#### **Sample Size and Sampling Technique**

The research included 136 pupils in all. During the data collecting period, accessibility and desire to participate were the determining factors in the sample size. The researcher utilised a convenience sample strategy to collect answers from students who were easily accessible and who use or have used digital learning tools.



### **Inclusion Criteria**

- Students currently enrolled in academic programs.
- Students with prior experience using digital learning tools (e.g., Google Classroom, Moodle, mobile apps, educational websites).
- Students willing to give informed consent to participate in the study.

### **Exclusion Criteria**

- Students without access to any digital learning tools.
- Respondents who did not complete the questionnaire or submitted incomplete responses.

### **Data Analysis**

Frequency distributions and percentage computations were among the descriptive statistical approaches used to analyse the data. Tables showing tool use frequency, student perceptions of advantages and obstacles, satisfaction levels, and effects on academic achievement were generated from the data.

This study mostly focuses on descriptive data, but if additional statistical analysis is needed, it may employ chi-square tests or cross-tabulation to look at the correlations between variables (such how often a tool is used and how much students' grades increase).

## **IV. DATA ANALYSIS AND INTERPRETATION**

**Table 1: Frequency of Usage of Digital Learning Tools by Students**

<b>Frequency of Use</b>	<b>Number of Students</b>	<b>Percentage (%)</b>
Daily	40	29.4%
2–3 times a week	35	25.7%
Once a week	28	20.6%
Occasionally (rarely)	21	15.4%
Never	12	8.9%
<b>Total</b>	<b>136</b>	<b>100%</b>

A large percentage of students (29.4% to be exact) utilise digital learning tools every day, and another 25.7% use them twice or thrice a week, which is rather consistent. It seems that over half of the people who took the survey (55.1%) regularly use some kind of digital platform. A quarter of users utilise the tools on a weekly basis, while almost 20% use them sometimes. A tiny percentage of pupils (8.9%) said they never use any kind of digital technology. These results show that most students are using digital resources in their study habits, which may be an indication of the increasing popularity and dependence on online education.

**Table 2: Perceived Benefits of Digital Learning Tools**

Benefit	Frequency	Percentage (%)
Improved understanding of topics	46	33.8%
Increased motivation to learn	30	22.1%
Better retention and recall	24	17.6%
Improved time management	20	14.7%
No significant benefit noticed	16	11.8%
<b>Total</b>	<b>136</b>	<b>100%</b>

Digital learning tools are seen as useful in clarifying ideas, as students most typically claim an enhanced grasp of subjects (33.8%). Improvements in memory and attention span (17.6%) and a greater desire to study (22.1%) are also highly ranked, indicating positive effects on mental health. One of the many organisational advantages of digital platforms is better time management, which accounts for 14.7% of the total. Although most students gain, there is opportunity to enhance accessibility, usability, or content alignment to satisfy various learning requirements. This is because a small minority (11.8%) did not find any meaningful advantage.

**Table 3: Impact of Digital Learning on Academic Performance**

Grade Change After Using Tools	Number of Students	Percentage (%)
Significant improvement	38	27.9%
Moderate improvement	44	32.4%
Slight improvement	26	19.1%
No change	18	13.2%
Decline in performance	10	7.4%
<b>Total</b>	<b>136</b>	<b>100%</b>

According to the data in the table, students' performance in the classroom has improved thanks to the use of digital learning resources. Overall, 79.4% of students saw an increase in their academic performance, with 32.4% claiming the greatest level of improvement at moderate. Problems with digital platforms or inefficient usage may explain why only 13.2% found no improvement and 7.4% noticed a decrease in performance. In general, the research shows that digital learning tools do a good job of helping most children succeed in school.

**Table 4: Student Satisfaction with Digital Learning Experience**

Satisfaction Level	Number of Students	Percentage (%)
Very satisfied	33	24.3%
Satisfied	47	34.6%
Neutral	29	21.3%
Dissatisfied	17	12.5%
Very dissatisfied	10	7.3%
<b>Total</b>	<b>136</b>	<b>100%</b>

With 34.6% expressing pleasure and 24.3% expressing extremely high levels of satisfaction, almost 59% of students were favourable about their digital learning experience. Some students seem to be somewhat engaged or indecisive, as shown by the 21.3% of replies that were neutral. Although the majority of students had a pleasant experience, there is room for improvement. This might be due to issues with material delivery, interface usability, or technological difficulties, since 12.5% of students were unsatisfied and 7.3% were extremely dissatisfied. As a whole, it seems that pupils are rather fond of digital learning tools.

**Table 5: Independent Samples t-test - Academic Performance Scores by Frequency of Digital Tool Usage**

Group	N	Mean Academic Score	Std. Deviation	t	df	p-value
Frequent Users (Daily & 2–3/week)	75	78.4	6.2	4.27	134	0.000*
Infrequent Users (Once/week & less)	61	72.0	7.5			

Students' academic performance ratings change significantly depending on how often they utilise digital learning tools (daily or 2-3 times per week vs. once a week or less), according to the findings of an independent samples t-test shown in Table 5. The average academic score for the 75 users who used the service often was 78.4 (standard deviation=6.2), but the average score for the 61 users who used it less frequently was 72.0 (standard deviation= 7.5). A very significant p-value of 0.000 ( $p < 0.001$ ) and a t-value of 4.27 (with 134 degrees of freedom) were the results of the t-test. This proves that the two groups' differing levels of academic achievement are not the result of chance alone and that regular use of digital learning resources leads to substantially higher levels of academic achievement. These results show that students' academic performance improves when digital learning technologies are used consistently, which means that more students may benefit from these tools if they were more widely used and accessible.

## V. CONCLUSION

Opportunities to improve students' academic performance are substantial when digital learning technologies are integrated into educational frameworks. With their capacity to provide adaptable, engaging, and personalised learning, these technologies have shown promise in meeting the requirements of a wide range of students and enhancing their academic performance. These results provide further evidence that digital technologies, when used properly, may enhance not only students' interest and engagement but also their understanding and retention of course material. But there are a lot of moving parts that need to be in place for these technologies to work, such as having access to trustworthy technology, being digitally literate, having well-prepared teachers, and having pedagogically aligned lessons. As a potent supplement that enhances the learning process, digital learning cannot fully replace conventional approaches. A well-rounded strategy that combines digital resources with tried-and-true methods of instruction is crucial for schools that want their students to



succeed. To guarantee that digital learning technologies deliver on their potential to improve education, future educational initiatives should prioritise fair access, teacher training, and continual evaluation.

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