Research Journal of Psychology (RJP)

Online ISSN: 3006-7219
Print ISSN: 3006-7200
Volume 3, Number 3, 2025, Pages 165 – 176
Journal Home Page
https://ctrjournal.com/index.php/19/index

Effect of Digital Pedagogy on Students' Interest in Learning During their Elementary Schooling

Rabia Gulzar[1] & Sher Zaman[2]

[1]*M.Phil. Scholar, Department of Education University of Gujrat, Email: Rabiagulzar169@gmail.com*
[2]*PhD Assistant professor, Department of Education University of Gujrat, Email: smzaman@uog.edu.pk*

ARTICLE INFO

Article History:

Received:	*June*	*08, 2025*
Revised:	*June*	*30, 2025*
Accepted:	*July*	*10, 2025*
Available Online:	*July*	*18, 2025*

Keywords:

Digital pedagogy, Interest in learning, Integrating digital tools, Traditional/routine teaching.

Corresponding Author:
Sher Zaman
Email:
smzaman@uog.edu.pk

ABSTRACT

The purpose of the study is to explore as whether the students taught through digital tools and those taught through routine teaching in classroom, differ in their interest in learning. The implied logic behind the assumed variance in the learning interest is to harness the increasing trend of using digital media among young ones, for the purpose of learning. The exclusive humanized and teacher centered instruction is insufficient to teach the generation - Z, particularly for engaging them through their mind and body in the classroom. To address the given challenge, the present study was conducted through implementing digital pedagogy, to channelize students' interest in computer science learning through blended approach. There were two groups, one was taught through routine i.e., teacher centered approach while the other through digitalized instruction. For four weeks, the stated intervention continued, to diagnose the impact of the digitalized pedagogy as compared to the exclusive humanized instruction. A learning related interest inventory was developed by the researcher, consisting of five factors including motivation, focus, curiosity, class participation/collaboration and, attention. The results of the collected data which was analyzed through paired sample t-test, reflect significant difference in the level of students' learning interest taught trough digital pedagogy and routine i.e., teacher centered teaching. Hence the application of interactive and engaging digital tools are more helpful to foster greater student interest and participation in the teaching learning process.

Introduction

There are revolutionary changes and developments in almost every field of life particularly the enhanced use of digitalized tools in the instructional processes. The given developments are rapidly influencing educational technology through integration of digital pedagogy with

humanized/ teachers'-based instruction. Behind such changes, there are the advocates of digital pedagogies, who through posing their believes, push towards the available opportunities of digital era for ensuring learning tasks like sharing and searching etc., (Vaataja & Ruokamo, 2021). Such developments in the field of teaching and learning are epistemic enablers, which present new ways of knowing and new structures of knowledge (Kelly, 2016). Thus, the cultures where digital technologies are used in every aspect of life, parents and students have also their expectations from the schools to educate their children through Edu Tech which would enable them to play a bigger role in their future societies (Howell & McMaster, 2022).

In the above stated perspective, the present study focuses on an initial factor of students' learning, i.e., their interest in learning, which requires in students' individualized engagement with their learning environment (Fink, 1991; Hidi, 1990; Renninger, 1990). While the individual itself and the classroom environment are both critical factors for enhancing learning interest, which are commonly investigated independently (Krapp, Hidi, & Renninger,1992). Although few studies have examined this relationship, Krapp et al. (1992) stated about the situational interest that "both naive and formal theories of instruction might suggest that classroom instruction and materials that are interesting play a large role in determining learning achievement".

According to Silvia (2006), interest is an emotion or sentiment influencing how people pay attention to and concentrate on a specific subject. There are various types of interest from an educational perspective, hence researchers have typically distinguished between two categories of interest: personal interest and situational interest. Individual interest is a persistent sentiment about particular pursuits or topics (Alexander & Jetton, 1996). Unlikely, situational interest is transient and depends more on external factors, such as the classroom environment and teaching tools and techniques (Nieswandt, 2007).

The present-day schoolers are availing the instructions in a world where digital technology permeates every aspect of daily life, hence the promotion of digital pedagogies requires empirical evidence to convince the stakeholders of the instructional system, for availing the benefits of digital technologies, through making it approachable and effective for exchange information and transforming pedagogies. Global educational systems are amenable to the transforming classroom cultures, where most of the well-developed and advanced ones have integrated such innovations for the effective pedagogical initiatives and are adjusting to the changes that digital technologies are bringing about in society (Nehring et al., 2019).

For such innovations and improvements, abilities and skills of the teachers are required to properly incorporate digitalized pedagogies into their lessons, for enhanced motivation among the students towards learning. According to Apelgren and Giertz (2010), pedagogical competence includes six elements: disposition, expertise, aptitude, situational adaptation, tenacity, and ongoing growth. Accordingly, the results of the study would be helpful for opening avenues related to the factors particularly the teachers' dispositions and their IT based pedagogical skills for state-of-the-art classroom cultures.

The present work, as a test case proceeds to investigate and quantify the effect of digital pedagogy on a critical factor or condition for learning that is interest in learning. Further here in the present study, 'learning interest' is further operationally defined as 'attention', 'curiosity', focus, and 'participation' specifically related to the teaching and learning in a classroom of computer science.

Accordingly, the study would pave way and might develop the stake holders' instructional beliefs to be proactive in opting the digitalized pedagogy because it is apparent that students are least taking interest in the routine classrooms, hence the intervention would be helpful that how the digitalized teaching learning ensures the conditions for enhancing students' interest in learning particularly the related subject of the digital phenomenon. Thus the study peruses the given rationale through attaining the following objectives formulated for the present study.

Objectives of the study

- Find out students' interest in learning while taught through routine classroom teaching.
- Find out students' interest in learning taught through digital pedagogy.
- Compare the effect of routine teaching and digital pedagogy on students' interest in learning.

Literature review

Over the past few decades, information and communication technology has significantly altered every facet of culture and society (Bonk, 2009; Kozma, 2003). For educational systems to drive perceptive-pedagogical and organizational changes in schools, they must connect schools to the evolving global landscape (Fullan, 2011). As the organizational and instructional center of an institution, a school is a complex system comprising the teaching staff, the instructional framework, the curriculum structure, and the system of students and classes (Kozma, 2009). A school functions as a system only when there is a high degree of coordination and interconnection between these subsystems and other internal and external factors influencing its ability to adapt to change (Kozma, 2008).

The phrase "digital pedagogy" refers to a broad range of approaches to teaching and learning that use digital learning platforms (Pink et al., 2016). Digital platforms and digital technology are two crucial elements of digital pedagogy that are essential to this investigation. While digital platforms relate to the specific learning (digital) tool used to effect learning (knowledge transfer), digital technologies refer to specific gadgets that can be utilized in learning, such as smartphones and tablets. Online discussion forums, voice recordings, movies, and information storage and retrieval places could all be included in this (Pink et al., 2016). It should be mentioned that this study discusses digital technologies that students use to access and learn through digital platforms, particularly tablets and smartphones. When appropriate, the general phrase "digital pedagogy" is utilized.

The use of technology and students' information literacy are inextricably linked. We ground our discussion of how technology may enhance learning on sociocultural theories (Rogoff, 2003; Goncu & Gauvain, 2012). Development is seen by this perspective as a process of interaction among learners and more experienced people where learners acquire knowledge concerning the goals, methods, and circumstances of specific activities that define practice ongoing in and across settings and groups (Rogoff, 2003). Settings of digital activity are broadly described as expanding learning chances for participation, specifically in the areas of interest and pleasure (Bebell & O'Dwyer, 2010; Suhr, Hernandez, Warschauer, & Grimes, 2010). By bringing together student survey data, teacher interviews, and classroom observations, Bebell and Kay (2010) identified a dramatic increase in student engagement like participation, enthusiasm, motivation, and directed behavior over three years in the Berkshire Wireless Learning Initiative.

Several theoretical perspectives, such as the "will-skill-tool" model (WST model) developed by Christensen and Knezek (2001), have addressed how teachers integrate technologies into the classroom for their practice or that of their pupils. This approach posits that instructors' opinions and views regarding digital technologies, their technical expertise, and the school's technological setup are important and favorable indicators of ICT integration. Several studies have demonstrated that these three facilitators account for a high degree of variance in the integration of technology (e.g., Agyei & Voogt, 2011; Farjon et al., 2019; Petko, 2012; Pozas & Letzel, 2023; Knezek & Christensen, 2016; Sasota et al., 2021).

Digital settings can offer increased opportunities for student engagement, encompassing both interest and enjoyment (Bebell & O'Dwyer, 2010; Suhr, Hernandez, Warschauer, & Grimes, 2010). Combining data from student surveys, instructor interviews, and classroom observations, Bebell and Kay (2010) studied classrooms within the Berkshire Wireless Learning Initiative and documented significant increases in student engagement measured through participation, enthusiasm, and motivation as well as improved attentiveness over three years. This increase in engagement is particularly relevant for initiatives aimed at enhancing resources in low-income schools, such as those in New Zealand, where disengagement has been identified as a barrier to student success. In these settings, increasing student participation in learning is seen as vital for improving educational outcomes (Gibbs & Poskitt, 2010).

It is frequently asserted that outdated pedagogy is the reason why educators have failed to use technology to change the procedures and results of education. For instance, Bush and Mott (2009) contend that educational leaders and institutions place more emphasis on teaching than on learning and on how technology may be used to increase efficiency based on outdated pedagogical paradigms rather than how technology can advance learning. Similar opinions have been voiced by educational technologists in Europe, but we must investigate the implications for pedagogy and whether pedagogy is essential to the potential for transformation and sustainability in the practices of technology-enhanced learning (Beetham & Sharpe, 2007).

Technology is utilized by students to find learning topics, solve challenges, and develop solutions during the learning process, as noted by Brush, Glazewski, and Hew (2008). It facilitates the acquisition of knowledge, making concepts and ideas in various learning domains more understandable when students are actively involved in applying technology tools. These tools also support student-centered and self-directed learning. However, despite the well-recognized advantages of using technology-based teaching and learning activities, some obstacles prevent teachers and students from fully adopting ICT in schools (Beak, Jung, & Kim, 2008; Ogunleye, 2007; Ndudi & Chinedu, 2016).

Not every institution is prepared to instruct academic institutions, lecturers, and students in pedagogy. Changes in learning, a substantial investment in technology, and pedagogical innovation are all necessary. While some professors are more educated, competent, and proficient in digital technology than others, lecturers with the necessary qualifications can assist academic institutions in providing digital technology training to other lecturers or academic members of the institution. There should be digital teachers in learning technologies available to academic institutions. If depending solely on instructors who possess extensive knowledge, expertise, and proficiency in training will be slow and ineffectual because to digital technology (Fındıkoglu & Ilhan, 2016).

People should strive to achieve their learning objectives by balancing technical and human factors, particularly through digital pedagogics. This applies to both teachers and teacher candidates. The

development of digital pedagogy should be a priority for educators and applicants in the process of beginning their teaching careers (Lloyd & Irvine, 2005). Teachers evaluate whether students are using educational devices appropriately when they arrive at school, and educators should possess relevant knowledge in this area, regardless of its specific pertinence. Digital pedagogy is defined as "the use of electronic fundamentals like multimedia, productivity applications, cloud computing, etc. to enhance or to change the experience of education and transform teaching and learning to provide rich, diverse, and flexible learning opportunities for digital generation" (Dangwal & Srivastava, 2016).

According to Prestridge (2012), "digital pedagogy" encompasses more than only the use of digital tools in teacher-directed approaches; it also covers methods in which ICT facilitates students' active use of information, collaboration, and creativity. Social theorists' views, which emphasize social variables and culture in cognitive development, are related to social theories of learning, including socio-constructivism and social cultural theory.

Research Design

The study follows the positivistic paradigm and is quantitative in its approach where the design of the study is experimental having two variables; one independent i.e., digital pedagogy, and the other is dependent variable, which is students' interest in learning. The randomized pretest posttest control group design was applied for the study from true experimental designs.

The research involves two randomly selected groups: an experimental group that receives instruction through digital pedagogy and a control group that follows traditional teaching methods. Twenty-eight 7th-grade students from a Government Girls' school in District Gujarat taken as sample of the study. Where the results of the study are generalizable to the given population i.e., elementary level students.

During random sampling, the selected sample of 28 students, was further split into two groups, i.e., 14 students were randomly assigned to the control group and the remaining 14 students to the experimental group. To assess the effectiveness of the intervention, both groups undergo pre-tests and post-tests, allowing for a comparative analysis of changes in students' interest in learning computer science. Following illustration is further helpful for easy understanding of the design representing the flow of the current study.

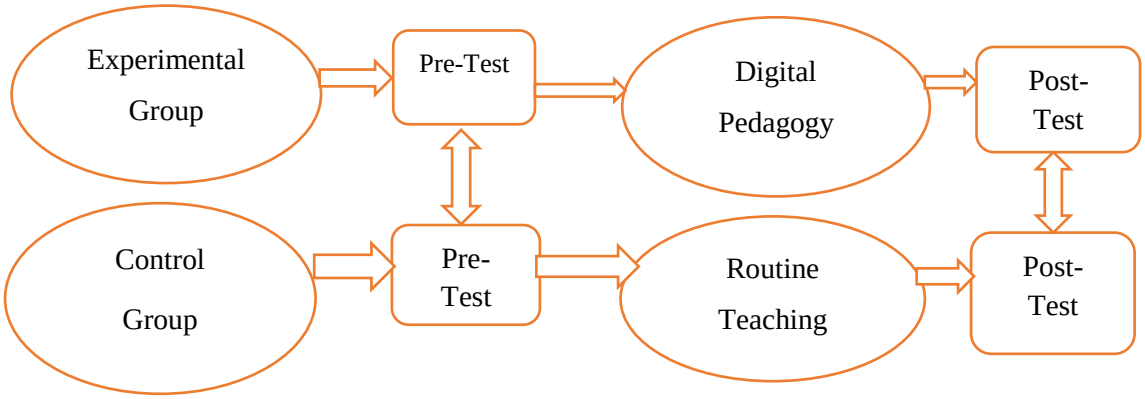

Figure-1: Randomized Pretest and Posttest Research Design

Research Treatment

The control group was taught through routine teaching i.e., text book method, where reading text mostly on the part of teachers, and students listen explanation where needed of the related concepts. Whereas, the students from the experimental group were taught through digital pedagogy, to determine the effect of digital pedagogy on the, 'learning interest', of grade 7th students, at the same time, through following the purposeful lesson plans in this regard.

Furthermore, an interest inventory that had five factors: classroom attention, curiosity, focus, motivation, class participation and collaboration, was developed and was applied to assess students' learning interest in the computer science subject at the preliminary stage of the experiment. For the purpose the experiment for 4 weeks, which makes 24 days, continued.

The validity of the instrument has been ensured with the help of expert opinion. Expert opinion has been taken from 14 people including professors of department of education, MPhil scholars of department of education, school principals, school teachers. After taking their opinion, MS Excel sheet and CVR (.91) have been calculated. 4 statements were rephrased and 7 statements were excluded. The reliability test was calculated on the data collected for piloting purpose where .90 Cronbach's Alpha was found, which is substantial for the desired level of the consistency in the scores to be collected through the given, 'Interest inventory'.

Results of the Study

A study comparing the effects of digital pedagogy versus the traditional teaching i.e., text book method, on 7^{th} -grade students' interest in learning in computer science was carried out. The sampled groups' pre-test and post-test results were acquired, and were compared using the paired sample t-test. The ultimate result for both groups was calculated by deducting the pre-test scores from the post-test scores. Furthermore the mean gain scores of both the groups were analyzed to determine the significance of the differences between the students' level of interest that they pose in the learning of the computer science subject.

In the following table, the results related to the objectives of the study are presented for easier understanding.

Table 1: Comparison of Mean Gain Scores on 'Interest in Learning Inventory'.

Group	N	Mean	SD	t	sig	Mean Difference
a) Control (Pre-Post, Routine)	14	3.60-3.40	0.74-0.59	0.87	0.39	-0.20
b) Experimental (Pre-Post, Digital Pedagogy)	14	3.60-4.07	0.49-0.26	3.12	0.008	0.47
c) Control vs Experimental	14	3.48 -4.12	0.59-0.40	3.36	0.003	0.64

Table.1. **a)** shows that students taught through traditional/ text book based teaching reported themselves to have their interest in learning at the pre stage of the experiment (M =3.60 and SD= 0.74) while at the post- test stage their interest level (M= 3.4, SD =0.59) whereas (t = 0.87 and sig =0.39) to have their level of interest in learning. The given results of the analysis reflect that the students' interest in learning little bit decreased but the given t value and significance level shows no statistically significant difference in the beginning stage and the end stage of their interest learning during the four weeks' intervention that is taught through traditional teaching. Additionally, the 95% confidence interval for the mean difference included zero, reinforcing the

conclusion that there was no significant change in student interest between the pretest and posttest. Therefore, the null hypothesis could not be rejected, indicating that the intervention did not result in a statistically significant difference in student interest in learning taught through routine teaching for four weeks.

b) The table results present that the students taught through digital pedagogy reported themselves to have their interest in learning (M =3.6 and SD= 0.49) while at the post test stage their interest level (M= 4.07, SD =0.26) whereas (t = -3.12 and sig =0.008) to have their level of interest in learning. As the p-value was less than the alpha level of 0.05, the null hypothesis was rejected, indicating a significant increase in student interest. These findings suggest that the use of digital pedagogy methods had a positive and measurable impact on enhancing students' interest in learning, highlighting the effectiveness of interactive and engaging teaching tools in fostering student engagement.

c) Comparing results of the students taught through routine/text book based teaching reported themselves to have their interest in learning (M =3.48and SD= 0.0.59) while that the post test stage their interest level (M= 4.12, SD =0.40) whereas (t = -3.363 and sig =0.003) to have their level of interest in learning. This result confirms a statistically significant difference in scores between the two groups. The experimental group scored, on average, 0.64 points higher than the control group, demonstrating a greater interest in reading for learning. These findings suggest that digital pedagogy significantly enhances students' engagement and interest in reading for learning compared to traditional teaching methods.

Table 2: Comparison of Mean Gain Scores: Factors of Interest in Learning

Factors	N	Mean	SD	t	sig	Mean Difference
a) Attention	14	19.26 -23.88	0.57 - 0.36	4.21	0.001	4.62
b) Curiosity	14	21.0-26.1	1.52 - 1.88	7.97	0.001	5.10
c) Focus	14	17.86- 25.43	3.21 -2.24	7.24	0.001	7.57
d) Participation	14	31.78 -36.85	5.13- 5.69	2.48	0.02	5.07

Table 2**. a)** shows the factor wise results through the mean gain scores on the 'interest in learning inventory', where the attention level of the students those who taught through routine teaching (M=19.26, SD=0.57) as well as digital pedagogy (M=23.88, SD= .36) reported themselves differently (t= 4.21) and sig= 0.001 with mean difference 4.62, which shows that the intervention was beneficial because of the difference is statistically significant at the 0.05 level ($t(26) = -4.210$, $p = 0.001$ (two-tailed).

b) shows the factor wise results through the mean gain scores on the 'interest in learning inventory', where the attention level of the students those who taught through routine teaching (M=21.0, SD=1.52) as well as digital pedagogy (M=26.1, SD= 1.88) reported themselves differently (t= 7.97) and sig= 0.001 with mean difference 5.10, this discrepancy is statistically significant and very unlikely to have happened by chance the variance in the results.

c) shows results on the sub factor 'focus while learning' of the students those who taught through routine teaching (M=17.86, SD=3.21) as well as digital pedagogy (M=25.43, SD= 2.24) reported

themselves differently (t= 7.24) and sig= 0.001 with mean difference 7.57. According to a t-test, the difference is statistically significant ($t(26) = -7.24$, $p < 0.001$). A significant impact of digital pedagogy is indicated by the mean difference of -7.57.

d) Results on the factor, 'Participation', shows that the students taught through text based teaching reported themselves to have their interest in learning (M =31.78 and SD= 5.13) while at the post test stage their interest level (M= 36.85, SD =5.69) whereas (t = 2.475 and sig =0.02) to have their level of interest in learning. The students taught through digital pedagogy scored, on average, 5.07 points higher in collaboration than those taught routinely. Thus variations, in scores indicate by the larger standard deviation, hence digital pedagogy had a positive impact on students' participation and collaboration skills compared to of those students taught in routine through text book based method.

Discussion on the Results

These results are supported by previous research that illustrates that routine teaching often lacks the active and interactive components necessary to keep students on task (Bain, 2004; Trowler, 2010). Specifically, in elementary and secondary school environments, the focus on passive learning in conventional teaching methods can lead to students becoming disaffected and demotivated. Mayer (2009), who emphasized the impact of multimedia learning on cognitive involvement and memory, verifies these results. Chou and ChanLin (2015) also came to similar findings, having found that using multimedia and digital storytelling in the classroom significantly enhanced elementary students' motivation and interest in science classes.

The perspective of Leu et al. (2011), who stressed that digital reading contexts can facilitate engagement and understanding through multimodal and interactive content. Similarly, Serafini (2012) pointed out that students who are exposed to digital texts learn more active and autonomous reading strategies in contrast to students restricted to print. Johnson and Johnson's (2009) study, which underscored the way technology-facilitated cooperative learning enhances students' academic and social performance. In addition, a study by Sung, Chang, and Yang (2015) confirmed that online and mobile learning platforms enhance students' engagement and collaboration skills when in groups. This is consistent with the ideas of the psychologists who emphasized that learning was strongly motivated by curiosity and that educational materials needed to be developed to encourage inquiry. According to a study by Kang et al.(2009), students' interest and exploratory behavior were significantly increased in surroundings that were rich in digital stimuli, such as movies, simulations, and interactive tasks.

These findings support Gagné's (1985) instructional design theory, where it has been pointed out that well-sequenced and structured digital learning environments are capable of significantly enhancing mental focus and attention. The study of Clark and Mayer (2016), which proved that high-quality digital instruction can increase learner motivation and contribute to quantifiable increases in learning performance.

Conclusion of the study

The results clearly indicate that digital instruction enhances the motivation of primary students to learn. The student performance in the experimental group where they were instructed through digital pedagogy, performed better those instructed through conventional/text book based teaching on several attributes, such as class attention, curiosity, motivation, focus in learning, and class participation etc.

Most significant difference creates the participation and collaboration which is more feasible and effective through digital pedagogy.

There is a trend of using digital media/ tools hence this inclination can be harnessed effectively to engage the students in teaching learning process which would enhance their interest unconsciously and would render desired results for students quality learning.

This implies that a key factor in igniting students' interest and enthusiasm was the incorporation of digital tools, multimedia materials, and interactive learning platforms. The results add to the increasing belief as how well digital learning strategies can provide a stimulating, student-centered learning environment.

This study's analysis of students' motivation in reading for learning under the two teaching philosophies was a crucial component. Students' interest in reading was enhanced by digital learning resources like e-books, interactive reading apps, and multimedia content, which validated the significance of incorporating technology-based reading interventions to improve young learners' literacy and comprehension abilities is underscored by this finding.

The role of digital pedagogy in encouraging student collaboration and participatory learning was another crucial area examined in this study. The digital pedagogy significantly improved students' collaborative skills and frequent classroom participation through digital learning platforms, which provide more convenience for peer interactions, group discussions, and cooperative problem-solving, all of which contribute to an enriched learning experience. Thus, through such strategies using the potential of digital tools, might be more helpful in fostering students' critical thinking, teamwork, and communication.

More conclusively the investigated overall effect of digital pedagogy on students' interest in learning demonstrates a greater success in effective classroom teaching through digital learning experiences which pave way forward for higher level of interest and engagement, further supporting the efficacy of technology-enhanced instructional methods.

Summarily attention, focus, curiosity, motivation to learn, and participation as well as collaboration like evidences indicate that digital pedagogy significantly increases many facets of students' engaged learning.

References

1. Agyei, D. D., & Voogt, J. M. (2011). Exploring the potential of the will, skill, tool model in Ghana: Predicting prospective and practicing teachers' use of technology. *Computers and Education*, 56(1), 91–100.
2. Alexander, P. A. & Jetton, T. L. (1996). The role of importance and interest in the processing of text. *Educational Psychology Review*, 8, 89–121.
3. Apelgren, K., & Giertz, B. (2010). Pedagogical competences: A key to pedagogical development and quality in higher education. In Å. Ryegard (Ed.), *A Swedish perspective on pedagogical competence* (pp. 25–41).
4. Bain, K. (2004). *What the best college teachers do*. Harvard University Press.
5. Beak, Y., Jung, J., & Kim, B. (2008). What makes teachers use technology in the classroom? Exploring the factors affecting the facilitation of technology with a Korean. *Sample Computer & Education,* 50, 224-234.
6. Bebell, D., & Kay, R. E. (2010). One-to-one computing: A summary of the quantitative results from the Berkshire wireless learning initiative. *Journal of Technology, Learning and Assessment*, 9(2), 4–59.

7. Bebell, D., & Kay, R. E. (2010). One-to-one computing: A summary of the quantitative results from the Berkshire wireless learning initiative. *Journal of Technology, Learning and Assessment*, 9(2), 4–59.
8. Bebell, D., & O'Dwyer, L. M. (2010). Educational outcomes and research from 1:1 computing settings. *Journal of Technology, Learning, and Assessment*, 9(1), 1-15.
9. Bonk, C. J. (2009). *The world is open: How web technology is revolutionizing education.* Jossey-Bass.
10. Brush, T., Glazewski, K. D. & Hew, K. F. (2008). Development of an instrument to measure Preservice teachers' technology skills, technology beliefs, and technology barriers. *Computers in the Schools*, 25, 112-125.
11. Bush, M. D., & Mott, J. D. (2009). The transformation of learning with technology: Learner-centered approaches. Innovate*: Journal of Online Education*, 5(2), 1-7.
12. Chou, C. H., & ChanLin, L. J. (2015). Digital storytelling for oral proficiency in language learning: A case study. *The Asia-Pacific Education Researcher*, *24*(4), 687–696.
13. Christensen, R., & Knezek, G. (2001). *Instruments for assessing the impact of technology in education. Computers in the Schools*, 18(2–3), 5–25.
14. Clark, R. C., & Mayer, R. E. (2016). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning* (4th ed.).
15. Dangwal, K. L., & Srivastava, S. (2016). Digital pedagogy in teacher education. *International Journal of Information Science and Computing,* 3(2), 67–72.
16. Farjon, D., Smits, A., & Voogt, J. (2019). Technology integration of pre-service teachers is explained by attitudes and beliefs, competency, access, and experience. *Computers and Education*, 130, 81–93.
17. Fındıkoglu, F., & Ilhan, D. (2016). Realization of a Desired Future: Innovation in Education. *Universal Journal of Educational Research*, 4(11), 2574–2580.
18. Fink, B. (1991). Interest development as structural change in person-object relationships. In L. Oppenheimer & J. Valsiner (Eds.), *The origins of action: Interdisciplinary and international perspectives* (pp. 175-204).
19. Fullan, M. (2011). *Change leader: Learning to do what matters most*. John Wiley & Sons.
20. Gagné, R. M. (1985). *The conditions of learning and theory of instruction* (4th ed.). Holt, Rinehart and Winston.
21. Gibbs, R., & Poskitt, J. (2010). Student Engagement in the Middle Years of Schooling (Years 7-10): *A. Report to the Ministry of Education.*
22. Goncu, A., & Gauvain, M. (2012). *Sociocultural theory and the study of learning and development*. In *The Oxford Handbook of culture and psychology* (pp. 147-164). Oxford University Press.
23. Helen; Sharpe Beetham, Beetham, H., & Sharpe, R. (2007). *Rethinking pedagogy for a digital age* (p. 10001). London
24. Hidi, S. (1990). Interest and its contribution as a mental resource for learning. *Review of Educational Research*, 60,549-572.
25. Howell, J., & McMaster, N. (2022). *Teaching with technologies: Pedagogies for collaboration, communication, and creativity*. Oxford University Press.
26. Johnson, D. W., & Johnson, R. T. (2009). An educational psychology success story: Social interdependence theory and cooperative learning. *Educational Researcher*, *38*(5), 365–379.
27. Kang, M. J., Hsu, M., Krajbich, I. M., Loewenstein, G., McClure, S. M., Wang, J. T., & Camerer, C. F. (2009). The wick in the candle of learning: Epistemic curiosity activates reward circuitry and enhances memory. *Psychological Science*, *20*(8), 963–973.
28. Kelly, F. (2016). *The idea of the PhD: The doctorate in the twenty-first-century imagination.*

29. Knezek, G., & Christensen, R. (2016). Extending the will, skill, tool model of technology integration: Adding pedagogy as a new model construct. *Journal of Computing in Higher Education*, 28(3),307–325.
30. Kozma, R. (2008). Comparative analyses of policies for ICT in education. In J. Voogt & G. Knezek (Eds.), *International handbook of information technology in primary and secondary education* (pp. 1083–1096). Fullan, M. (2011). *Change leader: Learning to do what matters most.*
31. Kozma, R. (2009). Assessing and teaching 21st-century skills: A call to action. In F. Schueremann & J. Bjornsson (Eds.), *The transition to computer-based assessment: New approaches to skills assessment and implications for large-scale assessment* (pp. 13–23).
32. Kozma, R. B. (Ed.). (2003). *Technology, innovation, and educational change: A global perspective.* International Society for Educational Technology.
33. Krapp, A., Hidi, S., & Renninger, K. A. (1992). Interest, learning, and development. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), *The role of interest in learning and development* (pp. 3–25). Lawrence Erlbaum Associates.
34. Leu, D. J., Forzani, E., Rhoads, C., Maykel, C., Kennedy, C., & Timbrell, N. (2011). The new literacies of online reading comprehension: Expanding the literacy and learning curriculum. *Journal of Adolescent & Adult Literacy, 55*(1), 5–14.
35. Lloyd, M., & Irvine, S. (2005). Digital pedagogy: Finding the balance in an online learning and teaching environment. *ASCILITE 2005, Balance, Fidelity, Mobility: Maintaining the Moment*, 375-378.
36. Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press.
37. Ndudi, O. C and Chinedu, E. U. (2016). Effect of Information and Communication Technology (ICT) on students' interest in basic electricity. *Issues in Scientific Research*, 1(4).
38. Nehring, J., Charner-Laird, M., & Szczesiul, A. (2019). Redefining excellence: Teaching in transition, from test performance to 21st century skills. *NASSP Bulletin*, 103(1), 5–31.
39. Nieswandt, M. (2007). Student affective and conceptual understanding in learning chemistry. *Journal of Research in Science Teaching*, 44, 908–937.
40. Ogunleye, B. O. (2007). Teachers' perceived barriers to the successful implementation of ICT in the teaching and learning of science subjects in Nigerian Secondary Schools. *Nigerian Journal of Computer Literacy*. 200-215.
41. Petko, D. (2012). Teachers' pedagogical beliefs and their use of digital media in classrooms: Sharpening the focus of the 'will, skill, tool' model and integrating teachers' constructivist orientations. *Computers & Education*, 58(4), 1351–1359.
42. Pink, S., Lingard, H., & Harley, J. (2016). Digital pedagogy for safety: The construction site as a Collaborative learning environment. *Video Journal of Education & Pedagogy*, 1(5), 2–15.
43. Pozas, M., & Letzel, V. (2023). "Do you think you have what it takes?" exploring predictors of pre-service teachers' prospective ICT use. *Technology, Knowledge and Learning*, 28(2), 823-841.
44. Prestridge, S. (2012). The beliefs behind the teacher that influences their ICT practices. *Computers & Education*, 58(1), 449–458.
45. Renninger, K. (1990). Children's play interest, representation, and activity. In R. Fivush & J. Hudson (Eds.), Knowing and remembering in young children (pp. 127–165). Cambridge University Press.
46. Rogoff, B. (2003). *The cultural nature of human development*. Oxford University Press.

47. Sasota, R. S., Cristobal, R. R., Sario, I. S., Biyo, J. T., & Magadia, J. C. (2021). Will–skill–tool (WST) model of technology integration in teaching science and mathematics in the Philippines. *Journal of Computers in Education, 8*, 443-464.
48. Serafini, F. (2012). *Reading the visual: An introduction to teaching multimodal literacy*. Teachers College Press.
49. Silvia, P. (2006*). Exploring the psychology of interest*. Oxford, UK: Oxford University Press.
50. Suhr, K. A., Hernandez, D. A., Warschauer, M., & Grimes, D. (2010). Laptops and fourth-grade literacy: Assisting the jump over the fourth-grade slump. *Journal of Technology, Learning and Assessment*, 9(5), 1–45.
51. Suhr, K. A., Hernandez, D. A., Warschauer, M., & Grimes, D. (2010). Laptops and fourth-grade literacy: Assisting the jump over the fourth-grade slump. *Journal of Technology, Learning and Assessment*, 9(5), 1–45.
52. Sung, Y. T., Chang, K. E., & Yang, J. M. (2015). How effective are mobile devices for improving student learning? A meta-analysis. *Educational Research Review, 16*, 68–84.
53. Thang, S. M., Nambiar, R. M. K., Wong, F. F., Jaafar, N. M., & Amir, Z. (2015). A clamor for more technology in universities: What does an investigation into the ICT use and learning styles of Malaysian 'digital natives' tell us? T*he Asia-Pacific Education Researcher*, 24(2), 353–361.
54. Trowler, V. (2010). *Student engagement literature review*. The Higher Education Academy.
55. Vaataja, J. O., & Ruokamo, H. (2021). Conceptualizing dimensions and a model for digital pedagogy. *Journal of Pacific Rim Psychology*, 15.