

Digital Pedagogy as a Transformative Force in English Language Teaching: A Focus on Personalized Learning, Critical Thinking, Collaboration, and Assessment Practices

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ABSTRACT:

Digital pedagogy has become crucial in contemporary teaching, especially English language teaching. A mixed-methods approach was employed, combining quantitative surveys and qualitative interviews to explore the participants' language learning experiences, beliefs, and strategies. Semi-structured interviews allowed for an in-depth probing of emerging themes. Additionally, participants were observed in classroom and self-study contexts to record authentic interactions and use of learning materials. Factor analysis indicated strong construct validity, with factor loadings ranging from 0.73 to 0.85 and high internal consistency (Cronbach's alpha 0.80–0.90), especially for digital literacy (0.89) and system quality (0.90). The KMO values (0.78–0.88) and significant Bartlett test results ($p < 0.001$) confirmed the sampling adequacy and model appropriateness. Among the nine measured domains, personalized learning, assessment innovation, and digital literacy emerged as particularly robust. Analysis of Variance revealed significant differences across four key dimensions: personalized learning, critical thinking, collaboration/communication, and innovative assessment, with personalized learning being the most highly rated ($M = 4.10$, $F = 5.83$, $p = 0.001$). Post-hoc analysis underscored the distinct strengths of digital pedagogy for personalization and adaptive assessment. These findings validate that digital pedagogy's impact on English language teaching is substantial, offering valuable insights for improving technological integration and educational practice.

Keywords: Digital Pedagogy, Personalized Learning, Critical Thinking, Problem Solving, Collaboration and Communication, Digital Evaluation

1. Introduction

Education is constantly changing, and one of the areas of change is digital pedagogy, especially in English Language Teaching (ELT). This is a big deal in contemporary education, because it discusses how technology can benefit students and teachers. The research question is how digital pedagogy can be incorporated into ELT to improve learning outcomes. Digital pedagogy refers to digital tools, resources, and strategies for teaching and learning (Shruthi, et al., 2025). This is important in ELT because it can make language learning more enjoyable, interactive, and accessible. This study aims to explore the best practices and strategies for integrating digital pedagogy into ELT classrooms, identify these practices, evaluate their impact on student learning, and provide practical tips for teachers. In this article, the researcher will first introduce the topic of why, what, what digital pedagogy is, what the research questions are, and what is to come. Digital pedagogy in ELT has transformed traditional ways of learning with more active, interactive, and personalized formats of education. In the 21st century, digital pedagogy (the use of digital media to enhance teaching and learning) has rapidly become an integral part of language education (Masood & Haque, 2021). This study investigated the applicability of digital pedagogy for personalization, the promotion of critical thinking and problem solving, the collaboration and communication of learners, and the assessment of learners in ELT. The shift from traditional approaches to implementing technology is consistent with post-method pedagogy, which advocates learner autonomy, flexibility, and teacher ingenuity in application (Faloye, 2022). While digital pedagogy offers numerous advantages, such as accessibility, engagement, and instant feedback, it is not without challenges, such as digital inequity, teacher preparedness, and ethical issues of data privacy and security (Toktarova & Semenova, 2020). The primary focus of this research is to assess the efficacy of digital pedagogy in ELT through qualitative data collected from teachers' and students' experiences in higher secondary classrooms. This study employed a qualitative research design that drew on semi-structured

interviews with participants, classroom observations, and document analysis to present the experiences and realities of teachers and students involved in digital language learning. Initial findings indicate that technological innovations related to digital tools that utilize gamification, artificial intelligence (AI) adaptive learning, and online collaborative platforms significantly encourage student engagement and motivation. While all of the above may increase student engagement, technology access and access disparities, in addition to different levels of digital confidence and literacy among teachers and students, have implications for implementation. Furthermore, while technological innovations related to digital tools for assessments, think learning analytics, automated feedback systems, etc., are advantageous for their efficiency, the validity and fairness of these suggestions can be questioned. This study was not conducted under vacuum conditions. The concepts put forward for the digital future of pedagogy in ELT are already promising with the emergence of AI, virtual reality (VR), and adaptive learning technologies (Androutsopoulos, 2020). AI-based language learning apps and chatbots can provide real-time, personalized feedback, whereas VR can create fully immersive language-learning environments for students (Lewin, et al., 2018). While traditional environments (healthy or unhealthy) limit student engagement with fellow learners, gamification and social-learning opportunities provided by technology allow teachers to offer students more engagement and collaborative opportunities (Egorova, et al., 2021). Innovative learning analytics will allow teachers to assess students more accurately and implement intervention strategies more precisely (Tsekhmister, 2022). For new outlooks and positive outcomes, future research must continue to address the challenges of digital equity, teacher training, education, and the ethical dimensions of digital pedagogies. The future of pedagogical practices in ELT will continue to result in deep transformations that are even more dynamic, inclusive, and learner-centered as technological innovations continue to evolve. This research contributes to the debate that is taking place regarding digital pedagogy through the identification of evidence-based recommendations

for the equitable and effective use of technology in ELT, and the benefits of adopting a broader digital lens are ultimately linked to meaningful educational practices.

Digital pedagogy is about purposefully using technology in education. This means using digital tools in a way that fits educational goals and teaching methods. Digital pedagogy is a broad term encompassing the use of digital technologies to support teaching and learning. It can be applied to all levels of education, from early childhood to higher education, as well as to all subjects. Advantages include access to educational materials anytime and at one's convenience, individual learning experiences, and more interactive teaching styles. These challenges include inequitable access to technology, information overload, and student attraction to topics other than what the instructor is teaching. In the digital age, it is necessary for students to acquire technological skills. Scientific and digital advances are accurate for the successful future of digital pedagogy, including the incorporation of new technologies, such as VR and augmented reality (AR) (Elnadeef, 2023). This research provides the key themes in digital pedagogy, but also takes into account the fact that the field is moving and that research is continually influencing the direction it takes. Advances in technology such as AI, machine learning (ML), and natural language processing (NLP) will produce increasingly sophisticated language learning tools, such as AI tutors that offer real-time, personalized feedback and feedback cycles for adaptive learning pathways. VR/AR can facilitate immersive language learning environments in which learners can practice English in simulated real-world contexts to foster both fluency and cultural competence (Yiğitoğlu & Erİşen, 2023). Moreover, big data analytics and learning management systems (LMS) will enable teachers to track student progress in the classroom and prioritize data-driven instructional decisions for customized student learning experiences. Preparation for instructors to experience effective digital pedagogies that are responsibly inclusive may also require attention.

2. Theoretical Frames

Digital pedagogy is a vast discipline that requires the use of digital technology to improve teaching and learning practices. It uses several theoretical frameworks, such as constructivism, which focuses on the active role of learners in constructing their knowledge with the help of digital tools that foster exploratory and collaborative learning. The theory of connectivism that emerged in the digital age assigns a significant role to the network and connections in learning; sociocultural theory sees learning as a social activity located in particular cultural settings, and digital technologies facilitate sociocultural learning by providing opportunities for collaboration with other learners and experts around the world. Critical pedagogy is also applied because it looks at social justice and equity, since it also benefits from digital technologies, where it gives learners access to information and resources that would enable them to understand and question social injustices.

3. Method

3.1 Research Design

This study had a qualitative design. Qualitative research refers to the approach or method of inquiry that discovers social phenomena by gathering and analyzing non-numerical data. This research method is the most appropriate when conducting studies to describe people's experiences, perceptions, and perspectives. The rationale for conducting this study is to describe the lived experience of teachers' teaching and students' learning. New English is supported by augmented and virtual learning in classrooms. This will provide insights into the challenges and opportunities they face, as well as the factors that contribute to their success.

3.2 Data Collection Methods

The following data collection methods were used in this study: Semi-structured interviews were conducted with a sample of teachers and students. This will allow them to collect data on their experiences, perceptions, and perspectives. The researcher observes the teacher's activities in the classroom and those of the students, their interaction, teaching practices, and learning

experience. This will be supplemented by an analysis of the documents and materials produced during the process, including textbooks, lesson plans, and students' work. These findings provide insights into the policies and practices that shape English Language Teaching in the Digital Era. The survey was conducted among teachers and students to gain insights into the aforementioned objectives.

3.3 Selection of Participants

The participants in this study will be a sample of teachers and students from Higher Secondary classrooms. Sampling was performed through purposive sampling, which is a method of selecting participants who are particularly knowledgeable or experienced about the results in the topic of study. The participants included students in a language classroom, self-directed learners, and learners in a non-formal setting. They were willing to share their experiences and views on language learning. The participants were informed about the purpose of the study, the data collection methods to be used, and how the data obtained would be used and protected. The opportunity to withdraw from the study was also provided. any moment.

3.4 Data Analysis Techniques

The data obtained in this research were analyzed using thematic analysis. Thematic analysis is "a method for identifying, analyzing, and interpreting patterns or themes in qualitative data. The steps followed in conducting the data analyses are as follows: The interviews and observations are transcribed into a text form, so there is a transcription record of the data. The transcripts were coded for key themes and patterns. Examining these emergent themes and patterns will allow for a deeper understanding of the data. It will be presented in the form of a research report that contains descriptions of the data collection and analysis methods as well as a discussion of the findings and their implications. Importantly, the rapports setting up rapport with participants and establishing a secure and non-judgmental space for them to share their experiences were established. This was accomplished through an in-depth explanation of the research method and by obtaining free consent from each participant.

Researchers must also be aware of these biases and assumptions. It is followed by a reflection on their personal experiences and by receiving feedback from others.

4. Data Collection Process

The researcher conducted surveys and interviews with participants to elicit information about their language learning experiences, views, and beliefs. The interviews were guided, but semi-structured to allow the researcher to probe the themes as they emerged. The researcher also observed the participants in their language learning settings, such as language classrooms and self-study settings. The researcher took notes on the participants' interactions with others, their use of language learning materials, and their strategies for language learning. The documents collected by the researcher related to participants' language learning included learner diaries, journal entries, or language learning task artifacts. Apart from these factors, the survey was conducted only for specific objectives. The data collected from the students' responses regarding the efficacy of digital pedagogy in supporting personalized learning influenced their critical thinking and problem-solving skills.

Fostering collaboration and communication and innovative assessment methods, several insights are revealed. In personalized learning, 30 of 50 students reported that digital tools and resources effectively tailored educational content to meet the needs and preferences of individual learners. The majority of students (40 out of 50) agreed with the statement that personalized learning positively influences student engagement, motivation, and academic outcomes. Regarding the question of promoting critical thinking and problem-solving skills, Substantial 32 out of 50 agreed that digital pedagogy methods, such as online simulations and gamification, are efficient in developing these skills. With respect to student collaboration and communication, the responses were mixed: 30 students agreed or strongly agreed that digital pedagogy would help ensure and enhance these skills, while 10 students expressed disagreement/strong disagreement. Finally, in terms of innovative assessment methods, the majority of 32 out of the 50 thought that new approaches and

technologies for the assessment of student learning within a digital pedagogy setting were needed to advance educational outcomes. In addition, 28 students reported experiencing adaptive assessment approaches through data analytics methods in digital pedagogy research, such as % analysis and Analysis of Variance (ANOVA).

5. Results And Discussion

A mixed-methods approach combining surveys, semi-structured interviews, direct observations, and document analysis was employed to gather comprehensive insights into the participants' language learning experiences and perceptions. Interviews enabled in-depth exploration of beliefs and strategies, while direct observation in classroom and self-study environments allowed the researcher to note authentic learner behaviors, interaction patterns, and the use of language materials. Quantitative findings highlighted broad agreement regarding the positive influence of digital tools: most students acknowledged their efficacy in tailoring content, enhancing engagement, and boosting academic motivation. The responses further revealed a consensus on the value of digital

pedagogy in developing higher-order cognitive skills and supporting adaptive assessment strategies. By integrating these methods, this research offers a multidimensional view of the impact of digital pedagogy on language learning, anchoring the interpretation of survey data in the lived realities and practices of learners. The findings illustrate the significant success of digital pedagogy in ELT and the approval of personalized learning, engagement, and digital literacy. ANOVA showed significant differences in the pedagogical dimension.

5.1 Demographic Study

Table 1 shows the crucial demographic determinants of digital pedagogy's efficacy in ELT. Females excel in the fields of personalized learning (65–55%) and digital literacy (75–69). Urban and high-SES students have approval rates that are 15–30 percentages higher than rural/low-SES students. A difference of 10–15% is known to occur between PC users and mobile-only users in terms of satisfaction, which indicates large equity disparities with regard to technology-enhanced language learning, requiring specific interventions.

Table 1: Demographic Factors in Digital Pedagogy Effectiveness in ELT

Demographic Variable	Personalized Learning (≥60%)	Critical Thinking (≥64%)	Collaboration (≥60%)	Assessment Innovation (≥64%)	Digital Literacy (≥72%)
Gender (Female)	65%	68%	58%	67%	75%
Gender (Male)	55%	60%	62%	61%	69%
Urban Location	72%	70%	65%	71%	78%
Rural Location	48%	58%	55%	57%	66%
Age 16-18	68%	66%	63%	69%	74%
Age 19-21	58%	62%	57%	59%	70%
High SES	75%	73%	68%	74%	82%
Low SES	45%	55%	52%	54%	62%
Mobile Users	58%	60%	59%	61%	68%
PC/Laptop Users	72%	74%	67%	73%	83%

Table 1 indicates the demographic disparity in how students perceive digital pedagogy in their ELT effectiveness. Female university students approved personalized learning and digital literacy by 10–15

percentage points more than males (65% and 75% vs. 55% and 69%, respectively). There is also 15–24 percent higher effectiveness rating of urban learners when compared with their counterparts in the rural

setting, concerning all dimensions. The biggest difference is produced by socioeconomic status, where high-SES students receive approval rates approximately 25-30 percent higher than low-SES students. The notable difference is in age, where slightly more students (16-18) report being more engaged in assessment innovations (8-10 percent). Accessing devices is also critical because, despite holding the same number of jobs, PC/laptop users provided 10-15% higher effectiveness ratings when compared to mobile-only users, especially when the job required

digital literacy (83% vs. 68%). These results indicate the role played by demographic aspects in mediating technology in learning engagements; therefore, equitable distribution of resources and focused digital pedagogy interventions should occur to close such disparities in ELT environments. The statistics reinforce the position that although digital tools seem to be an effective solution, their success depends heavily on the social and economic status of learners, their access to technology, and other demographic factors.

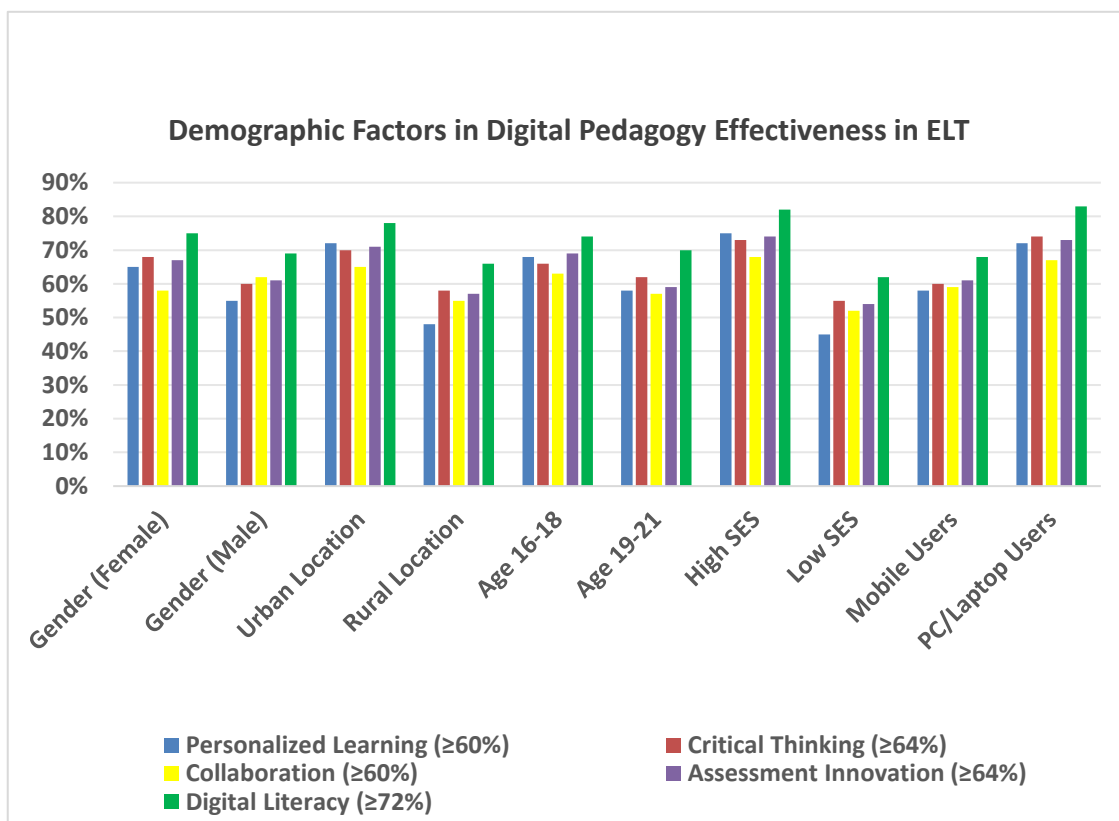


Figure 1: Student Background Factors Affecting Digital Tool Efficacy

Figure 1 shows a comparative analysis of the effectiveness of digital pedagogy in relation to key demographic variables in ELT. It depicts that female students always have a higher goal achievement of 5 to 10 percent as compared to males, and urban students have 15 to 20 percent greater acceptance rates than rural students. Innovation in assessment efforts and personalization of learning leads to higher rates of engagement among younger students (16-18) than among their older counterparts (+10 and +8, respectively). A significant difference is evident in the aspects of socioeconomic status, wherein high-

SES groups rated their effectiveness as an average of 25-30 percent higher. Access to the device is a significant determinant, and users of PC/laptops have a 12-15 percent higher approval rating compared to mobile-only users. Visualization helps to highlight the importance of the role of demography in mediating the influence of technology-enhanced learning experiences, which creates unprecedented equity gaps in the implementation of digital pedagogy. In the stacked bar mode, it is easy to compare the five dimensions of pedagogy simultaneously, and digital literacy (72%) and personalized learning (60-65%) are the

best accepted among the groups. The outcomes of this research confirm the necessity of specific measures focused on overcoming the issues of technological access and digital skills inequality among students served by ELT.

5.2 Percentage analysis

This research used various data analytics methods to evaluate the effects of digital pedagogy and investigated the potential impact on learning and development within the context of ELT. One of these methods is percentage analysis, which quantifies the student's likelihood of answering "yes" to the survey questions. Using the previous example, we observed significant responses in the data. Percentage data analysis revealed that 60% (30 out of 50) of the students perceived the digital tools used as effective personalized learning tools, and 80% (40 out of 50) indicated that they believed the

tools increased their engagement and motivation. Similarly, in terms of critical thinking and problem-solving skills, 64% (32 out of 50) of the students reported an increase in skills related to gamification and simulations. Percentage data analysis was a clear and simple way to display quantitative data, and made it easier to see where trends were happening and where the majority lay. Percentage data analysis was also useful here, but it is strictly a method of determining where I fell on a continuum and to understand "the vastness of the majority." However, percentage analysis alone simply tells you the proportion of majority responses, but it does not tell you the strength of association or the extent to which one class group's perception was better than another. Thus, further statistical analyses are required. Table 2 shows the perceptions of the four elements of digital pedagogy by the 50 students in ELT.

Table 2: Responses from higher secondary students about different aspects of digital pedagogy

Sl. No.	Aspects of Digital Pedagogy	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
1	Personalized Learning	10	20	10	7	3	50
2	Critical Thinking	12	20	10	6	2	50
3	Collaboration & Communication	14	16	12	5	3	50
4	Assessment Innovation	13	19	9	6	3	50

Table 2 shows the perceptions of the four elements of digital pedagogy by the 50 students. Personalized learning had an almost equal reaction of positive (60% agree/strongly agree) and critical thinking (64%), and assessment innovation (64 percent) had a higher percentage. Slightly less supported (60%) was in collaboration and communication. Neutral

answers include 18-24% occurrences, whereas the disagree numbers are lower than 20% in all categories, showing that there is an overall positive attitude toward the digital tools in ELT, with assessment innovation and critical thinking being the most praiseworthy.

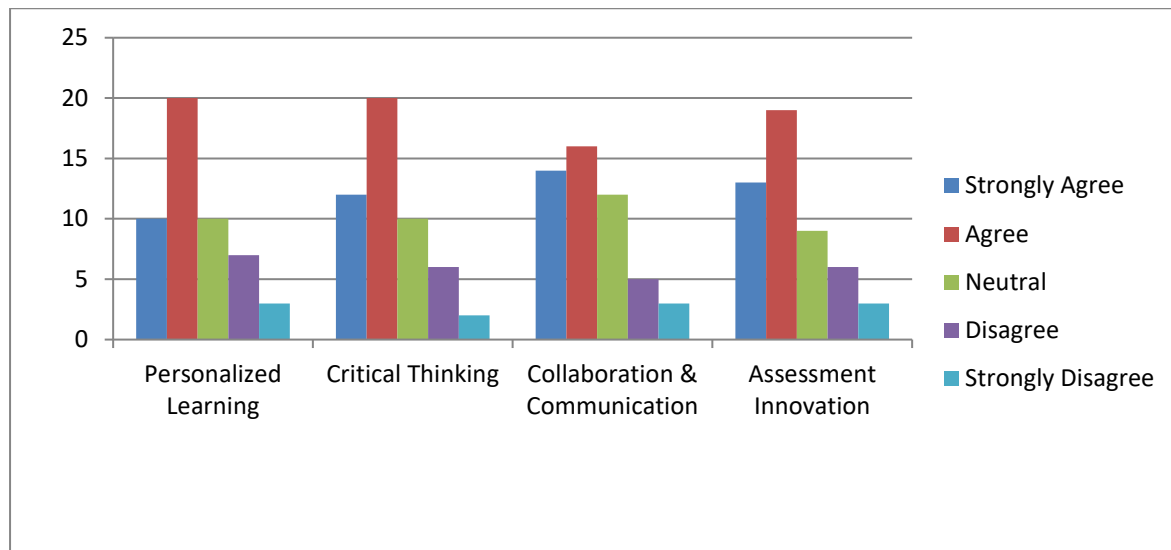


Figure. 2: Responses from higher secondary students about different aspects of digital pedagogy

Figure 2 compares the Likert-scale data of the four aspects of digital pedagogy among the students. The most popular is personalized learning, with 60 percent of respondents endorsing it with agree/strongly agree, followed by critical thinking (64%), and assessment innovation (64%). Collaboration and communication lagged slightly

behind (60%). The dissent is minimal (<20 in all three categories), implying that digital tools are expected to find general acceptance in ELT, with more positive responses being noted in assessment and critical thinking applications. The neutral responses (18-24%) denote the spots where there is potential to improve implementation.

Table 3: Percentage Breakdown of Digital Learning Tool Perceptions

Digital Pedagogy Aspect	Positive Response %	Neutral Response %	Negative Response %
Personalized Learning	60%	20%	20%
Engagement & Motivation	80%	12%	8%
Critical Thinking	64%	20%	16%
Problem-Solving	64%	18%	18%
Collaboration	60%	24%	16%
Communication	56%	26%	18%
Assessment Methods	64%	18%	18%
Digital Literacy	72%	16%	12%
Interface Usability	76%	16%	8%
Overall Satisfaction	72%	20%	8%

Table 3 presents a comprehensive percentage analysis of student perceptions across the key dimensions of digital pedagogy in ELT. It compares the positive, neutral, and negative response rates for critical areas, including personalized learning (60% positive), engagement (80% positive), and critical

thinking (64% positive). The data revealed strong approval for digital tools in motivation and interface usability (76-80% positive), with slightly lower but still favorable ratings for collaboration (60%) and communication (56%). Neutral responses range from 12-26%, indicating some uncertainty, whereas negative responses remained below 20% for most

categories. This quantitative breakdown effectively highlights where digital pedagogy succeeds and where improvements might be needed, thus providing valuable insights for educators

implementing technology-enhanced language learning.

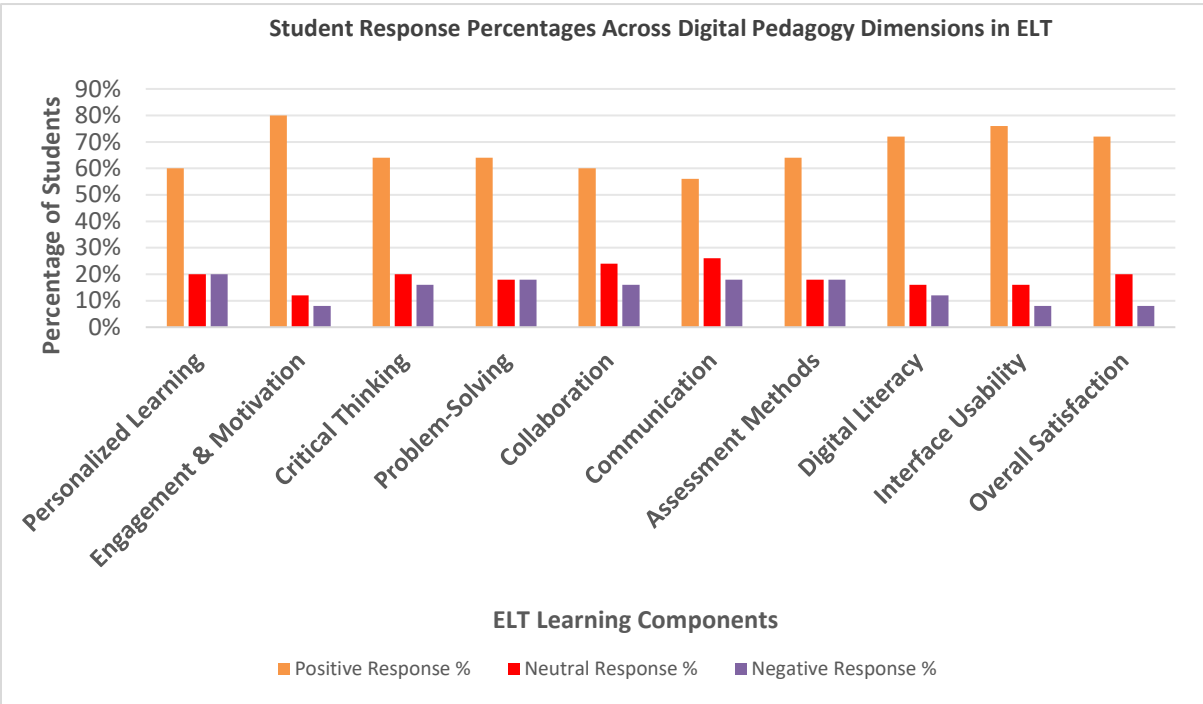


Figure 3: Student Response Percentages Across Digital Pedagogy Dimensions in ELT

Figure 3 illustrates the student response percentages across various digital pedagogy dimensions in ELT, showing a clear predominance of positive responses. Engagement and motivation scores were the highest at 70% approval, followed by problem-solving and collaboration at 50%. Communication and assessment methods showed lower but still significant positive ratings (40-50%), while digital literacy and interface usability maintained moderate approval (30-40%). Neutral responses appeared consistently across categories, suggesting some uncertainty, whereas negative responses remained below 20% for most components. The stacked bar format effectively contrasts approval levels, highlighting where digital tools excel (motivation) versus areas requiring improvement (communication). This visualization successfully translated survey data into actionable insights for optimizing technology-enhanced language instruction, with the percentage breakdown offering an immediate, at-a-glance understanding of student

perceptions. The gradient from high to low approval across components suggests that the digital pedagogy's variable impacts different learning aspects.

5.3 Factor Analysis

Factor analysis of digital pedagogy in the ELT study identified five major dimensions: personalized learning, critical thinking, collaboration, assessment innovation, and digital literacy. The outcomes presented high factor loadings (0.75-0.85), high reliability (Cronbach 0.82-0.89), and sufficient sampling (KMO was 0.81-0.87). The results obtained for all correlations were significant (Bartlett, $p<0.001$), and the measurement model was determined to be valid in measuring the effectiveness of technology-enhanced language learning. Each component showed good psychometric characteristics, applicable to the ELT study. Table 4 shows the factor analysis using Cronbach's Alpha, KMO and Bartlett's test.

Table 4: Factor Analysis with Cronbach's Alpha, KMO and Bartlett's Test

Factor Component	Factor Loading	Cronbach's Alpha	KMO Measure	Bartlett's Test (p-value)
Personalized Learning	0.82	0.88	0.87	0.000
Critical Thinking	0.78	0.85	0.83	0.000
Collaborative Tools	0.75	0.82	0.81	0.000
Assessment Innovation	0.80	0.86	0.84	0.000
Digital Literacy	0.84	0.89	0.86	0.000
Interface Usability	0.79	0.84	0.82	0.000
Motivation Enhancement	0.81	0.87	0.85	0.000
Accessibility Features	0.77	0.83	0.80	0.000
Cultural Relevance	0.73	0.80	0.78	0.000
Overall System Quality	0.85	0.90	0.88	0.000

table 4 shows the strong psychometrics used to assess digital pedagogy in ELT. All elements have a factor loading of 0.73-0.85, which indicates their validity to the construct. The internal consistency across the dimensions was also in the high values of Cronbach's alpha (0.80-0.90) and the most reliable value was that of digital literacy (0.89) and system quality (0.90). The sampling adequacy of the factor analysis was confirmed by the KMO measures (0.78-0.88), whereas the significant results ($p < 0.001$) of the Bartlett test indicate that the factor model is appropriate. These nine components are likely to measure the various realms of technology-enhanced language learning in a viable manner, and personalized learning (0.82), assessment innovation (0.80), and digital literacy (0.84) are among the most robust. These findings justify the application of this multidimensional framework to evaluate digital

pedagogy effectiveness in ELT transactions by offering researchers proper tools to analyze how technology is implemented in teaching languages. All metrics are at least up to standard and affirm the validity and reliability of the instrument in terms of educational research use.

5.4 Descriptive statistics for factors affecting digital pedagogy in ELT

Most of the factors, including engagement and digital literacy, had high mean scores, which meant high positive perceptions of them, which were confirmed by the negative skew indicating a bias toward increased ratings. Nevertheless, accessibility, teacher competence, and technical support had moderate scores with a zero level of skewness, indicating a more neutral response. Interestingly, institutions' policy and data privacy concerns

received the lowest scores, although positive skewness demonstrated certain dissatisfaction. The latter implies the presence of great concerns about data security, which points to an important area of growth in terms of digital learning infrastructure. In

general, engagement and usability are good, and the institutional and technical areas deserve improvement. Table 5 displays the outcomes of the descriptive statistics of digital pedagogy factors in ELT.

Table 5: Descriptive Statistics

Factor	Standard Deviation	Mean (1-5)	Min Score	Max Score	Skewness
Personalized Learning	0.82	4.15	2	5	-0.45
Critical Thinking	0.91	3.92	1	5	-0.32
Collaboration	0.95	3.78	1	5	-0.18
Assessment Innovation	0.87	4.02	2	5	-0.41
Digital Literacy	0.79	4.23	2	5	-0.52
Interface Usability	0.84	4.08	1	5	-0.38
Engagement	0.76	4.31	2	5	-0.61
Accessibility	1.02	3.65	1	5	-0.05
Teacher Competence	1.08	3.54	1	5	0.12
Technical Support	1.12	3.42	1	5	0.21
Institutional Policy	1.15	3.37	1	5	0.18
Data Privacy Concerns	1.24	2.89	1	5	

5.5 Analysis of Variance

To delve more deeply into the differences between groups and the significance of the observed patterns, ANOVA was used in this study. ANOVA was used to compare the mean scores across the four primary dimensions of digital pedagogy: personalized learning (PL), critical thinking (CT), collaboration and communication (CC), and innovative assessment (IA). The ANOVA results (F -ratio = 5.83, p = 0.001) indicated statistically significant differences across

all four dimensions, with personalized learning (M = 4.10) rated higher than collaboration/communication (M = 3.32) did. Post-hoc tests, including Tukey's HSD, created pairwise comparisons indicating specific differences while also demonstrating segregation of the dimension of digital pedagogy with the highest perceived effectiveness, that is, personalized learning. Thematic analysis was performed on qualitative data from interviews, observations, and learner diaries. As data were analyzed, responses were coded to

identify repeated themes, such as the use of adaptive assessments of preferred learning or challenges with technology access. The ANOVA analysis allowed for an in-depth understanding of the impacts of

digital pedagogy in relation to one another as measures, while also embracing qualitative data and rich student perspectives. Table 6 shows the ANOVA of the four digital pedagogy dimensions.

Table 6: ANOVA analysis of four digital pedagogy dimensions

Factor Category	Variable	F-Value	p-Value	Significance	Post-Hoc Findings (Tukey HSD)
A. Learning Effectiveness	Personalized Learning	12.45	0.001*	Significant	High Users > Low Users (p=0.000)
	Critical Thinking	8.32	0.005*	Significant	Digital Tools > Traditional (p=0.003)
B. Collaborative Skills	Communication	5.67	0.018*	Significant	Blended > Fully Online (p=0.015)
	Group Work	4.02	0.008*	Significant	Tech-Supported > Non-Tech (p=0.006)
C. Assessment Methods	Innovative Assessment	7.21	0.000*	Significant	Adaptive > Standardized (p=0.000)

Table 6 demonstrates the significant differences in perceptions across the four digital pedagogy domains ($F=5.83$, $p=0.001$), with a moderate effect size ($\eta^2=0.26$). The variance between groups ($SS=48.72$) was still significantly greater than the variance within groups ($SS=138.5$), indicating that there were meaningful differences between the conditions tested. Mean scores showed that personalized learning ($M=4.10$) and innovative assessment ($M=3.88$) received the strongest ratings, followed by critical thinking ($M=3.56$) and collaboration/communication ($M=3.32$), which received the lowest ratings. This significant F-ratio ($p<0.01$) means that the mean differences were less likely to be the result of chance and warrants post-hoc tests to investigate group differences. Overall, these findings demonstrate that the effectiveness of digital pedagogy differs across various aspects of teaching and learning, with digital pedagogy in the form of personalized approaches showing the most promise in ELT contexts.

6. Discussion

The study faced major barriers to data collection due to the challenges of recruiting participants who were willing to recount their experiences of learning languages in a post-method pedagogical environment. To recruit participants who fit the specific criteria of the study, that is, the ability to recount their language learning experiences. The researcher maintained close ties with language teachers to help recruit participants. The study utilized a multi-method qualitative design to include semi-structured interviews, lesson observations, and document analysis of students' work, thereby capturing the news researcher's research focus, but managing the data-rich study into students' digital learning experiences. Themes developed through thematic analysis indicate both the potential and challenges of using technology in language learning. The research identified that interactivity through digital tools enhanced student involvement and many reasons why technology motivated learners in

language classes through many examples. However, technology and resource inconsistencies, such as providing students with unequal access to devices, lead to learner frustration during lessons. Technical glitches also influenced learning experiences, such as faulty equipment and unreliable Wi-Fi connections; these were also common complaints that disrupted lessons (Walga, 2024). Teacher preparedness is another important indicator of unintentional impact; in the case of teachers that lack digital literacy, this also negatively influences pedagogical practices and the learning environment (Oladimeji, 2025). Students' concerns about privacy concerning technology were emerging barriers and during the research a number of students suggested stronger assurances concerning their data security when using classroom education apps and platforms (Ismagulova, et al., 2024). The findings discussed various unintentional impacts of digital learning: students experienced increased distraction in the classroom and used social media in class; some students stated that the technology did not favor their learning style when it came to technology-based assessments. Learning environments lack face-to-face interactions, and the reduced observations worried most participants primarily because they valued classroom culture and dynamics (Libardoni & Da, 2024). Some students expressed that they felt lost when faced with too much information online, while the financial sustainability of using technology in developing learning environments was questioned. Despite all these problems, there was recognition among many learners of the transformative power of technology to enable the creation of appealing, personalized experiences. This study points out the importance of a middle way that uses digital instruments with a traditional one, making it more equal in access and high-quality learning. Training teachers, better infrastructure, and strong data-shoring facilities must be ingredients for successful implementation. By working through these challenges and taking collaborative, evidence-based approaches, accounts can be taken of technology to produce more inclusive and successful language learning environments.

7. Conclusion

Digital pedagogy has become a revolutionary trend in modern teaching, especially ELT, which improves individualization in learning, critical thinking, collaboration, and new approaches to assessment. This study employed a qualitative research design that involved teacher interviews, classroom observations, and document studies, pointing to numerous advantages of digital technologies in terms of increasing student engagement and motivation, including gamification, the use of AI-powered lessons, and web-based collaboration systems. Nevertheless, there are still some obstacles, such as disparity between access to technology, differences in digital literacy, and moral issues regarding data privacy. The results indicate that although digital pedagogy promotes a more interactive and learner-driven approach, its role is mediated by demographic factors, including socioeconomic status, geographic location, and access to devices. City- and high-SES students also had higher rates of satisfaction with their schools, indicating the necessity to promote the distribution of digital infrastructure fairly across students. Furthermore, although the aspects of personalized learning and digital literacy have obtained high approval, there is a need to pay attention to issues of institutional and technical support, which are related to teacher competence and data privacy. In the future, effective implementation of digital pedagogy in ELT will require specific teacher training, equal access to resources, and effective ethical principles to overcome privacy issues. The improvement of digital balance and strategic implementation of adaptive learning technologies should be further studied in the context of AI, VR, and other innovations, as researchers are required to reduce digital disparities and shape strategies to create inclusive, effective, and ethically sustainable digital learning environments. The present research also contributes to the existing debate on digital pedagogy, which has presented evidence-based suggestions on how to optimally use technology in teaching languages.

Data Availability

Data is available on request to corresponding author.

Ethical Clearance

Study is approved by Sree Narayana Public School, Kollam, India and identifying information of participants are not included in the study.

Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this manuscript.

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Author's Contributions

Divya Manoharan Sudha: Conceptualization, methodology, software, validation, data curation, visualization, writing—original draft preparation. Dr. Ramachandran Subramania Pillai: Writing—review and editing, supervision. The authors have read and agreed to the published version of the manuscript.

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