
| RESEARCH ARTICLE

An Evaluation of the Use of Emerging Technology in Teaching English at the University Level in India

Sania Rizwan¹, Zeba Quamer², Aafrae Garmate³ ✉ and Sabeeha Naz⁴

^{1,2,4}Language Instructor, Department of Foreign Languages, Jazan university, Saudi Arabia

³Lecturer, Department of Foreign Languages, Jazan University, Saudi Arabia

Corresponding Author: Aafrae Garmate, **E-mail:** Aafrae.garmate@gmail.com

| ABSTRACT

The current digital era has brought about a rapid advancement in technology, particularly in the areas of big data processing and artificial intelligence. This has had a profound effect on pedagogy and educational processes, including strategies for teaching and learning foreign languages (FL). In this study, a quantitative analysis delves into the realm of emerging technologies employed in teaching English at the university level in India, engaging a robust sample size of 600 participants. Employing a multifaceted approach, the study utilizes inferential statistical techniques, including t-tests and regression analysis, to discern correlations and trends within the data. Complementing this, descriptive statistics are employed to meticulously evaluate questionnaire responses, offering a holistic overview of the research landscape. With two independent variables and four dependent variables under scrutiny, the study undertakes a nuanced exploration of the interplay between technological interventions and English language education outcomes. The collected data undergoes rigorous statistical scrutiny through the Statistical Package for the Social Sciences (SPSS), enabling a comprehensive understanding of the intricacies involved. This research not only contributes to the burgeoning field of educational technology but also holds significant implications for pedagogical practices in the Indian university context, shedding light on the potential impact of innovative approaches to English language instruction.

| KEYWORDS

Quantitative analysis, T-tests, Regression analysis, Statistical Package for the Social Sciences.

| ARTICLE INFORMATION

ACCEPTED: 02 April 2025

PUBLISHED: 08 May 2025

DOI: 10.32996/jhsss.2025.8.5.7

1. Introduction

The modern digital era and its burgeoning technological advancements, especially the most recent developments in artificial intelligence and big data processing (Negoescu & Bratu 2016), have had an unparalleled impact on educational processes and pedagogy (Horwitz 1995), including methods and tactics for teaching and learning foreign languages (FL) (Moeller & Catalano 2015). The current generation of graduates, known as Generation Z, is distinguished by their familiarity with digital technologies and their aptitude for technology (Rivera 2019). Generation Alpha, whose members are defined as always connected, capable of making independent judgments based on technology use (Hawamdeh & Soykan, 2021), and able to control their digital identities or appearances, will soon overtake them. Because technology is now an essential part of the lives of the current generation and because language learning environments (Jobeen *et al.* 2015) are no longer limited to traditional or formal school settings, foreign language education nowadays is typically, or should be, technology-based (Yukselturk *et al.* 2018).

Given that they must meet the educational demands of both generations, foreign language instructors have a significant problem in incorporating various technologies into their classrooms (Anyushenkova *et al.* 2019). But teachers need to embrace modern technology like chatbots and virtual reality to keep up with their technologically savvy pupils and get them interested in learning a foreign language (Nicolaidou *et al.* 2023). Along with analysing these technologies' potential and making use of all of

Copyright: © 2026 the Author(s). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) 4.0 license (<https://creativecommons.org/licenses/by/4.0/>). Published by Al-Kindi Centre for Research and Development, London, United Kingdom.

their advantages, teachers also need to assess which of them may have an influence on their classrooms (Alqurshi *et al.* 2020). In addition, they should evaluate the possible hazards that these technologies might provide (Duraku *et al.* 2020). The additional value of the tools used for the students' learning and learning outcomes must also constantly be taken into account by the teachers, which is a difficult task, as investigating how digital technology may be used in real-world applications with obvious educational results is quite rare (Sutarto *et al.* 2020). It's important to remember that, as the study highlights, FL teachers should encourage students' acquisition of information in diverse learning environments, but they should also strengthen the abilities that seem to be essential (Coman *et al.* 2020) (Geng *et al.* 2019). For the twenty-first century, such cooperation, communication, creativity, and critical thinking talents (Kocak *et al.* 2021). Additionally, to inspire their students to use these technologies in FL learning, teachers themselves need to adopt a positive mindset regarding their own use in FL classrooms and possess 21st-century pedagogical, technological, and subject-matter expertise, such as critical thinking, creativity, communication, or teamwork abilities (Tight 2021) (Haryani *et al.* 2021).

Our goal in this research study is to address the dynamic issues in language education by investigating new technologies for English instruction in Indian colleges. The effectiveness of teaching English may be greatly increased by utilizing cutting-edge techniques, including adaptive learning systems, virtual reality (VR) simulations (Hazarika & Rahmati 2023), and artificial intelligence (AI)-powered language learning platforms (Pokrivcakova 2019) (Rafsanjani & Nabizadeh 2023). AI can recognize unique learning styles, give activities that are specifically designed to narrow language skill gaps, and provide individualized feedback. While adaptive learning systems may dynamically change the curriculum depending on individual development, virtual reality (VR) simulations offer immersive language settings that let students practice real-life communication scenarios. Teachers in India can give university students a more effective and interesting English language learning experience that promotes increased linguistic competency and communication skills by incorporating these technologies into the pedagogical framework.

1.1 Objective in this work

- To determine the impact of emerging technology integration in English language teaching at the university level in India on student performance and learning outcomes
- To determine what new technologies are available now that can be used for English instruction in India.
- To determine what obstacles stand in the way of integrating emerging technology into English language instruction in India.

The following is how the paper is set up: Using recent studies, Section 2 outlines the literature review. A comprehensive discussion of the proposed approach is given in Section 3. Section 4 looked at the findings acquired in the proposed system and compared the results to existing techniques, and Section 5 concludes the paper.

2. Literature review

In the rapidly evolving landscape of education, the integration of technology has become a focal point for enhancing the teaching-learning process. (García-Delgado *et al.* 2023) Conducted a descriptive research study in Spain, evaluating the competency level of 101 instructors using the DigCompEdu Check-in questionnaire. The findings underscored the importance of instructors possessing skills and competencies to effectively integrate evolving technologies into their lessons. In a complementary vein, Criollo *et al.* 2023) proposed an instructional web application designed with Python libraries to facilitate networking equipment setup. This versatile application, adaptable to various learning environments, leverages graphical user interfaces and network automation concepts. Its potential to be used in diverse settings, including classroom, online, hybrid, and flexible learning, highlights the broader impact of technology in teaching network equipment setup. Reflecting on the efficacy of technology integration in teacher preparation, Gunter 2001) emphasized the benefits of a revised pre-service teachers' introduction to technology course. Employing both quantitative and qualitative methods, the study demonstrated statistically significant reductions in student anxiety after completing the Web-enhanced course, highlighting the effectiveness of innovative teaching tactics.

(Onyema 2020) delved into the obstacles hindering Nigerian educators from incorporating modern technology into their curricula. Through structured questionnaires and literature studies, the research shed light on challenges faced by teachers and students in Southwestern Nigeria, offering insights into the barriers preventing widespread technology integration. (Kirkwood & Price, 2013) Critically examined presumptions surrounding the influence of technology on education, emphasizing the need for well-considered research methodologies. They questioned the validity of claims made based on poorly considered techniques and procedures, urging a more rigorous approach to performance comparisons and attitudinal research. From a different perspective, Backhouse 2013) explored factors influencing instructors to experiment with emerging technologies in South African universities. Surveying professors, the study revealed that pedagogical issues, pragmatic concerns, and external imperatives drove instructors to adopt novel teaching and learning tools, showcasing the multifaceted motivations behind technology integration. (McGregor & McGregor, 2009) highlighted the significance of peer interaction in laboratories for overcoming obstacles in engineering and natural sciences. The study proposed that ethicists could achieve significant goals by engaging with

their peers, fostering collaboration, and addressing challenges in the laboratory setting. (Bozalek *et al.* 2013) investigated how South African higher education institutions incorporated new technology for realistic learning experiences. The survey of 265 professionals revealed nine qualities of authentic learning, forming the basis for in-depth interviews to gain insights into the practices of those using new technologies.

(Fowler *et al.* 2019) proposed a pedagogical approach to enhance students' understanding of technology interdependence. By incorporating systems thinking methodologies, the study aimed to bridge the gap between theoretical subjects and practical applications, providing students with a holistic perspective on technology. (Koondhar *et al.* 2021) introduced the P-learning environment concept for educational makerspaces, emphasizing accessibility and collaboration. The study envisioned a fully functional makerspace classroom accessible virtually, enabling students from distant locations to engage in laboratory activities, exchange ideas, collaborate, and conduct experiments, transcending physical limitations.

2.1 Problem statement

Incorporating developing technology into English language instruction at the university level has both advantages and disadvantages. One of the main issues noted is the widespread digital gap among pupils. Even while technology and internet connections may be more readily available in metropolitan campuses, many students from underprivileged or rural backgrounds may encounter difficulties getting access to the gadgets they need and a dependable internet connection. Due to unequal access, emerging technologies are not adopted uniformly, which results in an uneven learning environment where certain students may fall behind because of a lack of resources.

Being prepared for and conversant with developing technology, as teachers and students are, is another big obstacle. Teachers of English may not have received the assistance and training needed to successfully integrate digital resources into their lesson plans. Especially if they come from traditional educational backgrounds, students may find it challenging to adjust to a technology-centric learning environment. This obstacle requires educators and students to participate in extensive training programs that guarantee both parties are not only comfortable with the technology but also capable of incorporating it into the language learning process. Maximizing the potential advantages of new technology in raising the standard of university-level English language instruction requires addressing these problems.

2.2 New Developments in Digital Teaching Technologies

The largest issues in education today are material constraints, subject shortages, equipment shortages, and a lack of possibilities for self-directed learning, which affect instructors in many different nations. Digital technologies are being used by educators to assist in solving these issues and raise the standard of instruction (Frambach *et al.* 2012). The development of online, in-person, blended, and hybrid learning modalities can result from the use of technology in education (Xing & Saghalian, 2022). Because of this, the use of technology in education has the potential to benefit those who live in vulnerable areas, in distant locations, and without access to libraries, teachers, or educational institutions (Ngwacho 2020). Thus, it's anticipated that in the future, the development of fresh, cutting-edge learning settings will be predicated on the utilization of digital technologies. While there are many obstacles facing higher education institutions when implementing digital technology, the new student generations are definitely a plus. The employment of technology in the educational model is facilitated by the new means of knowledge acquisition that digital natives possess due to their improved technical skills. Digital technology has been used to establish activities that support the educational approach. Certain projects employ mobile apps to teach native languages in an effort to protect a nation's culture. Another illustration is the application of augmented reality (AR) in higher education to improve student learning. Immersion learning environments have been created in the educational setting using virtual reality, allowing students to see firsthand how information may be put to use. Because of gamification, the idea of gamification is now applicable to education. This digital technology is being employed in the educational setting with extremely positive outcomes regarding learning since it provides motivation, amusement, and competitiveness.

The usage of a technology, its application, its area, and the level of information about it all influence whether or not it is deemed emergent. One significant feature of these technologies is that, even after extensive usage, they do not require a finite lifespan. When they are applied creatively to help individuals accomplish their goals, they have the potential to emerge. The technologies that are being used in education that promote communication and make it simple to obtain educational resources are known as emerging technologies for education (ELTs). How ELTs are used is fairly varied. For instance, one study suggests that cellphones be used to run educational apps and enhance the standard of instruction. Furthermore, the author suggests that the utilization of mobile learning serves as a means of offsetting the deficiency of infrastructure and the paucity of books and school supplies in the study area. English as a second language is another thing they are used for.

3. Research design

- The research design incorporates a quantitative analysis technology to assess the effectiveness of English teaching at universities in India.
- The research was conducted throughout India, encompassing data collection from various locations across the country.
- The study involved 600 individuals as participants, indicating the sample size.
- The research employed a deliberate sampling approach, implying that the researchers purposefully selected participants based on certain criteria or characteristics.
- This study formulated a comprehensive questionnaire consisting of 20 questions, wherein there were two independent variables, four dependent variables, eight mediating variables, and six moderating variables.
- The data collection method involved the use of a Google Sheet to structure the variables, and random sampling approaches were used to gather the samples, revealing the data collection procedure.
- The research encompassed inferential statistical techniques, such as t-tests and regression analysis, and the collected data were subjected to statistical analysis using SPSS, indicating the software used for data analysis.

3.1 Hypothesis

- **Null Hypothesis (H0):** There is no significant difference in student performance and learning outcomes between classes that use emerging technology and those that do not.
- **Alternative Hypothesis (H1):** Classes that incorporate emerging technology in English language teaching show significant improvements in student performance and learning outcomes.

3.2 Data collection

The incorporation of developing technologies in English language instruction at the university level in India was investigated through a thorough review of the data gathering process. A total of 286 girls and 314 men made up the carefully collected 600 samples. With a gender-diverse sample, we want to offer a comprehensive view of how technology is being adopted and used in education. Particularly when it comes to English language training, the emphasis on cutting-edge technology highlights how dynamic educational methods are. In addition to shedding light on potential gender-specific trends and considerations that may influence educational strategies and outcomes, the research aims to capture a nuanced understanding of how technology is being embraced in the teaching of English at the university level by looking at both male and female perspectives.

4. Result

The discussion covered the creation and analysis of a frequency table to summarize categorical data. Additionally, correlation was explored to assess the strength and direction of relationships between variables. T-tests were employed to compare means and evaluate the significance of differences in sample data. These statistical tools provided a comprehensive understanding of the dataset's patterns and associations.

4.1 Frequency table of social demographic information

Table 1 and fig 1 show that concerning gender, year of study, comfort level with technology, access to technology, frequency of technology usage in the classroom, types of technology utilized, English proficiency level, and classroom environment, the data presented provide a demographic picture of the student population. The gender breakdown of the student body shows that males make up 52.3% of the surveyed population and girls make up the remaining 47.7%. Knowing this information is essential to comprehending the dynamics of gender in the student body. The information shows a varied representation at various academic levels with regard to the study year. Students in their second year make up the largest group (41.7%), followed by those in their third year (36.0%), first year students (11.3%), and those in their fourth year or above (11.0%).

Most students (68.8%) say they are only a little bit at ease, while a sizable percentage (31.2%) say they are extremely at ease. In order to successfully apply technology-integrated teaching techniques, educators and institutions must have a thorough understanding of the comfort level with technology. According to data on technology access, a significant proportion of students have access to cellphones with internet access (57.3%), personal computers or laptops with internet access (21.7%), and high-speed internet at home (21.0%). In the context of online or remote learning, this data is especially important for evaluating the digital infrastructure that students have at their disposal.

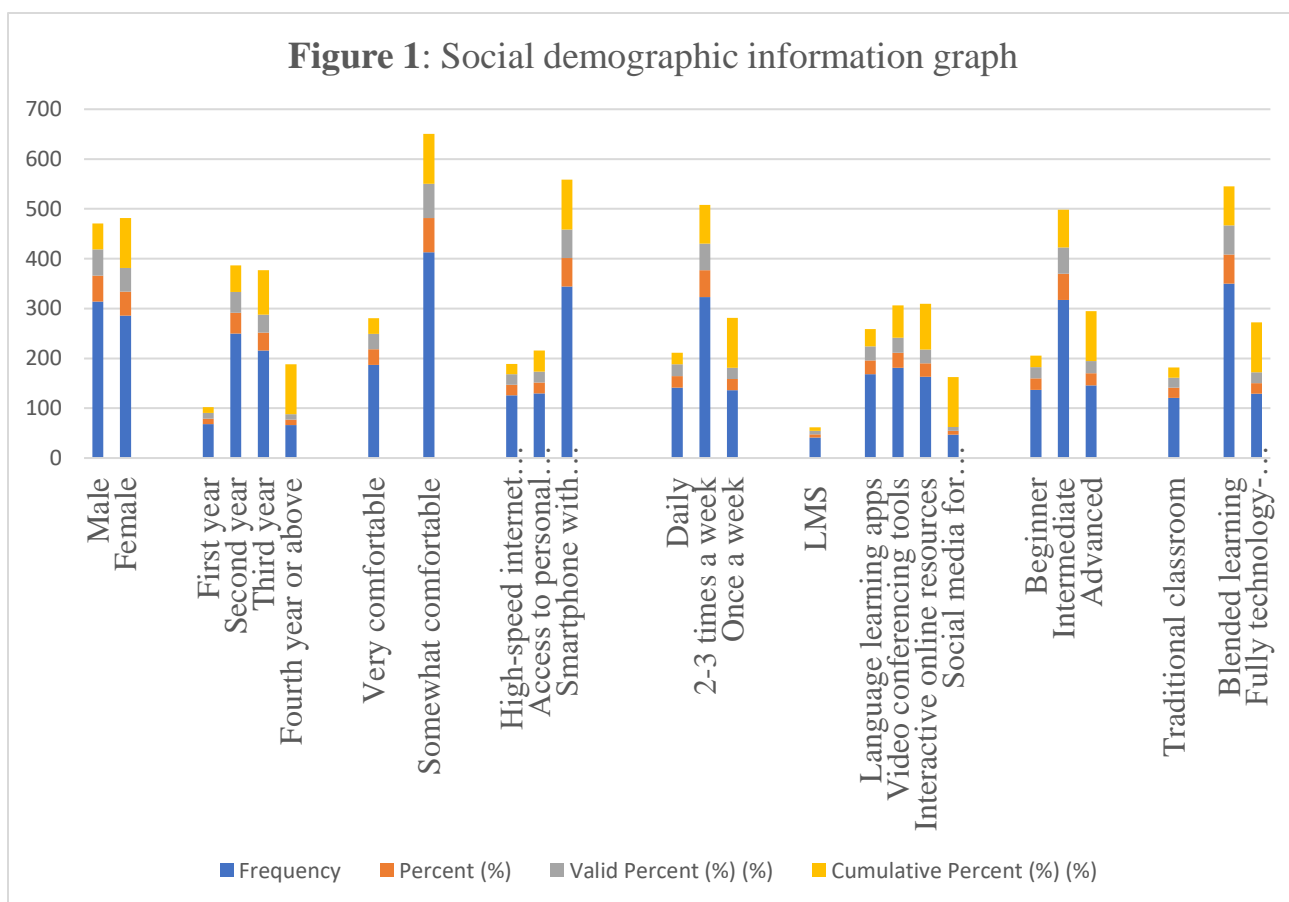
Regarding how often students use technology for learning, most of them use it two to three times a week (53.8%), then once a week (22.7%), and every day (23.5%). Teachers can better adapt their teaching strategies to students' preferences and habits by having an understanding of these use patterns. Technology is employed in many different ways, but the two most common categories are video conferencing tools (30.2%) and language study applications (28.0%). Teachers and content creators may use this information to match their content to platforms and resources that students are already accustomed to using and find useful.

The pupils' English skill levels are divided into three categories: advanced (24.3%), intermediate (52.8%), and beginner (22.8%). When creating language learning programs and making sure that the instructional materials are appropriate for the students' competence levels, this data is crucial. The distribution of classroom settings shows that mixed learning environments are prevalent (58.3%), with completely technology-integrated classrooms coming in second (21.5%) and conventional classrooms in third (20.2%). Teachers can adjust their instructional practices by using this knowledge, which educates them on the popularity of various teaching philosophies.

Table 1: Frequency table

Gender					
		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	Male	314	52.3	52.3	52.3
	Female	286	47.7	47.7	100.0
Year of Study					
Valid	First year	68	11.3	11.3	11.3
	Second year	250	41.7	41.7	53.0
	Third year	216	36.0	36.0	89.0
	Fourth year or above	66	11.0	11.0	100.0
Comfort with Technology					
Valid	Very comfortable	187	31.2	31.2	31.2
	Somewhat comfortable	413	68.8	68.8	100.0
Access to Technology					
Valid	High-speed internet available at home	126	21.0	21.0	21.0
	Access to a personal computer/laptop	130	21.7	21.7	42.7
	Smartphone with internet access	344	57.3	57.3	100.0
Frequency of Technology Use in Learning					
Valid	Daily	141	23.5	23.5	23.5
	2-3 times a week	323	53.8	53.8	77.3
	Once a week	136	22.7	22.7	100.0
Type of Technology Used					
Valid	LMS	41	6.8	6.8	6.8
	Language learning apps	168	28.0	28.0	34.8
	Video conferencing tools	181	30.2	30.2	65.0

	Interactive online resources	163	27.2	27.2	92.2
	Social media for learning purposes	47	7.8	7.8	100.0
English Proficiency Level					
Valid	Beginner	137	22.8	22.8	22.8
	Intermediate	317	52.8	52.8	75.7
	Advanced	146	24.3	24.3	100.0
Classroom Setting					
Valid	Traditional classroom	121	20.2	20.2	20.2
	Blended learning	350	58.3	58.3	78.5
	Fully technology-integrated classroom	129	21.5	21.5	100.0



4.2 Respondents' agreement regarding ethical reduces teaching English at the university level

The information in Table 2 provides a window into people's opinions and experiences with technology integration in English language instruction. The variance numbers reveal information about the consistency or dispersion of responses within each category, while the mean scores give an idea of the general opinion.

TI, or technology integration, is the main topic. With a mean score of 3.84 and a standard deviation of 1.13, respondents thought that new technology was, on average, moderately incorporated into their English language education. This indicates that there is a noticeable degree of individual response diversity and an overall good assessment of technological integration. A somewhat higher mean score of 3.90 was assigned to the frequency of technological instruments used in English language learning

activities, suggesting a rather regular usage of technology. The variation of 1.044 indicates that respondents' experiences with the frequency of technological tools follow a more regular trend.

Regarding the Learning Experience (LE), the average scores for how technology affects the way people interact with English language resources and how it improves comprehension of English language topics are 3.84. This shows that people generally believe technology improves learning experiences in a moderately good way. The replies were quite variable, as seen by the variances of 1.074 and 1.042, respectively. This suggests that people may hold different opinions on how technology affects their educational experiences.

The assessment criteria are: Learning Outcomes (LO), Comparison and Preferences (CP), Classroom Experience (CE), Digital Literacy (DL), Instructor Experience (IE), Access to Technology Resources (ATR), Student Engagement (SE), and General Perception (GP). A deeper understanding of these areas may be gained from examining the average scores and variations. For example, with mean ratings of 3.95 and 3.91 in LO, respondents thought that technology improved their writing and language skills, respectively. With a mean score of 3.85 in CE, the general learning environment in technology-integrated classrooms was viewed positively. Different experiences within this group, however, appear to be indicated by the variance of 1.154. There was a significant variance of 0.982 in CP, suggesting that respondents had varying viewpoints, although on average, they favored technology-integrated classrooms (mean score of 3.80). In SE, the variance of 1.075 indicates variations in individual reactions, even though technology-enhanced activities were typically stimulating (mean score of 3.84). The DL category indicates that prior digital abilities had a favorable impact on using technology (mean score of 3.85); however, the variation of 1.009 suggests that the impact of these skills was not uniformly beneficial. The variation of 1.035 reflects a range of opinions, while the mean score of 3.78 on the IE indicates that teachers were only moderately successful in integrating technology. ATR variances (1.073) and mean scores (3.84) reveal a divided opinion on the sufficiency of technological resources. The GP mean ratings of 3.84 and 3.80 point to a favorable general view of technological integration, while the variances of 1.007 and 1.039 show that subjective opinions vary.

Table 2: Ethical reduces teaching English at the university level

Training	Questions	Mean score	Variance
Technology Integration			
TI 1	To what extent do you believe emerging technology was integrated into your English language classes?	3.84 ± 1.13	1.290
TI 2	How frequently were technological tools utilized in your English language learning activities?	3.90±1.044	1.089
Learning Experience			
LE 1	Please rate the impact of technology on your engagement with English language materials.	3.84±1.074	1.154
LE 2	Did the use of technology enhance your understanding of English language concepts?	3.84±1.042	1.041
Learning Outcomes			
LO 1	How do you rate your improvement in language proficiency due to technology use	3.95±1.042	1.086
LO 2	To what extent did technology aid in the development of your writing skills in English	3.91±1.076	1.157
Classroom Experience			
CE 1	How would you rate the overall learning environment in technology-integrated classes	3.85±1.074	1.154
CE 2	Did the use of technology positively influence your interaction with peers and instructors in English classes?	3.80±1.049	1.100
Comparison and Preferences			
CP 1	How would you compare your performance in technology-integrated	3.80±0.982	0.964

	English classes to traditional classes?		
CP 2	Given the choice, would you prefer future English language classes to incorporate more technology	3.87±1.082	1.171
Student Engagement			
SE 1	How motivated were you to participate in English language activities that involved technology	3.84±1.075	1.156
SE 2	Did technology-enhanced activities encourage your active participation in English language learning	3.77±1.056	1.117
Digital Literacy			
DL 1	To what extent did your existing digital skills aid in your utilization of technology for English language learning	3.85±1.009	1.018
DL 2	How confident do you feel in using various digital tools for English language tasks after this course	3.81±1.041	1.084
Instructor Experience			
IE 1	How effective was the instructor in integrating technology into English language lessons	3.78±1.035	1.072
IE 2	Did the instructor's proficiency in using technology positively impact your learning experience	3.80±1.022	1.044
Access to Technology Resources			
ATR 1	Were the available technology resources (e.g., computers, software) adequate for your English language learning needs	3.84±1.073	1.152
ATR 2	How much did the availability of technology resources affect your engagement in English language activities	3.77±1.057	1.117
General Perception			
GP 1	Overall, how would you rate the effectiveness of integrating technology into English language teaching	3.84±1.007	1.014
GP 2	Do you believe that technology integration positively contributes to a better understanding of English language concepts	3.80±1.039	1.080

4.3 Correlation among different socio-demographic factors

The provided matrix outlines the correlation coefficients between various factors related to technology integration in education, as shown in Table 3. Each row and column represents a specific aspect, and the values in the matrix indicate the strength and direction of the relationships between these aspects. The matrix reveals that there are strong positive correlations between most factors, suggesting that they tend to co-vary positively.

The positive correlations between technology integration and different dimensions of the learning experience. The strongest correlation is observed between learning outcomes and digital literacy (.860), indicating that as digital literacy increases, so do positive learning outcomes. This implies that incorporating technology effectively into the learning environment can contribute significantly to students' overall understanding and mastery of the content. Additionally, the correlation between student engagement and technology integration (.701) underscores the role of technology in keeping students actively involved in the learning process. This positive relationship suggests that well-implemented technology can enhance student engagement, potentially leading to more effective learning experiences.

The correlations related to instructor experience and access to technology resources. The high correlation between instructor experience and digital literacy (.764) suggests that instructors with higher digital literacy tend to have better experiences integrating technology into their teaching. This correlation emphasizes the importance of providing professional development opportunities for educators to enhance their digital literacy skills. The positive correlation between access to technology resources and instructor experience (.694) indicates that instructors who have better access to technology resources tend to have more positive experiences with technology integration. This finding highlights the need for educational institutions to invest in sufficient and up-to-date technology resources to support instructors in delivering effective technology-enhanced instruction.

The broader implications of the findings, particularly in terms of general perception, comparison, and preferences. The strong positive correlations between general perception and various factors, such as student engagement (.713) and learning outcomes (.705), suggest that a positive overall perception is associated with positive educational outcomes. This reinforces the idea that stakeholders' attitudes and beliefs play a crucial role in the success of technology integration in education. Moreover, the correlation between comparison and preferences and classroom experience (.720) indicates that students and educators who prefer and are accustomed to technology-rich environments tend to have more positive classroom experiences. This suggests that considering preferences and providing choices in technology use might contribute to a more positive and effective learning environment.

Table 3: Correlation among different socio-demographic factors

	TI	LE	LO	CE	CP	SE	DL	IE	ATR	GP
TI	1									
LEx	.789**	1								
LO	.688**	.764**	1							
CE	.685**	.747**	.839**	1						
CP	.606**	.643**	.630**	.720**	1					
SE	.653**	.692**	.679**	.701**	.803**	1				
DL	.705**	.782**	.860**	.779**	.690**	.758**	1			
IE	.751**	.702**	.733**	.702**	.652**	.678**	.764**	1		
ATR	.636**	.642**	.562**	.631**	.670**	.683**	.612**	.694**	1	
GP	.705**	.710**	.709**	.705**	.680**	.695**	.713**	.790**	.757**	1

** . Correlation is significant at the 0.01 level (2-tailed).

4.4 T- test

To compare the means of two groups and determine if any differences are statistically significant, a t-test is a commonly used statistical technique. It is essential to hypothesis testing since it helps establish if a given procedure, intervention, or course of therapy significantly affects the population it is intended to serve. The means of the two groups are compared with the variability within each group to get a t-statistic for the test. To ascertain if the observed differences are more than would be predicted by chance, the resultant t-statistic is then compared to a critical value derived from a t-distribution. Informed judgments on the existence or non-existence of a true impact or difference between the groups are aided by this, offering a quantitative foundation for decision-making across a range of disciplines, from social sciences to medicine.

The output that is given seems to come from a set of one-sample t-tests that compare the mean scores of many groups (CP, SE, DL, IE, ATR, GP, TI, LE, LO, and CE) against a test value of 0. The degrees of freedom (df) and p-value (Sig., or significance level) are presented for each instance together with the t-test statistic (t). In every test, the population means equals zero, which is the null hypothesis. Since every p-value is given as 0.000, it may be concluded that there is a substantial difference between the group means and 0.

The group TI, for instance, has a t-test statistic of 95.588 with 599 degrees of freedom and a reported p-value of 0.000. The sample mean and the test value (0) have a mean difference of 3.87167. The 95% confidence range for this difference is [3.7921, 3.9512]. A 95% confidence range [3.7921, 3.9512] contains the genuine mean difference, which indicates that the group TI mean score differs considerably from 0 (mean difference of 3.87167).

With differing degrees of mean differences and confidence intervals, the findings show that the mean scores of all the groups (TI, LE, LO, CE, CP, SE, DL, IE, ATR, GP) are substantially different from 0. The conclusion that the observed differences are statistically significant is supported by the p-values being extremely near to 0, which offers strong evidence against the null hypothesis.

Table 4: T- test

One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
TI	95.588	599	0.000	3.87167	3.7921	3.9512
LE	99.869	599	0.000	3.84333	3.7678	3.9189
LO	96.980	599	0.000	3.93167	3.8520	4.0113
CE	97.879	599	0.000	3.82833	3.7515	3.9051
CP	98.082	599	0.000	3.83167	3.7549	3.9084
SE	97.613	599	0.000	3.80667	3.7301	3.8833
DL	102.18	599	0.000	3.82667	3.7531	3.9002
IE	97.908	599	0.000	3.79000	3.7140	3.8660
ATR	97.650	599	0.000	3.80500	3.7285	3.8815
GP	102.273	599	0.000	3.82333	3.7499	3.8968

4.5 Influence of emerging technology in teaching English

With an R-squared value of 0.474, the statistical model in Table 5 shows a moderate level of explanatory power, meaning that the independent variable(s) can account for around 47.4% of the variability in the dependent variable. The model's adjusted R-squared score of 0.473 provides a somewhat more cautious assessment of the model's goodness of fit by accounting for the number of predictors in the model. As a measure of the average departure of the observed data from the regression line, the standard error of the estimate is 0.72093. The change statistics indicate that the addition of the independent variable(s) greatly enhanced the model's fit, with the F-statistic of 538.521 and the corresponding significance level of 0.000 supporting this claim. It is crucial to take autocorrelation into account when interpreting the model's output, as indicated by the Durbin-Watson statistic of 1.743. It seems that the model has a fair amount of explanatory power overall, although more research on the autocorrelation problem could be necessary.

Table 5: Summary table

Model	R	R Square	Adjusted R-Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.688 ^a	.474	.473	.72093	.474	538.521	1	598	.000	1.743
a. Predictors: (Constant), TI										
b. Dependent Variable: LO										

Table 6 shows the findings of a statistical model, most likely a regression analysis, using the analysis of variance (ANOVA) method. Residual, Total, and Regression are the three primary components of the table. A sum of squares of 279.892 and one degree of freedom are used in the Regression section to describe the variance that the model explains. The regression model's overall significance is evaluated by the F-statistic (538.521), while the Mean Square (MS) measures variation within the regression. With a sum of squares of 310.806 and 598 degrees of freedom, the residual section represents the unexplained variability. A total sum of squares of 590.698 and 599 degrees of freedom is obtained by combining the explained and unexplained variance in the Total row. The statistical significance of the regression model is indicated by the low p-value (0.000) in the Regression row, which implies that at least one predictor variable is associated with the response variable.

Table 6: Regression analysis Anova

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	279.892	1	279.892	538.521	.000 ^b
	Residual	310.806	598	.520		
	Total	590.698	599			
a. Dependent Variable: LO						
b. Predictors: (Constant), TI						

4.6 Mediating Variable

In tables 7 & 8, the presented statistical analysis involves two models predicting outcomes (SE and TI) based on predictor variables (X: LO). For the SE outcome, the model indicates that LO significantly influences SE ($p < 0.000$), with an R-squared value of 0.46, suggesting that 46% of the variability in SE is explained by the model. The regression coefficient for LO is 0.6527, implying that for each unit increase in LO, SE is expected to increase by 0.6527 units. Similarly, for the TI outcome, the model is statistically significant ($p < 0.000$), with an R-squared value of 0.54, indicating that 54% of the variability in TI is explained by the combined effects of LO and SE. The regression coefficients for LO and SE are 0.4543 and 0.3576, respectively, suggesting their positive association with TI. The models demonstrate strong statistical significance and provide insights into the relationships between the variables.

Table 7: Mediating Variable model

R	R-sq	MSE	F	df1	df2	p
.7333	.5378	.4565	347.2946	2.0000	597.0000	.0000

Table 8: Mediating Variable output

	Coeff	se	t	p	LLCI	ULCI
constant	.7243	.1228	5.8962	.0000	.4830	.9655
LO	.4543	.0378	12.0043	.0000	.3800	.5287
SE	.3576	.0393	9.0880	.0000	.2803	.4348

4.7 Moderating variables

In tables 9 & table 10, regression analysis explores the relationship between the outcome variable TI (Target Indicator) and predictor variables LO (Variable LO) and IE (Variable IE). The model is statistically significant, as indicated by the low p-value ($p < 0.000$), with an R-squared value of 0.61, suggesting that approximately 61% of the variability in TI is explained by the combined effects of LO, IE, and the interaction term Int_1 ($LO \times IE$). The regression coefficients reveal that the intercept (constant) is 1.1275, indicating that when LO and IE are both zero, the estimated mean of TI is 1.1275. The coefficient for LO is 0.1308, but its p-value ($p = 0.2373$) suggests it is not statistically significant. On the other hand, the coefficient for IE is 0.3747, and it is statistically significant ($p = 0.002$), suggesting a positive association with TI. The interaction term Int_1 ($LO \times IE$) has a coefficient of 0.0519, with a p-value of 0.1097, indicating a potential but non-significant interaction effect. This model provides insights into the relationships between the variables, with IE appearing as a significant predictor for TI.

Table 9: Moderating variables model

R	R-sq	MSE	F	df1	df2	p
.7791	.6071	.3887	306.9239	3.0000	596.0000	.0000

Table 10: Moderating variables output

	Coeff	se	t	p	LLCI	ULCI
--	-------	----	---	---	------	------

constant	1.1275	.3546	3.1800	.0015	.4312	1.8238
LO	.1308	.1106	1.1830	.2373	-.0864	.3480
IE	.3747	.1209	3.0992	.0020	.1373	.6122
LO × IE	.0519	.0324	1.6021	.1097	-.0117	.1156

5. Conclusion

In conclusion, using a sizable sample size of 600 participants, this study offers a comprehensive analysis of the use of new technologies in English instruction at the university level in India. Meaningful correlations and patterns within the data are revealed by a thorough analysis that makes use of inferential statistical techniques like t-tests and regression analysis, together with descriptive statistics for questionnaire replies. Focusing on two independent factors and four dependent variables, the research offers a comprehensive examination of the complex link between technology interventions and the outcomes of English language instruction. Using the Statistical Package for the Social Sciences (SPSS) to conduct a thorough statistical analysis lends credibility to the findings, supporting the alternative hypothesis that significant gains in student performance and learning outcomes can be achieved by integrating emerging technology into English language teaching. This study indicates the potentially revolutionary effects of creative methods for teaching English as a second language. It also makes significant contributions to the field of educational technology and holds significant implications for improving pedagogical practices in the particular context of Indian universities.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers.

References

- [1] Alqurshi, A., (2020). Investigating the impact of COVID-19 lockdown on pharmaceutical education in Saudi Arabia—A call for a remote teaching contingency strategy. *Saudi Pharmaceutical Journal*, 28(9), pp.1075-1083.
- [2] Anyushenkova, O., Digtyar, O., Zakirova, E., Fomina, N., and Esina, L., (2019). Modern technologies in teaching foreign languages to students of the digital generation. In *Edulearn19 Proceedings* (pp. 3428-3434). IATED.
- [3] Backhouse, J., (2013). What makes lecturers in higher education use emerging technologies in their teaching?. *Knowledge Management & E-Learning*, 5(3), p.345.
- [4] Bozalek, V., Gachago, D., Alexander, L., Watters, K., Wood, D., Ivala, E. and Herrington, J., 2013. The use of emerging technologies for authentic learning: AS outh A South African study in higher education. *British Journal of Educational Technology*, 44(4), pp.629-638.
- [5] Coman, C., Țiru, L.G., Meseșan-Schmitz, L., Stanciu, C. and Bularca, M.C., (2020). Online teaching and learning in higher education during the coronavirus pandemic: Students' perspective. *Sustainability*, 12(24), p.10367.
- [6] Criollo-C, S., Govea, J., Játiva, W., Pierrottet, J., Guerrero-Arias, A., Jaramillo-Alcázar, Á. and Luján-Mora, S., (2023). Towards the Integration of Emerging Technologies as Support for the Teaching and Learning Model in Higher Education. *Sustainability*, 15(7), p.6055.
- [7] Duraku, Z.H. and Hoxha, L., (2020). The impact of COVID-19 on education and on the well-being of teachers, parents, and students: Challenges related to remote (online) learning and opportunities for advancing the quality of education. *Manuscript submitted for publication. Faculty of Philosophy, University of Prishtina.*
- [8] Fowler, W.C., Ting, J.M., Meng, S., Li, L. and Tirrell, M.V., (2019). Integrating systems thinking into teaching emerging technologies. *Journal of Chemical Education*, 96(12), pp.2805-2813.
- [9] Frambach, J.M., Driessen, E.W., Chan, L.C. and van der Vleuten, C.P., (2012). Rethinking the globalisation of problem-based learning: how culture challenges self-directed learning. *Medical education*, 46(8), pp.738-747.
- [10] García-Delgado, M.Á., Rodríguez-Cano, S., Delgado-Benito, V. and Lozano-Álvarez, M., (2023). Emerging Technologies and Their Link to Digital Competence in Teaching. *Future Internet*, 15(4), p.140.
- [11] Geng, S., Law, K.M., and Niu, B., (2019). Investigating self-directed learning and technology readiness in blending learning environment. *International Journal of Educational Technology in Higher Education*, 16(1), pp.1-22.
- [12] Gunter, G.A., (2001). Making a difference: Using emerging technologies and teaching strategies to restructure an undergraduate technology course for pre-service teachers. *Educational Media International*, 38(1), pp.13-20.
- [13] Haryani, E., Coben, W.W., Pleasants, B.A., and Fetters, M.K., (2021). Analysis of Teachers' Resources for Integrating the Skills of Creativity and Innovation, Critical Thinking and Problem Solving, Collaboration, and Communication in Science Classrooms. *Jurnal Pendidikan IPA Indonesia*, 10(1), pp.92-102.
- [14] Hawamdeh, M. and Soykan, E., (2021). Systematic analysis of the effectiveness of using mobile technologies (MT) in teaching and learning a foreign language. *Online Journal of Communication and Media Technologies*, 11(4), p.e202124.
- [15] Hazarika, A. and Rahmati, M., (2023). Towards an evolved immersive experience: Exploring 5G-and beyond-enabled ultra-low-latency communications for augmented and virtual reality. *Sensors*, 23(7), p.3682.
- [16] Horwitz, E.K., (1995). Student affective reactions and the teaching and learning of foreign languages. *International Journal of Educational Research*, 23(7), pp.573-579.

- [17] Jobeen, A., Kazemian, B., and Shahbaz, M., (2015). The role of error analysis in teaching and learning of second and foreign languages. *Education and Linguistics Research*, 1(2), pp.52-62.
- [18] Kirkwood, A. and Price, L., (2013). Examining some assumptions and limitations of research on the effects of emerging technologies for teaching and learning in higher education. *British Journal of Educational Technology*, 44(4), pp.536-543.
- [19] Kocak, O., Coban, M., Aydin, A., and Cakmak, N., (2021). The mediating role of critical thinking and cooperativity in the 21st-century skills of higher education students. *Thinking Skills and Creativity*, 42, p.100967.
- [20] Koondhar, M.Y., Memon, M., Rang, A.R. and Shah, A., (2021). Pervasive Learning Environment for Educational Makerspaces with Emerging Technologies and Teaching and Learning Transformation. *International Journal*, 10(3).
- [21] McGregor, J. and Wetmore, J.M., (2009). Researching and teaching the ethics and social implications of emerging technologies in the laboratory. *Nanoethics*, 3, pp.17-30.
- [22] Moeller, A.K. and Catalano, T., (2015). Foreign language teaching and learning.
- [23] Negoescu, A. and Boştină-Bratu, S., (2016). Teaching and learning foreign languages with ICT. *Scientific Bulletin*, 21(1), pp.21-27.
- [24] Ngwacho, A.G., (2020). COVID-19 pandemic impact on Kenyan education sector: Learner challenges and mitigations. *Journal of Research Innovation and Implications in Education*, 4(2), pp.128-139.
- [25] Nicolaidou, I., Pissas, P. and Boglou, D., (2023). Comparing immersive virtual reality to mobile applications in foreign language learning in higher education: A quasi-experiment. *Interactive Learning Environments*, 31(4), pp.2001-2015.
- [26] Onyema, E.M., (2020). Integration of emerging technologies in the teaching and learning process in Nigeria: the challenges. *Central Asian Journal of Mathematical Theory and Computer Sciences*, 1(1), pp.35-39.
- [27] Pokrivcakova, S., (2019). Preparing teachers for the application of AI-powered technologies in foreign language education. *Journal of Language and Cultural Education*, 7(3), pp.135-153.
- [28] Rafsanjani, H.N. and Nabizadeh, A.H., (2023). Towards human-centered artificial intelligence (AI) in the architecture, engineering, and construction (AEC) industry. *Computers in Human Behavior Reports*, p.100319.
- [29] Rivera, J.L., (2019). Blended learning: effectiveness and application in teaching and learning foreign languages. *Open Journal of Modern Linguistics*, 9(2), pp.129-144.
- [30] Sutarto, S., Sari, D.P., and Fathurrochman, I., (2020). Teacher strategies in online learning to increase students' interest in learning during the COVID-19 pandemic. *Jurnal Konseling dan Pendidikan (JKP)*, 8(3), pp.129-137.
- [31] Tight, M., (2021). Twenty-first-century skills: meaning, usage, and value. *European Journal of Higher Education*, 11(2), pp.160-174.
- [32] Xing, X. and Saghaian, S., (2022). Learning outcomes of a hybrid online virtual classroom and an in-person traditional classroom during the COVID-19 pandemic. *Sustainability*, 14(9), p.5263.
- [33] Yukselturk, E., Altıok, S. and Başer, Z., (2018). Using game-based learning with Kinect technology in a foreign language education course. *Journal of Educational Technology & Society*, 21(3), pp.159-173.