

## Original Research

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## COVID-19 Pandemic's Impact on Education Systems. Gendered Language Use and Equity in Technology-Mediated English Learning: An Empirical Linguistic Study

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### ABSTRACT:

**Background:** The integration of Information and Communication Technology (ICT) into English Language Teaching (ELT) signifies a major transformation in pedagogical approaches, a shift accelerated by the COVID-19 pandemic's impact on education systems. ICT adoption offers novel opportunities to enhance learner engagement, foster inclusivity, and address gender disparities in language education. This study, "Technology-mediated language pedagogy and gender equity: An exploration in Azerbaijan," aims to investigate how different ICT tools and platforms contribute to promoting gender equity and inclusivity within ELT classrooms across Azerbaijan's key regions of Baku, Ganja, and Sumgait.

**Methods:** Employing a mixed-methods research design, the study combined quantitative data collected via structured surveys with qualitative insights derived from in-depth interviews and classroom observations. The research evaluated the accessibility, utilization, and effectiveness of various technology-mediated resources including course management systems (CMS), virtual meeting software, interactive language applications, and computer-assisted language learning (CALL) tools. Additionally, it assessed educator and learner readiness, institutional support, and policy frameworks influencing gender equitable practices in digital ELT environments.

**Results:** Analysis revealed notable gender-based differences in access to and use of ICT tools. While male learners generally reported higher levels of independent access and greater confidence with technology, female learners exhibited comparable or higher motivation to engage with digital resources when access barriers were minimized. Systemic and sociocultural challenges persisted that disproportionately affected female students' ability to fully benefit from technology-enhanced learning.

**Insights:** The findings underscore the pivotal role of targeted interventions to bridge gender gaps in technology access and usage within ELT. Technology, when implemented thoughtfully, can foster balanced gender participation, increase learner autonomy, and enable personalized, inclusive language instruction aligned with diverse learner needs. The study highlights the importance of culturally responsive pedagogy and gender-sensitive professional development to equip educators in maximizing the equitable integration of ICT.

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## I. INTRODUCTION

In the 21st century, English Language Teaching (ELT) is undergoing a profound transformation driven by rapid advancements in Information and Communication Technology (ICT). Incorporating ICT into language education has become essential rather than optional, enriching learning, supporting diverse pedagogical methods, and meeting the evolving demands of learners in a globalized world [1,2]. ICT enables multimodal, interactive, learner-centered approaches that foster communication, participation, and learner autonomy [3].

However, equitable access remains challenging. Gender inequalities, socio-cultural dynamics, and infrastructural shortcomings limit opportunities, particularly for female learners in digital classrooms [4]. The COVID-19 pandemic further revealed disparities in institutional readiness, teacher preparedness, and student engagement [5]. Hence, frameworks integrating ICT effectively into ELT must promote inclusivity and reduce gender gaps.

This study, "Technology-mediated language pedagogy and gender equity: An empirical exploration in Azerbaijan," investigates how ICT tools—such as Learning Management Systems (LMS), video conferencing, collaborative applications, and language learning software—support equitable learning environments. It highlights ICT's role in encouraging gender-inclusive participation, enhancing digital literacy, and creating adaptable pedagogical models across diverse educational settings.

Drawing on data from Azerbaijan's districts of Baku, Ganja, and Sumgait, the study identifies localized challenges and opportunities in ICT-integrated ELT classrooms. It emphasizes the importance of teacher training, institutional support, and adaptive feedback mechanisms for effective ICT use [6]. Ultimately, the study presents ICT as a transformative force democratizing education, empowering learners of all genders, and preparing them with essential communicative competence for academic and professional success.

## RESEARCH PROBLEM

Although ICT tools are becoming more accessible in English Language Teaching (ELT), several obstacles impede their effective use and negatively affect learning outcomes. These challenges include:

- Limited access to appropriate technology and resources
- Unequal technological proficiency and engagement among learners
- Insufficient training opportunities for educators to effectively use digital tools
- Poor implementation of personalized assessments and adaptive learning strategies
- Difficulty fostering meaningful interactions in technology-mediated settings
- Socioeconomic disparities affecting students' access to technology

Addressing these issues is critical for fully leveraging digital technologies' transformative potential to reshape ELT pedagogy and provide equitable, high-quality language learning experiences.

## TECHNOLOGY-MEDIATED INSTRUCTIONAL STRATEGIES

The research shows that both educators and learners extensively use varied digital technologies, including word processors, video-sharing platforms, web-based learning management systems, and other ICT tools. These platforms support diverse instructional activities such as distributing lecture materials, conducting online assignments, and accessing a wide array of academic resources.

The adoption of such technologies has significantly accelerated, particularly during the global pandemic when education rapidly shifted to virtual environments. Professionals across fields increasingly rely on ICT for communication, collaboration, and productivity. In education, these technologies have become essential for supporting both students and teachers in overcoming pandemic-related disruptions.

The proposed digital platform incorporates intelligent adaptive algorithms, multimedia content, and instant feedback to strengthen foundational ELT skills. It fosters active learner participation through interactive, context-rich modules; encourages collaboration and authentic language use in virtual spaces; offers personalized learning paths aligned with individual progress; improves assessments with automated, data-driven tools; and supports flexible instructional formats suited to traditional, blended, or fully online settings.

By immersing learners in realistic, technology-enhanced scenarios and providing continuous practice, the platform develops the communicative proficiency necessary for academic achievement, career advancement, and social integration within an interconnected global society.

This study responds to the urgent need for scalable, inclusive, and effective ELT innovations aligned with current technological advances and learner expectations. It equips educators and learners to confidently navigate the evolving educational landscape while enhancing language proficiency using forward-thinking, ICT-supported pedagogical approaches.

## II. LITERATURE REVIEW

Over the past two decades, the integration of ICT in English Language Teaching (ELT) has attracted increasing scholarly attention for its instructional effectiveness, inclusivity, and impact on learner engagement. Research consistently highlights ICT's capacity to transform traditional language teaching into more engaging, learner-centred, and interactive approaches. [7–9]

The ICT-enabled ELT paradigm is rooted in established linguistic and pedagogical theories:

- Warschauer and Healey [10] emphasized computing's role in enhancing interaction and autonomy. Warschauer [11] discussed how the Internet globalizes English education by facilitating authentic, cross-cultural communication.
- Mumtaz [12] highlighted teachers' crucial role in ICT integration, influenced by their attitudes, confidence, and access to resources. Prensky [13] introduced "digital natives" theory, describing 21st-century learners' natural affinity for digital tools.
- Levy and Stockwell [14] detailed CALL's pedagogical and technical dimensions; Hubbard [4] stressed aligning technology with linguistic pedagogy and teacher training.
- Bingimlas [1] noted barriers like inadequate infrastructure and resistance to change in developing regions.
- Kukulska-Hulme [15] introduced Mobile-Assisted Language Learning (MALL), promoting autonomy and ubiquitous access.
- Selwyn [3] raised critical concerns on socio-cultural implications and digital inequality.
- Kessler [6] and Godwin-Jones [16] explored AI, analytics, and mobile tools enhancing adaptive learning.
- Studies in Azerbaijan reveal urban-rural ICT disparities requiring policy attention [17].

- The pandemic accelerated ICT adoption but highlighted inequities in infrastructure and pedagogical readiness [5,18,19].

This study builds on these insights by focusing on gender, geography, and institutional factors affecting ICT efficacy in ELT. Dhawan (2020) described online learning as a necessary “panacea” during the crisis, while Jena (2020) observed that the pandemic accelerated ICT adoption but also exposed deep-rooted inequities in access, digital infrastructure, and pedagogical readiness.

UNESCO (2021) reinforced the global imperative for gender equality in education, advocating for inclusive digital learning environments. Reinforcing this perspective, Saxena and Pandey (2021) investigated gender-related constraints within ICT-enabled education in Azerbaijan, demonstrating that female students frequently encounter socio-cultural and infrastructural challenges that limit their engagement with digital platforms and adversely affect their educational achievement. [20,21]

Collectively, these studies—from early CALL developments to modern digital equity research—illustrate the evolving integration of ICT in ELT. While technology has transformed teaching and learning through accessibility, interactivity, and personalisation, persistent challenges such as digital literacy gaps, infrastructural inadequacies, and socio-demographic inequalities continue to shape its impact. The present study builds upon this corpus by examining how gender, region, and institutional support influence the efficacy of ICT tools in English language teaching and learning.

### III. RESEARCH METHODOLOGY

The researchers have designed and implemented an ICT-enabled framework titled “Technology-mediated language pedagogy and gender equity: An empirical exploration in a Azerbaijan context” to explore the role of technology in enhancing English Language Teaching and ensuring inclusivity. This methodology systematically integrates digital tools into classroom practices to address challenges in communication skills while simultaneously promoting gender equity in learning environments.

The study involved 650 students drawn from diverse higher education disciplines across the districts of Azerbaijan—Baku, Ganja, and Sumgait districts. Over a period of two months, ICT-based interventions were introduced into ELT classrooms, employing tools such as Learning Management Systems (LMS), video conferencing applications, collaborative platforms, and digital assessment methods. The methodology followed a blended approach combining both qualitative and quantitative techniques. A structured course schedule was developed, embedding ICT activities that encouraged student participation, collaboration, and self-paced learning. Data was collected through survey questionnaires, classroom observations, and performance evaluations.

To systematically analyse outcomes, the methodology was divided into two phases:

- A) Questionnaire Analysis – evaluating learners’ perceptions, attitudes, and accessibility toward ICT in ELT.
- B) Assessment of ICT Impacts – examining the effectiveness of digital tools in improving speaking, listening, and collaborative communication skills, with a particular focus on gender inclusivity and equitable access. This framework ensured progressive engagement of students, enabling them to transition from traditional to technology-supported ELT practices, while simultaneously providing insights into localised challenges and solutions for ICT integration in higher education.

### IV. ANALYTICAL ASSESSMENT

The evaluation of survey responses yielded significant insights into the incorporation of ICT tools in English Language Teaching (ELT) and their role in narrowing gender disparities within academic contexts. The survey instrument comprised 50 questions organized across multiple dimensions, including digital technology utilization, student engagement, gender equity, educator preparedness, institutional backing, and the perceived effectiveness of ICT in language instruction. Data were gathered from both learners and instructors across the districts of *Azerbaijan—Baku, Ganja, and Sumgait* through a mixed-methods research design are:

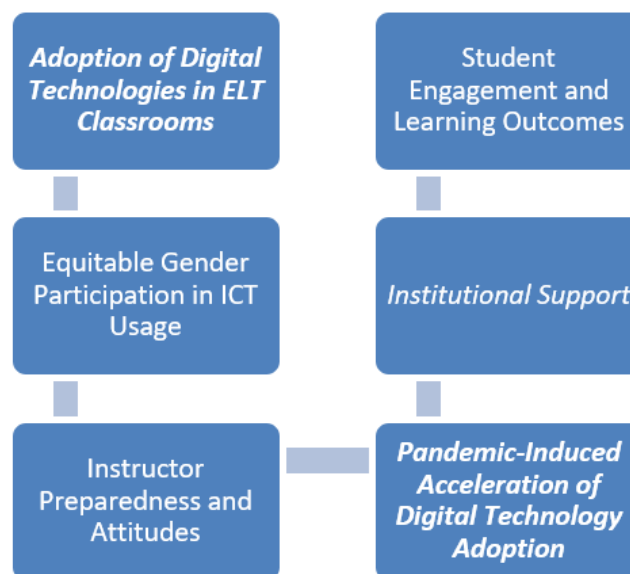


Figure 1

## 1. Adoption of Digital Technologies in ELT Classrooms

The survey findings indicated that over 72% of participants consistently utilized digital technologies, including Learning Management Systems such as Google Classroom and Moodle, video conferencing platforms like Zoom and Microsoft Teams, as well as language learning applications such as Duolingo and Quizlet. This confirms the growing penetration of digital technologies in ELT classrooms. However, a gendered digital divide was evident: female students reported slightly lower access to personal devices and reliable internet connectivity compared to male students. This suggests that despite increasing ICT adoption, access-related challenges continue to persist, especially among female learners.

## 2. Equitable Gender Participation in ICT Usage

The analysis of the survey data indicated that 74% of male respondents and 65% of female respondents reported having independent access to ICT resources. While quantitative results point to a gender gap, qualitative data indicate that female students demonstrated equal, and in some cases greater, motivation to use ICT tools for language learning once access was provided. This underscores the importance of institutional and policy-level interventions to ensure equitable access and to leverage the enthusiasm of female learners for digital language learning.

## 3. Instructor Preparedness and Attitudes

Approximately 68% of teachers reported feeling confident in incorporating ICT tools into lesson planning, instructional delivery, and assessment practices. Male Instructors were generally more comfortable with advanced tools such as Virtual Reality (VR) and Augmented Reality (AR), while female Instructors expressed a preference for more familiar tools like LMS platforms and collaborative applications. This highlights the need for targeted digital training workshops that not only enhance technical proficiency but also build confidence across genders, ensuring inclusivity in professional development.

## 4. Student Engagement and Learning Outcomes

ICT integration was reported to significantly improve motivation, participation, and communication skills among students. More than 70% of respondents agreed that tools such as Kahoot!, Padlet, and Google Docs made learning more “fun,” “interactive,” and “easy to understand.” These tools facilitated collaborative learning, reduced classroom anxiety, and encouraged both male and female learners to actively engage in peer-based tasks. This suggests that ICT-enabled ELT fosters greater learner autonomy and collaborative competence.

## 5. Institutional Support

Institutional infrastructure emerged as a critical factor influencing the extent of ICT integration. While some institutions provided robust digital infrastructure and training, others reported gaps in access to devices, internet bandwidth, and updated software. Students from urban areas demonstrated higher exposure to ICT tools compared to their rural counterparts, pointing to a rural–urban digital divide. Bridging this divide through improved infrastructure and institutional support is essential for equitable ICT adoption in ELT.

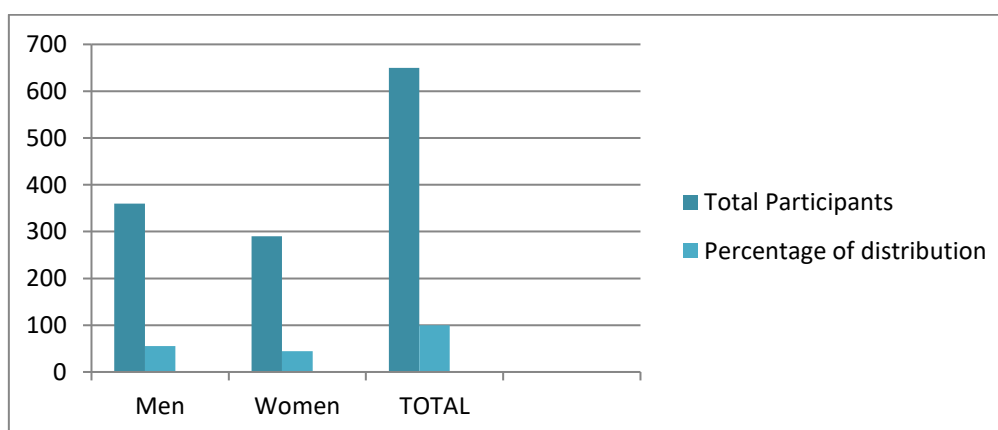
## 6. Pandemic-Induced Acceleration of Digital Technology Adoption

The pandemic acted as a catalyst in accelerating ICT integration across ELT classrooms. Approximately 91% of educators acknowledged that ICT has become indispensable in the post-pandemic educational landscape. However, the pandemic also revealed systemic inequalities, particularly for female learners in rural areas, who faced greater barriers in accessing devices and stable internet. These findings emphasise the need for gender-sensitive and location-sensitive ICT policies to mitigate learning disruptions in future crises.

In the context of "Technology-mediated language pedagogy and gender equity: An empirical exploration in a Azerbaijan context," the data highlights the gender distribution among the respondents. Of the total 800 students surveyed from the districts of Azerbaijan—Baku, Ganja, and Sumgait, Azerbaijan 270 is female, representing approximately 44.61% of the sample, while 530 are male, making up around 55.38%. This indicates a greater participation of male students in the study compared to female students.

**Table-1:** Demographic Distribution of Respondents

| Gender category | Total Participants | Percentage of distribution |
|-----------------|--------------------|----------------------------|
| Men             | 270                | 55.38                      |
| Women           | 530                | 44.61                      |
| TOTAL           | 800                | 100                        |

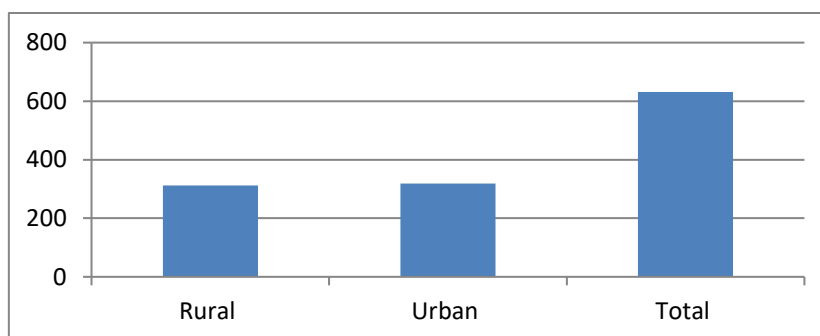


**Figure 2**

Table 2 and Figure 2 show the rural–urban distribution of respondents. Of the total sample, 321 were from rural areas and 329 from urban areas, demonstrating a near-balanced representation. This distribution is significant because it allows the study to explore ICT adoption across different socio-economic and infrastructural contexts.

**Table 2:** Area of Respondents

| Area of Respondents | Number of Respondents |
|---------------------|-----------------------|
| Rural               | 321                   |
| Urban               | 329                   |
| Total               | 650                   |



**Figure 3**

## 7. Integration of ICT Tools in ELT

Based on both quantitative and qualitative data, the following ICT tools were most frequently highlighted in contemporary ELT practices:

1. **Learning Management Systems (LMS)** – for structured content delivery and assessments
2. **Video Conferencing Tools** – for real-time classroom interaction
3. **Interactive Whiteboards** – for visual and multimodal learning
4. **Collaborative Tools** – for group projects and peer learning
5. **Language Learning Apps** – for independent and gamified practice
6. **Social Media Platforms** – for informal communication and resource exchange
7. **Digital Assessment Tools** – for interactive evaluations
8. **VR and AR Applications** – for immersive learning contexts
9. **Podcasts and Audiobooks** – for flexible listening practice
10. **Discussion Forums** – for asynchronous, peer-driven knowledge sharing

The analysis confirms that ICT integration significantly enhances student engagement, motivation, and language outcomes. However, gender-based and rural–urban disparities remain critical challenges. [21, 22] While male students reported higher access to ICT resources, female students demonstrated strong motivation and effective use when given access. Similarly, urban students benefited from better infrastructure, whereas rural learners faced infrastructural and connectivity constraints. Institutional support, teacher readiness, and targeted ICT policies will therefore be central to achieving equitable and sustainable ICT adoption in ELT.

## PEDAGOGICAL IMPACT OF ICT INTEGRATION IN ELT

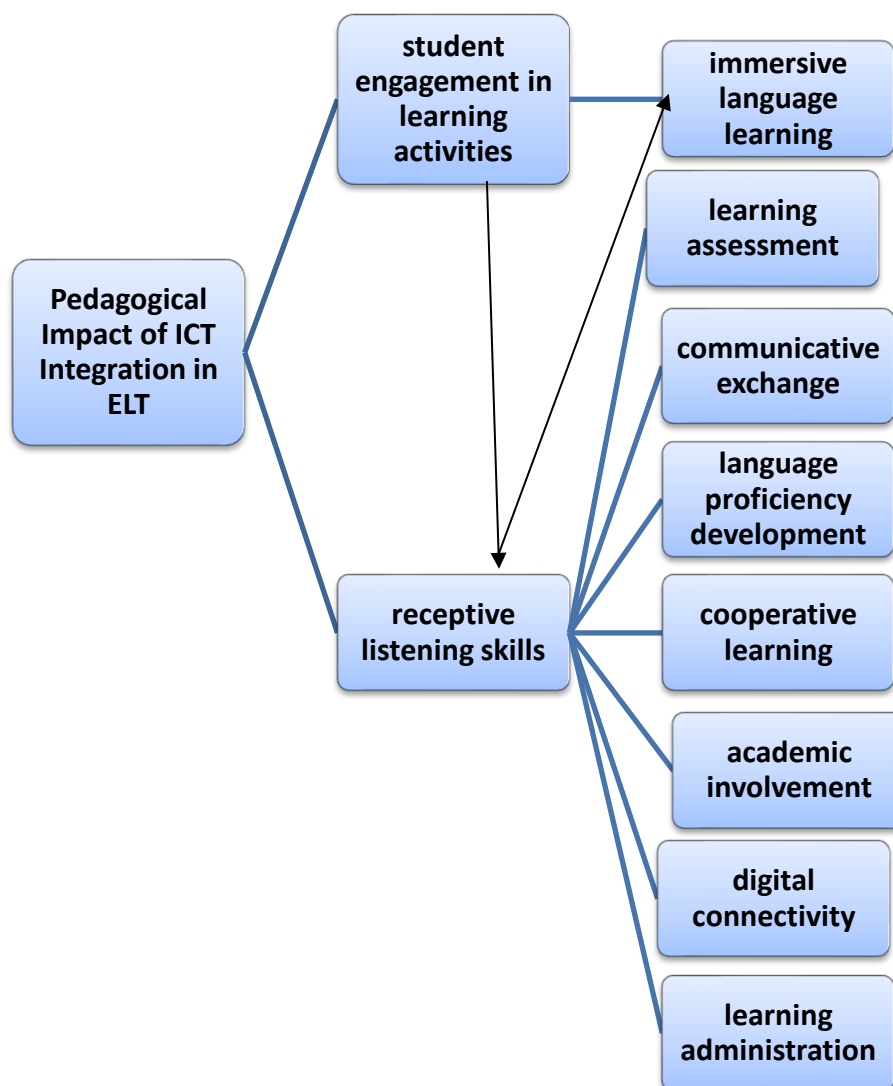


Figure 4

The integration of ICT tools in English Language Teaching (ELT) has yielded multiple positive outcomes, particularly in creating inclusive, interactive, and gender-equitable learning environments. The present study, conducted across selected districts of Assam, highlights the following key outcomes:

❖ **student engagement in learning activities**

- ICT platforms such as Learning Management Systems (LMS) and video conferencing applications have significantly increased student participation. By offering flexible and accessible modes of learning, these tools encourage both male and female students to actively engage in discussions, collaborative tasks, and virtual classrooms.

❖ **receptive listening skills**

- The use of podcasts, audiobooks, and multimedia platforms has enhanced listening comprehension and pronunciation skills. These tools provide authentic listening opportunities that help learners practice English beyond the classroom, supporting both genders equally in developing critical receptive skills.

## ❖ **immersive language learning**

- Emerging technologies like Virtual Reality (VR) and Augmented Reality (AR) provide immersive language-learning environments where students experience real-life communication contexts. Such technologies allow learners to practice English in simulated professional and social settings, thereby improving confidence and practical application.

## ❖ **learning assessment**

- Assessment tools such as Kahoot! and Quizlet introduce interactive and gamified evaluation methods. These not only make assessments engaging but also reduce anxiety associated with traditional testing, motivating both male and female learners to perform with greater confidence.

## ❖ **communicative exchange**

- Video conferencing tools, collaborative apps like Google Docs, and online forums such as Edmodo have strengthened teacher–student and peer–peer interaction. These platforms encourage synchronous and asynchronous exchanges, ensuring that both genders benefit equally from collaborative language use.

## ❖ **language proficiency development**

- Language learning applications such as Duolingo and Babbel promote continuous practice of English speaking and writing. By offering self-paced and personalised exercises, these tools support fluency development and enable students to practice independently, overcoming barriers of time and location.

## ❖ **cooperative learning**

- Collaborative platforms like Padlet and Google Docs foster group projects and peer feedback, promoting teamwork and collective problem-solving. These tools encourage equal contributions from male and female students, supporting gender inclusivity in classroom dynamics.

## ❖ **academic involvement**

- Social media platforms and interactive classroom technologies (e.g., SMART Boards, Jamboard) increase learner engagement by integrating familiar and visually rich media into lessons. Students become more motivated and interested, leading to higher levels of participation and sustained involvement in ELT activities.

## ❖ **digital connectivity**

- ICT tools bridge geographical and socio-economic gaps by connecting students to global resources and communities. Through digital platforms, both urban and rural learners gain equal opportunities to access English language content, supporting digital equity across genders.

## ❖ **learning administration**

- Learning Management Systems (LMS) help in systematically organising course materials, assignments, and assessments. Such structured environments allow students to track their progress and engage with lessons at their own pace, providing a well-organised framework that benefits all learners.

## **V. CONCLUSION**

This study examined the integration of ICT tools in English Language Teaching (ELT) with a focus on gender equity, learner engagement, and regional disparities across selected districts of Azerbaijan. By combining quantitative and qualitative approaches, the research generated important insights into how ICT influences language learning outcomes, motivation, and classroom participation.

The findings reveal that while ICT integration has significantly enriched ELT practices—enhancing learner interaction, promoting collaborative learning, and improving language proficiency—gender and regional divides continue to pose challenges. Male students reported higher access to ICT resources, yet female students, particularly in rural areas, demonstrated

equal or greater motivation when given the opportunity to use digital platforms. This highlights the need for gender-sensitive policies that address unequal access while leveraging the enthusiasm of female learners.

Similarly, the study underscores the rural–urban digital divide, with urban students benefiting from better infrastructure and exposure compared to their rural counterparts. Inadequate institutional support, limited connectivity, and uneven access to devices continue to restrict the effectiveness of ICT adoption in rural settings. These findings suggest that infrastructural investment and context-sensitive implementation strategies are essential to bridge existing gaps and ensure equitable participation in digital learning environments. The role of teachers also emerged as central to effective ICT integration. While a majority expressed confidence in using digital tools for lesson delivery and assessment, variations in familiarity—especially with advanced tools such as VR/AR—indicate the importance of continuous professional development. Targeted training programs can strengthen teacher readiness and create more inclusive classrooms where technology is effectively leveraged for language learning.

Overall, this study confirms that ICT tools—ranging from Learning Management Systems and video conferencing platforms to collaborative applications, gamified assessments, and immersive technologies—have the potential to transform ELT into a more dynamic, interactive, and learner-centred practice.[23] However, their successful implementation depends on addressing systemic inequalities in access, providing sustained institutional support, and fostering inclusive practices that consider both gender and regional differences.

In conclusion, ICT adoption in ELT offers transformative opportunities but must be inclusive, adaptable, and sustainable. Bridging gender and regional disparities, investing in digital infrastructure, and equipping both teachers and students with the necessary skills are essential steps toward maximising the benefits of ICT in language education. By adopting comprehensive and context-aware strategies, stakeholders can ensure that digital innovation truly empowers learners, enhances communicative competence, and prepares students for academic and professional success in a globalised world.

## CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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