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Balancing Agency and Automation to Overcome Digital Divide in ESP Writing Instruction

Sadia Arshad
Air University, Islamabad, Pakistan
National University of Sciences & Technology, Islamabad
https://orcid.org/0009-0006-4406-7057

Huma Batool
Air University, Islamabad, Pakistan
https://orcid.org/0000-0002-7774-6746

Sadia Irshad
Air University, Islamabad, Pakistan
https://orcid.org/0000-0002-4874-4581

ABSTRACT: *In the digital age, technology access and application inequalities, conceptualized as the digital divide, present a continuing problem for English for Specific Purposes writing education. This qualitative research explores the experience of the digital divide among ESP teachers in terms of four levels of access to van Dijk and how they view technological determinism as a factor in defining pedagogical engagement with digital tools. The data were gathered through open-ended questionnaires and analyzed using thematic analysis. The results demonstrate an unequal distribution of technology integration, influenced by infrastructural constraints, institutional support, disparate levels of digital literacy, and ethical issues related to the use of automated writing tools. While some teachers resisted due to motivational and material constraints, others adopted innovative practices, reflecting a soft determinist view. The paper highlights the importance of continuous professional growth, institutional support, and explicit policy guidelines to achieve equitable digital integration in ESP writing pedagogy.*

Keywords: Digital divide, Digital inclusion, Technological determinism, ESP writing instruction, Quality education

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INTRODUCTION

It is now widely accepted that the digital divide causes problems in higher education, especially in English Language Teaching (ELT) and English for Specific Purposes (ESP). Initially, the digital divide referred to those who could use digital technologies compared to those who could not; today, it takes into account motivation, skills and how digital tools are used (van Dijk, 2005). In ELT settings, where technology plays an important role in teaching, unequal access to digital tools can seriously affect both the effectiveness of instruction and student achievements (Warschauer, 2004). An example is students who cannot use group online learning tools or the internet effectively despite having school computers and other resources (Akhter et al., 2025; Alamri, 2021). Therefore, it is crucial for English language teachers to design balanced strategies, with a blend of technological and humanistic approaches to ensure holistic learning objectives (Maarif et al., 2025).

van Dijk (2005) Resources and Appropriation Theory (RAT) gives a clear framework for explaining the digital divide in higher education settings. It outlines access into four sequential phases: motivational access (attitude and interest toward technology), material access (availability of the necessary gear and internet), skills access (being able to use technology well) and usage access (using a variety of digital tools). The idea is that if people have unequal income, education or work status, resources are not distributed equally, which affects all four major areas of access (Arshad et al., 2025). Not only do such differences influence beginning digital usage, but they also shape how much someone participates in education and community activities (van Dijk, 2006).

Although van Dijk's theory shows how access to technology occurs at different levels, the idea of technological determinism provides insights into teachers' views of technology in shaping educational outcomes. Those who

support technological determinism argue that social and cultural changes are driven by technological progress (Dusek, 2006). In an educational context, this can lead people to assume that using specific tools will immediately result in better learning outcomes. Others, including Oliver (2011) and Fawns (2022), point out that this approach does not account for the interplay between technology, pedagogy and the institutional environment. Some ESP teachers who focus on writing instruction may embrace technology as a way to deal with access issues, while other teachers might feel doubtful or attuned to the possible problems.

The problem of the digital divide acquires particular importance with a focus on international students in higher education. Such learners tend to experience educational systems that are very different from those of their home countries, and with them come a mixed degree of technological readiness and the differences in cultural expectations of digital learning. For a large number of people, insufficient access to consistent internet connections, digital resources, or academic support networks may be an imposition on their involvement in ESP writing practices, where internet-based platforms, collaborative editing tools, and digital submission systems are widespread (Anwar et al., 2024; Arshad et al., in press). The scenario demonstrates the unequal distribution of the notion of technological determinism among student demographics: on the one hand, domestic students may view technology as an indifferent or empowering power that affects their academic life, but on the other hand, international students may face it as one more impediment to academic engagement (Gulzar et al., 2024). Exploring these inequalities can contribute to the clarification of the interactions among access inequalities and mobility, language, and culture, thereby contributing to the overall concept of inclusivity and equity in globalized ESP education (Perspective Chapter, 2024). Even with increased interest in digital tools in ELT, there is a lack of studies that closely examine teachers' experiences with the digital gap in higher education from a theoretical viewpoint. In their study, Soomro et al. (2020) discussed the absence of research on how faculty at higher education institutions, including teachers of language courses, deal with issues related to digital access. In addition, there is insufficient research on how ESP teachers see technological determinism in regard to teaching writing skills.

Responding to previous research, this research addressed the following guiding questions:

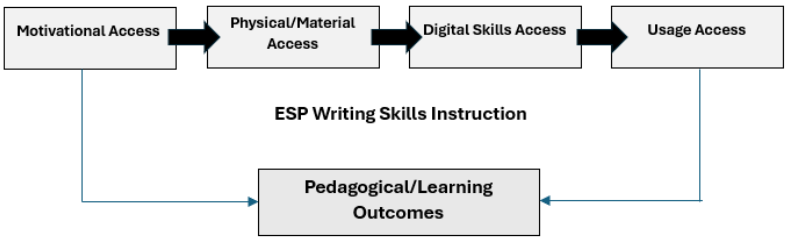
1. How do English language teachers experience a digital divide at different levels (motivational, material, skills, and usage access)?
2. How do ESP teachers perceive the role of technological determinism in addressing the digital divide in teaching writing skills across these four access levels?

As a result of considering these issues, the study seeks to inform both theory and practical application by illuminating how access and teacher views determine the use of technology in higher education.

LITERATURE REVIEW

Digital Divide in Pakistani Higher Education: ELT and ESP Contexts

The digital divide in Pakistani higher education goes beyond access to technology and has to be considered a multidimensional process. Based on the resources and appropriation theory, by van Dijk (2005), as illustrated in figure 1, the divide exists on the motivational, material, skills, and usage access. Although technology can often be framed as a panacea to educational inequalities, it can also recreate social inequalities (Selwyn, 2010).



Motivational (Attitudinal) Access

Motivational access in ELT and ESP settings seems to be quite robust: educators tend to be positive toward ICT, although they should not overrely on it (Al-Wasy, 2020; Shehab, 2022). Nonetheless, engagement is affected by age, gender, and the hierarchy in the institution, as younger faculty prove to be more engaged, and senior staff members are sometimes reluctant to change (Soomro et al., 2020; JDSS).

Material (Physical) Access

Disparities in materials between rural and urban institutions and between the public and private sectors continue to exist, and the infrastructure is not reliable (Jamil, 2021; Jamil & Muschert, 2024). Despite the ubiquity of smartphones, institutional resources are limited, restricting meaningful academic integration (Raza et al., 2018).

Skills Access and Usage Access

The skills and usage access further reveal the third and fourth levels of access where educators and learners have basic operational competence but do not have pedagogical and critical digital literacy, which results in recreational rather than academic use (Soomro et al., 2020; Raza et al., 2018). Through the transition to

COVID-19, the lack of training revealed vulnerabilities in the structures (Jamil & Muschert, 2024). Single-purpose innovations, such as gamified tools (Yunus et al., 2019) or AI-assisted writing feedback (Ittefaq et al. 2025; Malik & Kalim, 2025), are seen as potentially useful, but they are still disjointed and situational.

Rethinking Technological Determinism in ESP Writing

These trends undermine technological determinism, the assumption that technology is an autonomous force that drives educational change (Hynes, 2013). This kind of opinion overlooks the social, pedagogical and institutional circumstances mediating the use of ICT (Selwyn, 2013). Experience in Pakistani settings demonstrates that technology used without any pretraining of pedagogical training can be counterproductive and not useful for instruction (Al-Wasy, 2020; Shehab, 2022), and AI systems work best as assistive technologies (Malik & Kalim, 2025). Technology results, thus, are human agency (Hynes, 2013), making teachers intermediaries that fit the tools to the needs and contextual realities of learners (Asghar et al., 2023; Hallstrom, 2020). Nevertheless, a significant amount of current literature is based on survey-based information (e.g., Soomro et al., 2020; Anwer et al., Remittances Review), which does not provide sufficient information on how ESP teachers manage such tensions in practice.

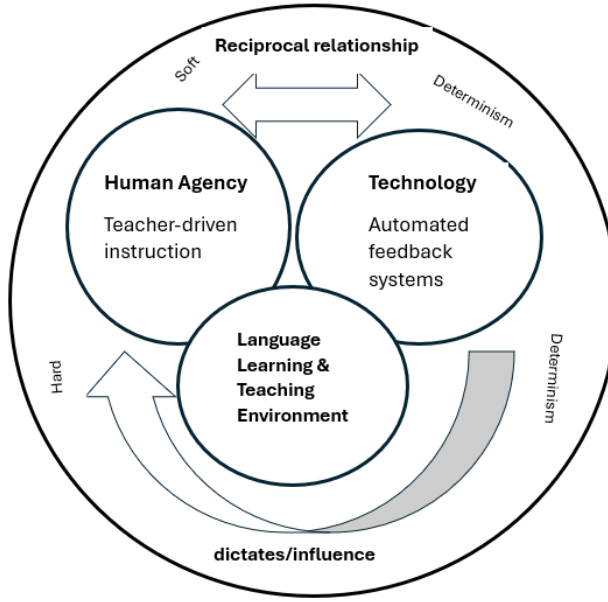


Figure 2: Technological Framework (hard & soft) (Adapted from Hynes, 2013)

A research gap is critical due to the lack of qualitative, experience-based studies, despite emerging evidence of institutional frustration and peer resistance (JDSS). To solve the digital divide in ESP writing teaching, therefore, it is necessary to transcend the explanation of the infrastructure in terms of description to the analysis of teacher agency within the structure. A more careful focus on the lived experiences of ESP instructors can shed light on the reasons behind the gaps in usage and guide more context-sensitive and fairer digital pedagogies that do not rely on deterministic expectations.

Figure 2 shows the technological framework (adapted from Hynes, 2013), which displays the reciprocal relationship between human agency and technology and how they interact and shape language learning and teaching space.

METHODOLOGY

Research Design

The study involves a qualitative exploratory-descriptive research design (Merrium & Tisdell, 2016), aiming at exploring the experiences of digital access of ESP teachers in terms of motivational, material, skills, and usage levels of the digital divide (van Dijk, 2005) and how these experiences reflect their views on technology's role in teaching writing.

i. Research Context and Participants

The study stems from Phase 1 of doctoral research. The complete study had three sequenced phases. A total of 72 ESP teachers participated in the study, teaching ESP courses in the context of higher education institutions and registered for the workshop sessions. These criteria helped to ensure that each of the participants had a common pedagogical role, institutional context and exposure to the intervention, which ensured the coherence of the case. Out of 72 teachers, 29 teachers responded to all-level questions. The questionnaire was administered in two parts to cope with respondent burden related to its length. A total of 63 ESP English language teachers teaching at 28 different universities in Pakistan responded on levels 1, 3, and 4. The data presented in Appendix A indicate that 38 teachers from 16 universities responded to the Physical Access section.

ii. Data Collection Instrument

The questionnaire was created based on theory-informed and literature-driven processes, as displayed in Appendix E. Items were aligned with Van Dijk's four levels of digital divide access (motivational, material, skills, and usage). Appendix C contains the official ethical approval letter issued by the Institutional Review Board/Ethics Committee of the host university. Appendix B includes the participant information sheet and informed consent form used in the study. The coded identification of institutional identities was to safeguard organizational privacy. The qualitative requirements of credibility, dependability, confirmability

and transferability as stipulated by Lincoln and Guba (1985) were followed in the study. Responses from the teachers were kept confidential. Participation was entirely voluntary, and no incentive was provided to avoid coercion.

iii. Data Analysis

Data were analyzed using Braun & Clarke's (2006) six-phased thematic analysis framework. Although we moved from one phase to another, it is not necessarily a linear process (Creswell, 2013). Researchers immersed themselves in vast data to obtain an understanding of the text and content during the familiarization stage. Figure 3 below shows the six-phased thematic analysis framework by Braun and Clarke (2006), which offers a systematic way of interpreting, outlining and reporting trends in information.

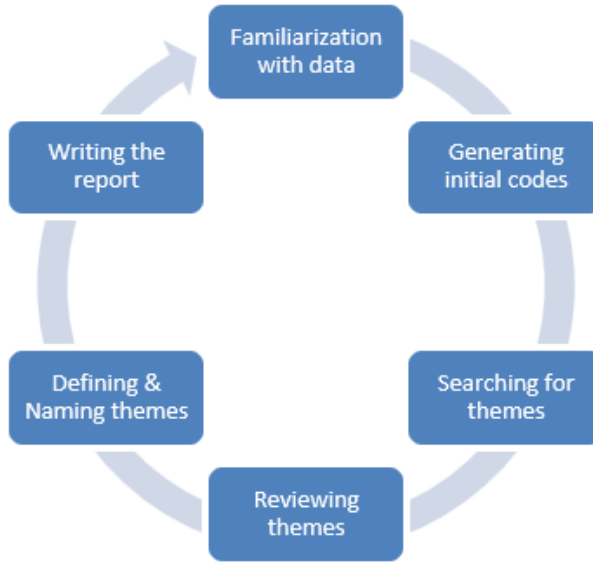


Figure 3: Braun & Clark (2006) six-phase thematic analysis framework

Coding Framework:

We conducted deductive (theory-driven) and inductive (data-driven) thematic analysis using theoretical perspectives of the digital divide and technological determinism lenses to categorize questionnaire responses into patterned themes (Glesne, 2011, 2016). Responses were coded deductively based on Van Dijk's four levels of Digital Divide, and new emerging themes were

identified inductively. Four levels of Digital Divide were used as predetermined themes while analyzing responses to identify hard and soft technological determinism. Finally, the quantification of data to track theme frequency (Sandelowski et al., 2009) is detailed in Appendix D.

FINDINGS AND DISCUSSION

Figure 4 below outlines themes across each access level that were analyzed deductively and inductively.

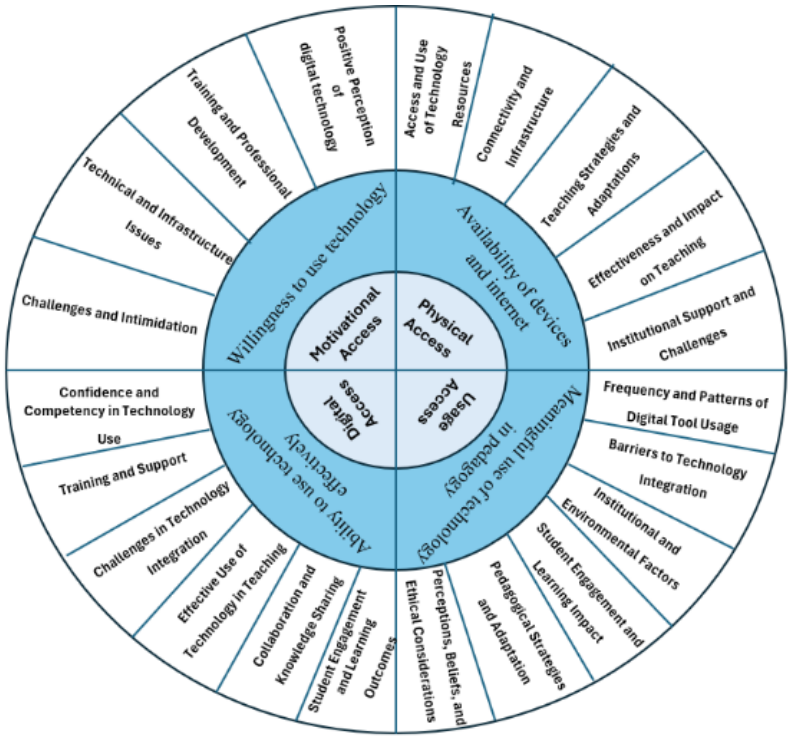


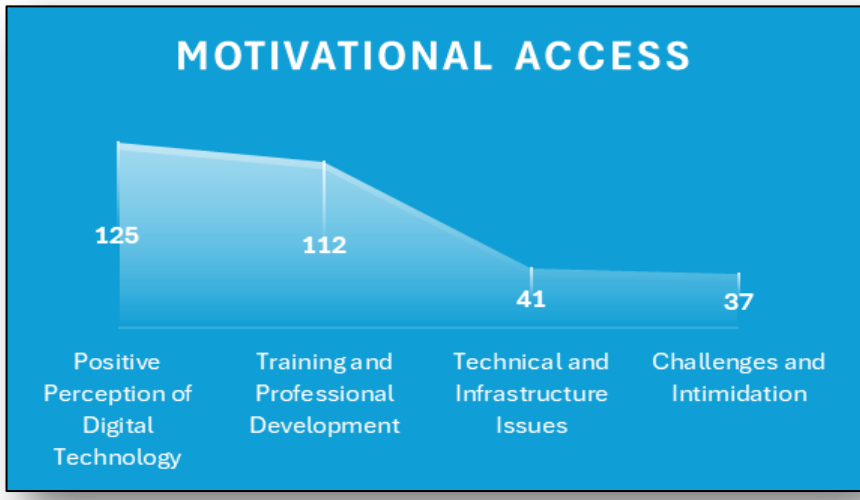
Figure 4: Themes Generated across Four Levels of Access

Teachers' Experiences of Digital Divide across Four Levels

The results and interpretation of each level of the digital divide are given below:

a) Motivational Access (MA)

The study of the digital divide among English language teachers reveals substantial differences between the four levels of access: material, motivational, skills and usage. Four major themes were identified after careful categorization of the initial codes (Graph 1) and are analyzed below:



Graph 1: Experience at Motivational Access (MA)

Teachers who lack motivation or see no relevance in using digital tools may not incorporate them into their teaching practices. This can result in a reliance on traditional methods, potentially missing the benefits of digital tools for teaching writing skills. However, graph 1 depicts some encouraging results highlighting a distinct hierarchy of the factors that influence teachers' motivation. For motivational access, the total number of responses was 315.

- ***Positive Perception of Digital Technology***

A positive perception of digital technology has the highest frequency of occurrence (125), indicating that most teachers show strong dedication to embracing digital tools in the classroom. That positive perception of tech is also motivating for them because they understand how tech can improve student engagement and learning outcomes. *"I loved using digital technology…."* However, that enthusiasm is usually tempered with fears of intimidation and inadequate knowledge of their technological capabilities *"I am afraid the overuse*

of tools like Chat GTP…", "… I do feel like there are…more creative ways for cheating now.", "…some aspects that discourage my engagement…relying completely on digital technology."

- ***Training and Professional Development***

The score (112) indicates that long-term institutional encouragement and professional growth are necessary to ensure that ESP teachers are more confident and motivated to combine technology with the lack of encouragement leading to isolation and a lack of readiness to use digital resources. such as, *"i find it intimidating keeping in mind the lack of access and training in technology."*

- ***Technical and Infrastructure Issues***

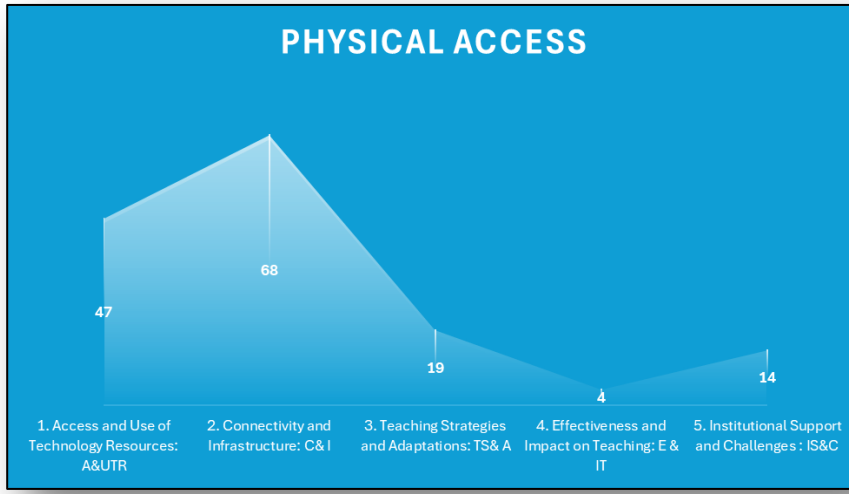
A reasonable frequency of responses (41) indicates technical and infrastructure issues. These issues hinder language teachers' effective interaction with technology. If such issues become frequent, teachers can become demotivated, which affects their willingness to explore and use digital tools. For example, data privacy and security, lack of resources, accessibility issues, etc., as one teacher experience indicates students' accessibility problems, *"…sometimes students do not have laptops."*

- ***Challenges and Intimidation***

Overall, the graph reflects that although positive attitudes and professional growth are powerful incentives, technical problems and intimidation are challenges (37 responses) "*Using digital technology is exciting but challenging at the same time"*. As we know less about technological tools that can hinder ESP teachers' engagement with technology, teachers who lack motivation or see no relevance in using digital tools may not incorporate them into their teaching practices: "*Something is better than nothing. It is helpful, but if learned otherwise, it is hectic"*. This can result in a reliance on traditional methods, potentially missing the benefits of digital tools for teaching writing skills.

b) Physical Access

Access to physical and technological resources is unequal, which restricts the ability of teachers to successfully integrate technology, contributes to the digital divide and ultimately affects student success. Five themes were identified after a close analysis of initial codes and are analyzed below:



Graph 2: Experience at Physical Access (PA)

Graph 2 identifies key factors that may become the cause of the digital divide at the physical access level.

- ***Access and Use of Technology Resources***

In the context of digital divide theory, disparities in access to technology reflect structural inequalities that hinder ESP teachers' capabilities to engage students in various activities. Teachers who have access to personal devices, such as *"I have personal laptop… good internet connection at home…UPS…."*, *"…I use my own internet when university net is unable to access…"* are better equipped to digitally enhanced pedagogy and reduce their reliance on institutional resources, mitigating some aspects of the digital divide. In case personal access is not available, teachers turn to traditional methods or download materials to use them offline. "…*I turn to traditional classroom methods as it saves a lot of time.".* Teachers use "…*university-provided computers, creating offline materials like handouts, prerecording lectures for asynchronous learning."*

- ***Connectivity and Infrastructure***

On asking about the connectivity issues, teachers responded, "…*we are very close to Air Base and due to jammers internet is sometimes very slow… there is frequent power outage...", "… it is quite challenge to access internet here...".* Although institutional support is essential, the workaround of inconsistent connectivity and infrastructural barriers such as external disruptions relies on personal resources and, in turn, exposes the presence of contextual constraints that

directly affect teaching effectiveness and contribute to the digital divide even more.

- ***Teaching Strategies and Adaptations***

A proactive way to stimulate independent learning is for the teacher to encourage students to research and bring materials to class: *"We ask the students to research and collect data at home..."*.

- ***Effectiveness and Impact on Teaching***

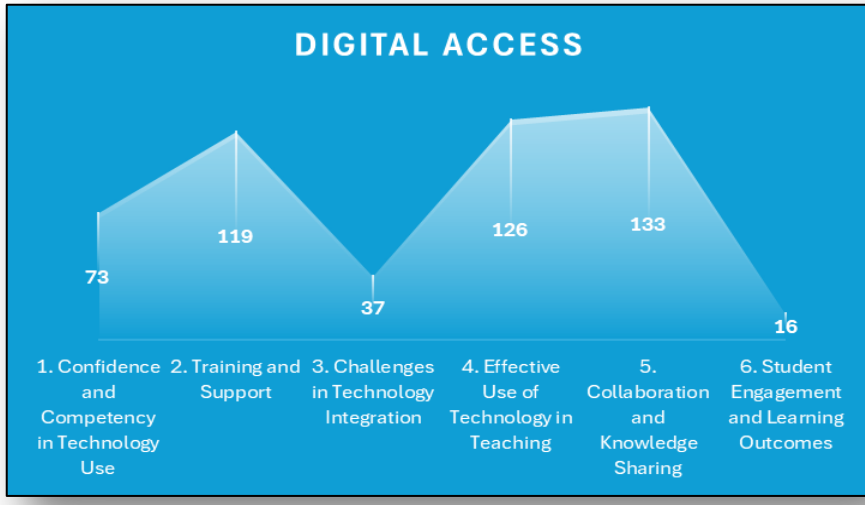
However, this method also points to the restrictions of not having real-time access to online resources, *"...I could not make them practice those tasks which need internet access at that moment..."* making the depth of student engagement and immediacy of feedback less surgical. While the strategy encourages critical thinking and self-directed learning, it might reinforce inequity, as not all students have the same resources outside of the classroom.

- ***Institutional Support and Challenges***

Surprisingly, enough support for teachers exists, however, because the support is so inaccessible and does not work to the teachers' advantage *"Support is available but they are not always accessible."*, teachers begin to become frustrated and ultimately demotivated about their instructional practices. These challenges are compounded by the limited access to alternative resources, *"We have very little access to alternate resources",* which further limits educators' capacity to innovate and meaningfully engage students. These twin shortages of support and insufficient resources not only undermine the quality of teaching but also contribute to a sense of dejected helplessness among teachers: *"Nonavailability of resources makes a teacher demotivated for instructional activities"* and lead to a dumbing down of the system of education in their classrooms.

c) Digital Access

Based on the digital divide and Resources and Appropriation theories proposed by van Dijk (2005, 2020), the study highlights that digital inequality not only exists in the form of physical access to technology but is also determined by motivational, skills, and usage access and the presence of sufficient material and cognitive resources that can facilitate meaningful integration. The themes are analyzed as follows:



Graph 3: Experience with Digital Access (DA)

The analysis (Graph 3) of English language teachers' experiences regarding digital access has illustrated a complicated nexus of both opportunity and barrier along such lines as consistent with van Dijk's (2005, 2020) conception of the digital divide as a multilevel phenomenon.

- ***Confidence and Competency in Technology Use***

The analysis shows the evident differences in digital literacy levels of ESP teachers manifesting in the different levels of confidence. Highly confident instructors exhibit functional mastery, *"... I use digital tools even in traditional class settings."* Even *"Not any training yet in Pakistan!"* signifies high levels of skills gaps; although many may seek to offset this through self-education and constant practice, *"...have got 1 or 2 trainings but they are not sufficient."* These asymmetrical skills competencies depict a skills access gap that, as theorized by van Dijk (2005, 2020, 2017), argues that simply providing technology does not guarantee its effective appropriation by the user, without corresponding competence.

- ***Training and Support***

Training quality strongly influences digital skills development. Teachers with limited or no training reported difficulty handling basic digital platforms. Therefore, unequal access to educational resources and professional development leads to stratified teacher capabilities. *"Tailored and practical training is needed to meet actual classroom demands."* It points to a lack of context-specific digital skills training. Generic training fails to build applicable competencies.

- ***Challenges in Technology Integration***

Teachers face several challenges not only due to infrastructure but also due to insufficient digital skills and a lack of user-friendly design. *"Creating online quizzes and evaluating online exams are a bit challenging at times."* It shows the struggle of the teacher with advanced operational skills. Even motivated users to withdraw when technology is too complex, *"Nonuser-friendly tools discourage me from continuing*. When teachers revert to traditional methods, *"I switch back to traditional methods because digital tools are difficult to handle."* It is not always due to preference, but it may also indicate resistance rooted in skill, resulting in a lack of digital skill confidence and usability frustrations, pointing toward the third level of the digital divide (van Dijk, 2020).

- ***Effective Use of Technology in Teaching***

Teachers who are skillful digital teachers use technology innovatively in their classrooms, differentiating them from teachers who use it minimally or not at all. *"...once you have given enough time, it plays for you and your students."* It shows adaptive digital learning, and initial resistance overcome by determination leads to skill growth. *"Using apps like Quizlet and Duolingo is still challenging for me."* This shows that tool-specific digital literacy gaps lead to limited effective pedagogical use. In another instance, teachers' views reflect self-reliance and informal skills building using online resources. *"I normally consult YouTube videos for troubleshooting."*

- ***Collaboration and Knowledge Sharing***

Peer support plays a crucial role in digital skill development. Where support networks are weak, self-learning becomes harder, thus deepening the skills divide. *"I have senior colleagues for support, but we still need to explore more."* Skill growth is slow when peer networks are not highly skilled. *"Few colleagues are tech-savvy and willing to share tools and methods."* The response highlights the positive impact of collaborative learning, thus improving digital skills. *"Some colleagues with good digital knowledge do not share their methods."* It shows how a lack of collaboration exacerbates the skills gaps of individuals, especially when institutional learning structures are weak. The social dimension in van Dijk's framework is vital in that social capital adds to digital skills and usage.

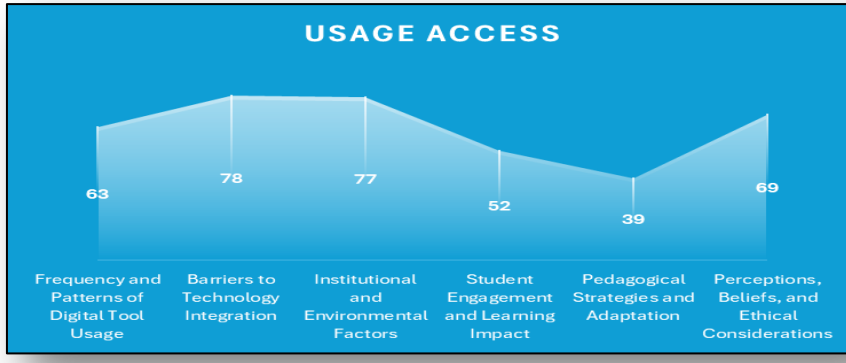
- ***Student Engagement and Learning Outcomes***

Teachers realize that digital skill competency plays a crucial role in student engagement. Struggles in handling online engagement indicate a gap in advanced pedagogical digital skills: *"I prefer Zoom because I can see and observe students' activities more efficiently." "Managing online discussions with a large class is difficult."*

According to the Resources and Appropriation Theory, partial technology appropriation implies that in the absence of robust operational, informational, and strategic digital capabilities (van Dijk, 2008), even simple access to devices and the internet reinforces the digital divide and highlights the need to implement pedagogical innovations and specific interventions to ensure that digital tools can contribute to the development of writing among ESP learners meaningfully to make them autonomous learners (Irshad & Janjua, 2022).

d) Usage Access

This is the culmination of the process, the usage access to interpret their digital competencies to create meaningful outcomes. As shown in the graph (Graph 4), the findings indicate the diverse realities that teachers encounter at this last but essentially crucial stage.



Graph 4: Experience at Usage Access (UA)

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- ***Frequency and Patterns of Digital Tool Usage***

The embedded digital divide conceptualized by van Dijk (2005) is analyzed in relation to English language teachers' experience with digital tools as a layered digital divide based on motivational, material, skills and usage access. Although there appears to be frequent digital tool usage (63 responses) (*"I frequently use it in my classes"),* there are a significant number of teachers who use the tool just occasionally or not at all *("Just relying on projector and WhatsApp groups*), thus suggesting variability in how and who has access to using the tool.

- ***Barriers to Technology Integration***

Complaints about technical barriers (78 responses) *"Sometimes multimedia do not work, poor internet facility, load shedding"* show that the provision of technology does not automatically lead to its effective use. Regarding usage

access, teachers have varied levels of digital literacy, as some of them were able to innovate creatively *"Yes, creative writing after a detailed exploration on ChatGPT",* while others admitted to being open about struggling *"No, I am still struggling with implementing such tools in my class because I lack the confidence and experience".*

- ***Institutional and Environmental Factors***

Teachers who are found in supporting environments (77 responses) *"My institution encourages the use of technology and even organizes training programs" exhibited* higher use access than the teachers subjected to curriculum and systemic resistance *"Curriculum and syllabus is not supporting the integration of technology for activities".*

- ***Student Engagement and Learning Impact***

Fifty-two responses from teachers highlighted the frequency of engagement and learning outcomes. Positive student responses *"Students enjoy using digital-based activities"* can be motivational reinforcements that can narrow the gulf. However, "*It becomes difficult sometimes to build connection with the students".* This matches van Dijk's (2005) reasoning that digital inequality is cumulative: material access alone isn't enough without motivation; skill alone won't be used unless motivated, and a conducive institutional environment is necessary even for the skilled. In addition, as van Dijk states, informal peer networks may exacerbate or diminish the skill access gap depending on the strength of their collaboration (van Dijk 2005).

- ***Pedagogical Strategies and Adaptation***

The lowest recorded responses (39) on this theme indicate that adapting teaching methods to fully utilize digital tools remains a major challenge. Since digital strategy is still not widespread among teachers, they have difficulty using technology to its fullest and helping students overcome the usage divide. Some teachers tried to overcome technology barriers by developing certain strategies. One said, "*by information outsourcing and enabling students to create opportunities for themselves".* However, a few lack this ability of adaptation, *"I find physical classrooms better."* or *"I am still struggling implementing such tools…"*

- ***Perceptions, Beliefs, and Ethical Considerations***

A significant number of responses (69) touched on beliefs, opinions and ethical approaches: *"… it may lead to some unethical activities or bad experiences…". "…use of hightech tools. It is an integral part no doubt, but not the "whole" of it".* Participants provided a range of opinions about the impact of

technology, the challenges of using AI in education and the balance between writing using apps and traditional methods. Van Dijk says that motivational access, founded on beliefs and attitudes, is relevant at even usage levels.

The findings indicate that although English language teachers have advanced a lot in promoting usage access, that access is still highly fragmented and uneven. The findings support van Dijk's (2005) Digital Divide theory that hardware access is not enough to bridge the digital divide at the usage level; rather, it requires ongoing institutional support, sufficient professional development, equitable infrastructure, and proper consideration of motivational and skill gaps.

Technological Determinism in ESP Teachers' Perceptions and Practices

The thematic analysis of ESP teachers' responses reveals technology's role in shaping writing instruction that can be meaningfully understood through the theoretical lens of technological determinism. Using the frameworks provided by Chandler (1995), Feenberg (1991), and Hynes (2013), this analysis will illustrate how there are multiple (hard and soft) determinist views regarding architecture and strong implications for teacher agency, institutional support and the use of digital tools.

- ***Hard technological determinism: Technology as an autonomous force***

According to Chandler (1995), hard determinism holds that technology, independently of human beings, develops and leads alterations in the social and cultural sphere without the significant role of human agency. In the context of this study, a minority of teacher responses portray a deterministic position that effectively regards technology as a force that cannot be denied with inevitable power in educational trends.

One teacher commented:

"The biggest challenge is AI. Our students tend to use it to create 'original' content as a replacement for intellectual labor."

Conforming to Feengberg's (1991) critique of a hard determinism, technology is not just a neutral tool but is a system that obliges to its own logic (here, the absence of the teacher's control over academic integrity and the learning environment to reduce the teacher's capacity to monitor). Moreover, this deterministic view is intensified by institutional inaction: *"Overall traditional and neo-liberalist learning environment wherein performativity is prioritized over innovation is a key challenge."*

This demonstrates how technological imperatives, pushed forcefully from the start of this century into the educational institutions that are themselves neoliberal, contribute to hard determinism's contention that society conforms to technology not the other way around (Chandler, 1995).

- ***Soft determinism: Role of human agency in shaping technological use***

On the other hand, as Hynes (2013) and Feenberg (1991) argue, soft determinism contends that technologies influence possibilities, but it is human choices, values and institutional contexts that determine how such technologies are actually realized. A few teachers defined intentional and creative pedagogical adaptations of technology as follows:

"Yes, creative writing after a detailed exploration on ChatGPT. It was a group activity done using laptops and personal internet connections to ensure productive time."

Technology here is not used as a means to drive change but as a resource to be creatively combined with pedagogical strategies. This is consistent with Feenberg's (1991) theory of instrumentalization, which explains that technologies are socially formed and contextually embedded. Another example highlighting soft determinism comes from a teacher who responded that:

"Students get very excited whenever I incorporate technology... through surveys, QR codes, or forum discussions."

These are illustrations of how teachers exercise agency, choosing and adapting tools to increase learning, consistent with Hynes's (2013) notion that technology and users are in cocreative relationships, and educational goals shape the trajectory of technology use. Even in the presence of institutional barriers, some teachers showed resilience and adaptability:

"I overcame these challenges in my classes of speaking skills, academic writing... by using different relevant tools."

These illustrations of teachers carrying out their tasks suggest that they are not actually being changed by technology but rather actively putting technology to new use within material and pedagogical bounds, thus supporting Feenberg's (1991) idea that users can democratize and reshape technology using reflective practice.

- ***Tension Between Hard and Soft Determinism in Practice***

The data also point toward the tension between determinist views: ESP teachers negotiate between what is perceived to be a technologically inevitable future and personal or institutional control. This is evident in a teacher response as follows:

"It's a need of the hour, no doubt, but learning and teaching are much more nuanced than just the use of high-tech tools. It is an integral part no doubt, but not the "whole" of it."

Soft determinism's optimism is a cautious optimism that recognizes the systemic pressures of hard determinism's reality while encapsulating the flexibility of soft determinism. In addition, it demonstrates the ambivalence of digital impact as expressed by Chandler (1995) as empowerment on the one hand and constraint on the other, depending on context and implementation.

The results show that soft technological determinism reflects ESP teachers' lived experiences. Teachers acknowledge the pedagogical implications of digital

technology but highlight the agency of contextual, institutional, and pedagogical variables in driving its applications. However, elements of hard determinism are evident in teachers' concerns over the misuse of AI, monitoring issues, and institutional inertia, reflecting an ongoing tension between human agency and technological influence. According to Feenberg (1991) and Hynes (2013), progress toward a more equitable integration of technology in writing instruction depends not only on access but also on the dynamic shaping of technology by teachers, institutions, and policy designs.

CONCLUSION

The present research shows that the digital divide of ESP writing instruction is a multilevel, context-sensitive phenomenon that is determined by motivational, material, skills, and usage access (van Dijk, 2005) and mediated by the negotiation of technological determinism by teachers. Although the majority of teachers expressed high intrinsic motivation and critical perception of the fact that technology can never substitute pedagogical vision (Batool et al., 2025; Ertmer, 1999; Warschauer, 2004), structural disparities such as unstable infrastructure, limited devices, poor connectivity, and inadequate institutional support curbed equal integration and had to depend on their own resources (Selwyn, 2010). Digital competence variations also demonstrated a skills-based gap, with some teachers adopting AI, LMS systems, and interactive tools creatively and others failing because of a lack of training and peer support, which confirmed that inequality is perpetuated by access without operational and strategic literacy (Fernandez-Batanero et al., 2022). Whereas a minority of opinions were expressed as hard determinist issues with regard to automation and ethical dangers (Chandler, 1995), the prevailing position of soft determinism saw technology as socially constructed and even more pedagogically gained through human action (Feenberg, 2002; Hynes, 2013).

The implications of these findings are clear: governments and institutions should provide stable infrastructure, equal distribution of devices, and stable access to the internet; introduce long-term and context-sensitive professional development aimed at digital-pedagogical competence and ethical use of AI; introduce collaborative mentoring systems at the departmental level; and redesign institutional policies that would help to transform individual responsibility to system responsibility. Digital transformation in ESP writing can only be shifted beyond technological delivery to equitable and human-centered educational transformation through coordinated investment in infrastructure, training, and pedagogical support.

These findings are particularly important for international students in ESP programs who experience linguistic, cultural and technological transitions simultaneously. Digital inequalities in host institutions may aggravate preexisting inequalities in access, digital literacy and academic writing conventions, especially in AI-mediated environments with varied norms of academic integrity. Therefore, equitable access to digital tools, explicit instruction in the ethical use

of AI and culturally responsive writing support are critical to promote inclusive learning and successful academic integration.

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×☐ Some sections, with extensive editing

This article incorporates the artificial intelligence (AI) tool (ChatGPT) to improve sentence structure, grammar and clarity. The sections where the AI tool was employed are the Introduction, Literature Review, Findings and Discussion sections. The use of AI tools complied with ethical standards and guidelines for academic integrity. The final content has been thoroughly reviewed and edited to ensure accuracy, relevance, and adherence to academic standards.

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Author bios

SADIA ARSHAD, Senior Lecturer serving in the School of Civil & Environmental Engineering (SCEE), at the University of Sciences and Technology (NUST), Islamabad. She is a PhD scholar at Air University, Islamabad. Her research interests span English language teaching (ELT), computer-assisted language learning (CALL), sociolinguistic competence, discourse analysis, and corpus linguistics. Passionate about advancing innovative teaching methods and exploring the intersection of technology and language education, she strives to contribute meaningful insights to these dynamic areas of study.
Email: sadia.arshad@nice.nust.edu.pk

HUMA BATOOL is an Assistant Professor in the Department of English at Air University, Islamabad. She holds a PhD in Cognitive Linguistics, with research interests spanning Psycholinguistics and Neurolinguistics. With over 20 years of experience in English Language Teaching (ELT), she has been an advocate of technology-enhanced pedagogy, consistently integrating digital tools into language learning. Her recent work focuses on exploring the pedagogical potential of generative AI in ELT and linguistics classrooms at both the undergraduate and postgraduate levels. As an Academic Collaborator for the National Research Program for Universities (NRPU) project on developing digital competencies among English Language Teachers in Pakistan, Dr. Batool has played a pivotal role in organizing training sessions, workshops, webinars, and two international conferences, and in conducting impactful training sessions to build digital capacity among educators. Email: humabatool2019@gmail.com

SADIA IRSHAD is an Assistant Professor of Linguistics in the Department of English at Air University, Islamabad. Her research focuses on technology-enhanced language pedagogy, teacher education, and digital literacy in ELT. She has participated in a number of funded opportunities offered by RELO Pakistan, including professional development and teaching programs such as English Works, teacher exchange programs at the University of Nebraska, and completed professional development courses through Arizona State University. Dr. Irshad has worked on three HEC-funded research projects, including a recent project as a principal investigator awarded under the National Research Program for Universities (NRPU) project on developing digital competencies among English language teachers in Pakistan.
Email: sadia.irshad@mail.au.edu.pk