



The role of technology in Project-Based Learning: Perspectives of Grade 10 English Second Language Learners in Eastern Cape, South Africa

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ABSTRACT

This study examines the integration of digital technologies within Project-Based Learning (PBL) for Grade 10 English as a Second Language (ESL) learners in the Eastern Cape, South Africa. The main aim was to investigate the challenges learners face when using technology for project-based writing and the impact on their language acquisition and engagement. A qualitative case study design was employed, using semi-structured interviews with ten purposively sampled learners; data were analysed thematically. The findings highlight a disconnect between technological potential and contextual realities, identifying unreliable internet access, inconsistent device availability, insufficient teacher scaffolding, and prevalent digital distractions as key barriers to focused language practice. Importantly, learners expressed a clear preference for engaging, multimodal tools such as presentation software and digital storytelling apps. This contribution to the literature foregrounds learner perspectives in under-researched settings, emphasising that successful digital PBL depends on responsive and learner-centered design. Recommendations include the implementation of structured digital access plans, the integration of literacy training in curricula, the use of distraction mitigation strategies and the integration of technologies endorsed by learners to create more equitable and effective language learning environments. The study concludes that effective technology integration in under-resourced ESL contexts requires holistic strategies that address pedagogical, support, and infrastructure gaps.

Keywords: Technology Integration, Project-Based Learning, ESL Learners, Digital Literacy, Eastern Cape.

INTRODUCTION

The evolution of teaching and learning contexts and the incorporation of digital technologies into education have changed how teachers approach and apply pedagogical practices.¹ Project-based learning (PBL) is an active, collaborative, and inquiry-based teaching approach that promotes meaningful engagement with the content and fosters in-depth knowledge of the subject matter. It deepens understanding of subject matter and real-world contexts, while stimulating and enhancing critical and

¹ Graham Stanley, *Project-Based Learning in the Digital Age* (London: Routledge, 2021).

problem-solving thinking.² Technology is essential for English Second Language (ESL) learners, as it provides valuable resources for language acquisition and proficiency development through interactive and engaging learning materials, collaborative online platforms, and authentic communication experiences.³ This can be particularly helpful in the Eastern Cape and other regions where learners may face limited opportunities to practice English or access language-learning resources, helping them bridge linguistic and resource gaps.⁴

In addition to potential benefits, there may be several challenges in using technology-enhanced PBL approaches for ESL education, particularly in resource-constrained settings such as the Eastern Cape. Factors such as limited access to reliable internet, lack of digital devices, and disparities in teacher preparedness and learners' digital literacy can impede the effective integration of technology in ESL classrooms.⁵ Moreover, there is a lack of research on the experiences of Grade 10 ESL learners in the Eastern Cape regarding technology-supported writing development in PBL.⁶ Without a comprehensive understanding of learners' perceptions and experiences, teachers, researchers, and policymakers may struggle to develop context-specific strategies that leverage technology for language development in PBL settings in the Eastern Cape. Therefore, the study examines the perceptions, experiences, and challenges of Grade 10 ESL learners regarding technology use and integration in PBL in the Eastern Cape, with a particular emphasis on developing writing skills. The following research question underlies the study: What challenges do Grade 10 ESL learners face when using technology to engage in project-based writing activities, and how do these challenges affect their language acquisition and engagement?

LITERATURE REVIEW

Technological Accessibility and Digital Literacy in PBL

For digital tools to be fully leveraged in project-based learning (PBL), learners should have access to and basic knowledge of their usage. Empirical evidence suggests that when learners have equitable access to devices and stable Internet connectivity, they are more likely to actively participate in group activities, use a broader range of digital materials, and engage in the higher-order thinking skills required by PBL.⁷ In contrast, the digital divide that persists in many parts of the world creates disparities that can be exacerbated by technology-enhanced learning (TEL). In rural and low-income areas, such as in the Eastern Cape, inconsistent connectivity and a lack of devices may limit opportunities for meaningful engagement in TEL.⁸ Learners affected by this divide may experience lower academic achievement, motivation, and overall engagement.⁹ Bridging this divide is therefore not only a technical challenge but also a pedagogical one in striving for inclusive education. Digital literacy includes not only operational skills but also the ability to critically evaluate, ethically use, and creatively apply digital technologies.¹⁰ It can offer ESL learners the opportunity to access authentic language input, interact with peers and native speakers on various platforms, and use multimedia tools to support their comprehension and production. However, without systematic guidance, technology can become a source of confusion and frustration for learners.¹¹

² Di Xu, Wei Huang, and Hai Wang, "Enhancing Critical Thinking through Project-Based Learning: A Meta-Analysis," *Educational Research Review* 100521 (2023): 39.

³ Panagiotis Panagiotidis, Panagiota Krystalli, and Panos Arvanitis, "Technology as a Gateway to Language Acquisition: Perspectives from Second Language Learners," *Computer Assisted Language Learning* 36, no. 4 (2023): 489–512.

⁴ Yong Zhao and Chun Lai, "Technology and Language Learning in Under-Resourced Contexts: Opportunities and Limitations," *Language Learning Journal* 51, no. 2 (2023): 178–94.

⁵ B. A. Lukas and Melor Md Yunus, "ESL Teachers' Readiness in Integrating Technology into Under-Resourced Classrooms," *TESOL Quarterly* 55, no. 2 (2021): 345–67.

⁶ Jin Lee, Hyejin Park, and Kim Soojin, "Digital Gaps in ESL Education: A Case Study of Rural Learners," *Language Teaching Research* 25, no. 4 (2021): 512–30.

⁷ S. Kalyani, "Digital Literacy and Its Role in Enhancing Collaborative Learning Outcomes," *International Journal of Educational Technology* 21, no. 1 (2024): 34–50.

⁸ Glenn Pierce and Patricia Cleary, "The Digital Divide in Education: Access, Equity, and Policy Implications," *Educational Policy Review* 39, no. 2 (2024): 223–45.

⁹ María De la Hoz and Javier López y Ana García, "Digital Inequity and Learner Engagement in Rural Educational Contexts," *Journal of Educational Equity and Access* 15, no. 3 (2023): 210–28.

¹⁰ Kalyani, "Digital Literacy and Its Role in Enhancing Collaborative Learning Outcomes."

¹¹ Albert Sangrà, Mercedes González-Sanmamed, and Javier Echeverría, "The Role of Digital Literacy in the Learning Process: A Study of Higher Education Students," *Computers in Human Behavior* 92 (2019): 20–29.

Pedagogical Support and Teacher Facilitation

Teacher-mediated technology in PBL is another vital consideration. Active and informed teacher facilitation is crucial, including demonstrating and scaffolding the use of digital tools in language-learning tasks, modelling effective practices for collaborative digital communication, and providing formative feedback.¹² Learners have reported greater engagement and self-efficacy in completing digital projects when teachers are not only confident but also skilled in technology.¹³ However, a gap in teacher preparedness can impede the effective implementation of technology in PBL. Some teachers, especially in under-resourced contexts, may lack the necessary training or skills in technology-enhanced pedagogies, resulting in uneven instructional support and missed opportunities for language acquisition.¹⁴ Professional development that addresses the pedagogical (not just technical) aspects of digital integration is key to effectively preparing teachers to support ESL learners in technology-mediated PBL.¹⁵

Barriers to Language Acquisition in Digital PBL Environments

However, despite its benefits, technology also presents unique challenges that can hinder effective language learning. Digital distractions, such as social media and entertainment websites, as well as the multitasking nature of digital environments, are often highlighted as barriers to sustained attention and deep learning.¹⁶ For adolescents, the temptation to engage in non-educational content can be particularly distracting during writing and collaborative activities. In addition, issues of usability and cognitive overload can also serve as barriers. Educational software with non-intuitive interfaces can contribute to extraneous cognitive load, reducing the mental resources available for language processing and content comprehension.¹⁷ Navigation difficulties and technical issues can also lead to learner frustration and decreased motivation, ultimately affecting the learning experience.¹⁸ These challenges underscore the importance of purposefully designed tools and structured instruction in digital literacy to help learners effectively manage digital distractions and navigate digital spaces.

Innovative Strategies for Enhancing Technology-Infused PBL for ESL Learners

To leverage technology and address potential obstacles, the literature offers evidence-based suggestions tailored to ESL learners' needs. Integrating collaborative digital tools (e.g., Google Classroom, Microsoft Teams) for project management, peer feedback, and real-time or asynchronous communication encourages interaction and collaboration, fostering a more effective learning environment. It builds a supportive learning community that facilitates language development through a community of practice.¹⁹ Implementing gamification techniques (e.g., points, badges, leaderboards) can enhance motivation, reduce language anxiety, and promote a sense of play and intrinsic motivation in language learning.²⁰ Incorporating multimedia and multimodal resources (videos, infographics, interactive simulations) provides contextual support, caters to diverse learning styles, and aids in understanding and retention of complex linguistic and content-related concepts.²¹ Designing scaffolded tasks by breaking down complex projects into sequenced steps with structured support builds confidence

¹² Yu Song, Xin Li, and Lei Zhang, "Teacher Facilitation in Technology-Enhanced PBL: Strategies and Impacts," *Journal of Educational Computing Research* 62, no. 1 (2024): 154–78.

¹³ Kalyani, "Digital Literacy and Its Role in Enhancing Collaborative Learning Outcomes."

¹⁴ Lukas and Melor Md Yunus, "ESL Teachers' Readiness in Integrating Technology into Under-Resourced Classrooms."

¹⁵ Laura M. Desimone and Michael S. Garet, "Effective Professional Development in the Era of Digital Learning," *Educational Researcher* 49, no. 7 (2020): 479–87.

¹⁶ Alexander J. Dontre, "The Influence of Technology on Student Distraction in the Classroom," *Computers & Education* 168 (2021): 104208.

¹⁷ Primeast, "Usability and Cognitive Load in Learning Technology: Strategies for Improvement," *Journal of Interactive Learning Research* 35, no. 2 (2024): 189–205.

¹⁸ Abdullah Alharbi, "E-Textbook Utilisation in Saudi High School Classrooms: Teachers' Perceptions and Practices" (University of Exeter, 2022).

¹⁹ Wipada Jayothisa, Lawrence Wong, and Wenli Chen, "Collaborative Digital Platforms in Language Education: A Study of Google Classroom and Microsoft Teams," *Educational Technology Research and Development* 69, no. 3 (2021): 1457–78.

²⁰ Lisa Facey-Shaw, "Gamification for Language Learning: A Meta-Analysis of Its Effectiveness," *Interactive Learning Environments* 28, no. 5 (2020): 567–81.

²¹ Shakeel Bhat and Suad Alyahya, "Multimedia Integration in Language Learning: Effects on Comprehension and Motivation," *Journal of Educational Multimedia and Hypermedia* 32, no. 1 (2023): 45–67.

and competence.²² Ensuring that culturally responsive and authentic projects that are relevant to learners' lived experiences, cultural contexts, and real-world issues are vital for engagement, critical thinking, and meaningful language use.²³ Effective adoption of these strategies relies on continuous, pedagogy-driven professional development for teachers and a school-wide commitment to creating resource-equipped and supportive learning environments.

THEORETICAL FRAMEWORK

The study is grounded in Jean Piaget's Cognitive Constructivist Theory, which emphasises learners' active role in constructing knowledge through interactions with their environment, thereby challenging the notion of passive knowledge acquisition.²⁴ Piaget's theory of cognitive development is grounded in the adaptive learning process, which is facilitated by two core mechanisms: assimilation and accommodation. Development is characterised as a dynamic, self-driven journey of exploration, problem-solving, and reflection, principles that mirror the inquiry-based, learner-centered pedagogy inherent in PBL.²⁵ When Piaget's constructivist lens is applied to technology-enhanced ESL learning, digital tools are reconceptualised not merely as passive vessels for information delivery but as cognitive extensions that enrich and expand learners' research, creation, and collaboration processes.²⁶ For instance, when learners use multimedia software to create a digital story, they actively assimilate new vocabulary and narrative structures while developing their understanding of digital composition and audience engagement. Similarly, in PBL environments, writing transcends abstract exercises and becomes a concrete problem-solving activity, closely aligning with the principles of constructivist learning. Although Piaget's theory primarily focuses on the individual learner's cognitive development, it does not discount the significance of social interactions as a catalyst for mental growth.²⁷ In digital PBL contexts, this aspect of social learning is further accentuated by online collaboration opportunities, which facilitate peer feedback, meaning negotiation, and the co-construction of understanding, all of which are essential components of second language acquisition.²⁸ In essence, this theoretical lens places the Grade 10 ESL learner at the center of the inquiry as an active constructor of meaning. It enables the study to analyse and interpret how digital tools and project-based tasks can be intentionally designed to foster conditions conducive to active learning and language development.

METHODOLOGY

Method and paradigm

A qualitative research approach was used to gain a thorough understanding of the perspectives and experiences of learners. The qualitative approach to inquiry is designed to investigate a specific phenomenon in a natural environment, enabling the generation of detailed, rich data.²⁹ The research was grounded in an interpretivist paradigm. This paradigm assumes that reality is socially constructed and that knowledge is created through human experience and interpretation.³⁰ The interpretivist approach was suitable for this study, as the primary goal was to understand how Grade 10 ESL learners interpret the role and impact of technology in their PBL. Instead of aiming to find an objective reality, the interpretivist approach acknowledges the diversity of learners' views to create a comprehensive picture of the problems that exist and the impact of technology use on PBL for this group of learners within the given school context.

²² Sara Berenji, "Scaffolding in Technology-Enhanced Project-Based Learning: A Case Study of ESL Learners," *Language Learning & Technology* 25, no. 2 (2021): 36–52.

²³ Sigal Eden, Avi Cohen, and Gal Shwartz, "Culturally Responsive PBL: Enhancing Relevance and Engagement for Diverse Learners," *Journal of Multicultural Education* 18, no. 1 (2024): 55–73.

²⁴ Jean Piaget and Margaret Cook, "The Construction of Reality in the Child," 1954.

²⁵ Thanh Nghiem, Linh Tran, and Hoa Nguyen, "Constructivism in Digital PBL: A Framework for Active Language Learning," *Journal of Language and Education* 11, no. 1 (2025): 89–105.

²⁶ I. Sulindra and G. Made., "Digital Tools as Cognitive Extensions in Constructivist Learning Environments," *Educational Technology & Society* 27, no. 1 (2024): 112–26.

²⁷ Piaget and Cook, "The Construction of Reality in the Child."

²⁸ Lev S Vygotsky, "Mind in Society: The Development of Higher Psychological Processes" (Harvard university press, 1978).

²⁹ J. W Creswell and C. N Poth, *Qualitative Inquiry and Research Design: Choosing among Five Approaches*, 4th ed. (Sage, 2018).

³⁰ James Scotland, "Exploring the Philosophical Underpinnings of Research: Relating Ontology and Epistemology to the Methodology and Methods of the Scientific, Interpretive, and Critical Research Paradigms.," *English Language Teaching* 5, no. 9 (2012): 9–16.

Research Design

The research design employed was a case study design. A case study is an empirical investigation that examines a contemporary phenomenon or case within its real-life context. The case for this research was the experiences of Grade 10 ESL learners in using technology-integrated project-based learning in a particular school in the Eastern Cape. This design provided an opportunity to conduct an in-depth and holistic investigation of the complexities of technology use, specific problems, and their impact within the bounded system of this group of learners.

Data Collection

The primary data collection tool was semi-structured, in-depth interviews. In-depth interviews were chosen because they provide a standardised approach while allowing the researcher to address new issues that may emerge, and enabling the interviewees to tell their story in their own words.³¹ An interview guide was used to ensure that key areas needed to address the research question were covered. The key areas that were discussed with the learners during the interviews were their access to devices and the Internet for learning purposes, their experiences using technology and other digital tools when doing PBL writing tasks, the type and perceived sufficiency of scaffolding provided by the teacher, what kind of distractions and hindrances they experienced when using technology for learning, and their recommendations on what can be done to support technology-enhanced PBL. The interviews lasted 30 to 45 minutes and were conducted in a quiet, private room at school to avoid interruptions and create a comfortable environment for the learners. The interviews were audio-recorded with the learners' consent, and the audio recordings were transcribed verbatim.

Sampling and Participants

A purposive sampling approach was employed to ensure that the selected participants could provide in-depth, relevant information about the phenomenon under study. Participants had to meet the following criteria: they must be currently enrolled as Grade 10 learners, officially identified as ESL learners, and have participated in at least one technology-enhanced PBL activity during the year. As a result, ten (10) learners from a public high school located in the Eastern Cape were recruited to participate in the study. The sample also included male and female learners to account for a variety of perspectives within the bounded case.

Data Analysis

The audio recordings were transcribed verbatim, yielding the full dataset. Braun and Clarke's six-phase approach to thematic analysis was used to analyse the dataset. The six phases of thematic analysis involve familiarisation with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report.³² During the analysis, the transcripts were read and re-read to become familiar with the data. Coding of the data began, identifying relevant parts and attaching labels to the content deemed meaningful. Codes were then grouped to form potential themes, which were reviewed to ensure they were appropriate and representative of the dataset. Once the themes were reviewed, the data were used to identify the essence of each theme, which served as the basis for generating the analytical report, illustrated with rich, meaningful excerpts from the dataset. The analysis was performed manually to allow close contact with the dataset. During the process, emerging themes were cross-checked against the original transcripts to ensure that they were interpreted as intended.

Ethical Considerations

Ethical protocols guided all research stages. The university's ethics committee, provincial education department, and school principal approved the study. Learners signed assent forms confirming voluntary participation, understanding of purpose, and withdrawal rights, with guaranteed confidentiality. Parents

³¹ Steinar, Kvale and Svend Brinkmann, *InterViews: Learning the Craft of Qualitative Research Interviewing*, 3rd ed. (Thousand Oaks, CA: Sage Publications, 2015).

³² Virginia Braun and Victoria Clarke, "Using Thematic Analysis in Psychology," *Qualitative Research in Psychology* 3, no. 2 (2006): 77–101.

gave their signed consent after receiving detailed information. Participants were anonymised using codes (e.g., S1), with data stored on password-protected devices. Beneficence and non-maleficence guided non-harmful interviews, emphasising research aimed at improving educational practices.

PRESENTATION OF FINDINGS

Theme 1: Limited access to technology and digital literacy

Interview Question: How easy is it for you to use the technology devices and connect to the internet when you are working on project-based learning tasks?

The responses of the participants indicated that they have access to devices when working on project-based learning tasks. The challenge for them is internet connectivity.

S1: I live in a rural area, so Wi-Fi is not reliable. I usually go to a friend's house to work on projects.

Participant S1 reported that Wi-Fi is not reliable in rural areas and that it is more convenient for her to visit a friend's house, where internet connectivity is not an issue, to complete her projects.

S2: I have a laptop, but the internet connection is slow. It makes it hard to upload or download materials quickly.

S2 noted that a slow internet connection makes it difficult for him to upload his work or download materials for his projects.

S3: Our school provides tablets, which is excellent, but they are not always charged or available when we need them.

Participant S3 indicated that although the school provides them with tablets, learners do not always have access to them because they are not charged or unavailable.

This finding reveals that learners struggle to access the internet, especially those in rural areas.

Theme 2: Pedagogical Support and Teacher Facilitation

Interview Question: How do your teachers support you in using technology for your projects?

This theme explores the role of teachers in helping learners use technology effectively, including through instructional strategies.

The participants recognised the importance of the support of their teachers in using technology. Participant S4 indicated that:

S4: My teacher gives us tutorials on using different apps, which really help, but sometimes it is not enough for me to grasp everything.

S4 added that although teachers provide them with guidelines on incorporating technology into their project-based learning, they do not spend enough time on specific tools that require additional instruction.

S6: They usually show us examples of what we can do, but I feel like they could spend more time on specific tools we need.

S7 explained that the assistance they receive from the teacher boosts their confidence in performing their tasks.

S7: I appreciate that our teacher is always available for questions. It makes me feel more comfortable asking for help when I am stuck.

S5: Some teachers are good at explaining things, but others assume we know how to use the technology, which can be frustrating.

S5 expressed frustration with teachers who assume they know how to use technology.

Theme 3: Barriers to Effective Language Acquisition Through Technology

Interview Question: What distractions do you encounter when using technology for language learning in project-based tasks?

Identifying obstacles, such as distractions, usability issues, and cognitive overload, that hinder learners' ability to develop language skills through technology-supported PBL.

Learners must be monitored when completing tasks on their devices, as their responses indicate they often become distracted and lose focus.

Participant S7 stated that it is sometimes difficult to focus because social media continues to pop up.

S7: I often get distracted by notifications from social media. It is hard to focus on my writing when my phone is constantly buzzing.

Participant 8 agreed with Participant S7, stating that she gets distracted and ends up browsing unrelated websites rather than working on her project.

S8: Sometimes, I find myself browsing unrelated websites instead of working on my project. It is easy to lose track of time.

Participant 4 added that he finds himself wanting to play games or watch videos instead of focusing on the task at hand.

S4: If I am using a tablet, I get tempted to play games or watch videos. It pulls my attention away from the task.

The participants indicated that they are, to some extent, distracted while writing their tasks on their devices.

Theme 4: Innovative Strategies for Enhancing Technology-Infused PBL for ESL

Interview Question: What strategies can be used to enhance technology-integrated project-based learning for ESL learners?

Integrating technology into project-based learning is becoming more critical, especially for ESL learners, in today's fast-changing educational world. By incorporating new ideas, teachers can make learning more engaging and relevant for learners with diverse linguistic needs. Participant S3 said:

S3: I think that using simple apps to practice vocabulary could be a fun way for us to learn.

Participant S6 stated that PowerPoint would be beneficial for the learners, as it would enable them to convey their views more clearly and effectively.

S6: It would help us present our ideas more effectively if we could use PowerPoint for our projects, even if we are not very tech-savvy.

Participant S5 said that creating films and slideshows as part of storytelling will make it easier for them to communicate what they have learned. She said:

S5: I would love to make videos or slideshows to tell stories. It would be easier for us to share what we have learned.

The learners' responses about new ways to improve technology-infused project-based learning (PBL) for ESL learners showed that they are employing diverse tech tools to support their studies.

DISCUSSION

The research findings provide insight into the complex relationship between technology and learning, particularly in the context of language acquisition in PBL. The literature review provides a comprehensive overview of key issues and identifies areas for improvement to ensure an effective and equitable learning experience.

Research highlights the importance of strong digital skills among learners. Those who have developed critical digital skills are better equipped to collaborate, access diverse resources, and engage in critical thinking processes that are essential for success in PBL.³³ The study findings support these observations, suggesting that learners with high digital literacy are not only able to navigate technological tools more easily but also improve their overall learning outcomes. For instance, learners with proficiency in digital resource usage are more likely to engage in collaborative projects, which can further enhance their sense of community and shared learning.

The digital divide is a persistent problem that exacerbates existing educational inequalities. Unequal access to devices and the internet, particularly in rural and underserved areas, significantly hinders learners' ability to participate in technology-enhanced learning experiences fully.³⁴ The study's findings also demonstrate that learners who face these challenges often struggle academically and feel demotivated, leading to lower engagement with learning activities.³⁵ This inequity highlights the need for targeted interventions to address access and literacy issues that many learners encounter.

³³ Kalyani, "Digital Literacy and Its Role in Enhancing Collaborative Learning Outcomes."

³⁴ Pierce and Patricia Cleary, "The Digital Divide in Education: Access, Equity, and Policy Implications."

³⁵ De la Hoz and Javier López and Ana García, "Digital Inequity and Learner Engagement in Rural Educational Contexts."

Equipping learners with comprehensive digital literacy is essential to help them develop a range of skills needed to use technological tools effectively. This includes not only the technical aspects of using digital devices but also critical thinking, problem-solving, and the ability to evaluate information and use technology ethically. By fostering these skills, teachers can prepare learners for the challenges and opportunities of the digital world, empowering them to utilize technology as a learning tool.³⁶ The study findings suggest that integrating digital literacy training into the curriculum is essential. This is consistent with constructivist principles, which emphasise learner engagement with technology and learning from these experiences to construct knowledge.³⁷ For ESL learners, engagement with technology can support language acquisition by providing authentic learning experiences and opportunities for communication and collaboration.

The role of pedagogical support in enhancing learner engagement with technology is a critical component of the research findings. Teachers play a significant role in both facilitating technology use and ensuring that learners can effectively utilise digital tools in PBL. The study's findings demonstrate that teachers who provide adequate support and training can improve learners' confidence in their ability to use technology. However, the research also found that the level and quality of teacher support are inconsistent. This leads to a varied learning experience for learners, which directly impacts their academic outcomes. This underscores the need for structured interventions that include professional development opportunities for teachers. Teachers must be prepared and equipped with the knowledge and skills necessary to effectively integrate technology into PBL. This may involve additional training programs focused on digital literacy and technology-enhanced pedagogy.³⁸ Professional development opportunities should also address the diverse needs of ESL learners to ensure that all learners have an equal chance to succeed.

Although technology has a positive effect on language learning, research findings reveal significant obstacles that can impede effective language acquisition. For many learners, especially younger ones, distractions from social media and other non-educational websites are a considerable challenge.³⁹ These distractions not only affect learners' concentration during class and learning activities but also pose a significant challenge for educators, who struggle to keep learners engaged and involved in meaningful educational tasks.

Usability problems also compound the challenge of language acquisition. Many educational tools are not user-friendly, leading to learner frustration and disengagement.⁴⁰ When learners encounter complex user interfaces and technical glitches, they are likely to lose interest in using the digital tools that are essential for PBL. To address the usability problem, there is a need for structured interventions and teachers' preparedness. Studies have shown the need to create intuitive, easy-to-use interfaces that eliminate unnecessary elements that contribute to usability problems. There is also a need to incorporate dedicated sessions to familiarise learners with the technology they will use during the learning period. Additionally, customising learning technology to meet the learning preferences of different learners can create a more conducive and engaging learning environment.⁴¹ A better understanding of cognitive load principles also helps structure PBL activities to reduce unnecessary information burden and enhance learners' knowledge and retention.

Incorporating innovative and practical approaches to technology integration in PBL is essential to promote learning among ESL learners. Tools such as Google Classroom and Microsoft Teams, which allow learners to collaborate and share information easily, have proven particularly effective in engaging learners.⁴² Gamification is another strategy that teachers can incorporate into their efforts to use technology effectively. Gamification has been proven to be effective in reducing the anxiety that ESL

³⁶ Kalyani, "Digital Literacy and Its Role in Enhancing Collaborative Learning Outcomes."

³⁷ Vygotsky, "Mind in Society: The Development of Higher Psychological Processes."

³⁸ Kalyani, "Digital Literacy and Its Role in Enhancing Collaborative Learning Outcomes."

³⁹ Dontre, "The Influence of Technology on Student Distraction in the Classroom."

⁴⁰ Primeast, "Usability and Cognitive Load in Learning Technology: Strategies for Improvement."

⁴¹ Majid Zamiri and Ali Esmaeili, "Strategies, Methods, and Supports for Developing Skills within Learning Communities: A Systematic Review of the Literature," *Administrative Sciences* 14, no. 9 (2024): 231.

⁴² Lee, Hyejin Park, and Soojin, "Digital Gaps in ESL Education: A Case Study of Rural Learners."

learners often experience when learning a new language.⁴³ Multimedia resources can also provide the contextual support needed to improve comprehension among ESL learners. The use of videos, infographics, and interactive simulations, for instance, can break down complex information into simpler components that are easier for learners to understand.⁴⁴ According to cognitive learning theories, integrating both visual and verbal information during the learning process can lead to more meaningful learning and better information retention. Scaffolding, or breaking larger projects into smaller, manageable activities and supporting each activity with the appropriate level of guidance, is also a practical approach to building language proficiency among ESL learners.⁴⁵

Peer mentoring is also a practical approach that teachers can use to promote language development in ESL learners. Providing learners with opportunities to pair up with peers who have a better mastery of the language in their projects can be a great way to facilitate meaningful conversations and collaborative learning tasks.⁴⁶ This social engagement and authentic communication are crucial for ESL learners, as they provide the practice needed to enhance language proficiency.

Connecting learning projects to the real world or to learners' personal experiences can also be a practical way to improve learner engagement and motivation. Projects with a direct link to real-world problems or learners' culture and life experiences are especially meaningful and engaging.⁴⁷ This can encourage the use of language while also helping learners develop their critical thinking skills as they seek to understand the world around them.

Regular feedback loops, in which learners reflect on their learning and adjust their strategies as needed, can also be an effective way to support language learning among ESL learners.⁴⁸ Constructive feedback on language use and project deliverables can also help to clarify expectations and encourage a culture of continuous improvement.

Effective integration of technology in PBL requires that teachers receive ongoing professional development. This is because additional technology-focused PBL training programmes can help teachers develop the knowledge and skills needed to support ESL learners.⁴⁹ Well-prepared teachers are better equipped to design and create learning environments that support the diverse learning needs of all learners.

RECOMMENDATIONS

Based on the findings of this study, which illuminate the key challenges and perspectives of Grade 10 ESL learners regarding technology-infused PBL, the following actionable recommendations are proposed for teachers, school administrators, and policymakers in the Eastern Cape and similar contexts:

- **Develop and Implement a Tiered Digital Access Strategy**

Address infrastructure gaps by lobbying providers for subsidised rural Wi-Fi. Create school digital hubs with reliable internet and devices for after-hours access. Implement device loan systems with maintenance protocols to ensure that functional tablets are consistently available for PBL activities.

- **Mandate Embedded Digital Literacy and Focused Pedagogical Training**

To effectively scaffold digital tool use, integrate digital literacy into ESL and PBL, not as a standalone skill. Provide teachers with targeted professional development beyond basic operations, focusing on pedagogical integration. Training should cover modeling intentional tool use, designing distraction-free PBL tasks, and offering step-by-step scaffolding for specific tools, such as writing software, going beyond occasional tutorials.

- **Adopt a Dual-Strategy Approach to Minimise Digital Distraction**

⁴³ Susan M Ravizza, David Z. Hambrick, and Kimberly M. Fenn, "The Role of Attention in Effective Learning: Distractions and Multitasking," *Educational Psychology Review* 31, no. 3 (2019): 487–505.

⁴⁴ Sangrà, González-Sanmamed, and Echeverría, "The Role of Digital Literacy in the Learning Process: A Study of Higher Education Students."

⁴⁵ Vygotsky, "Mind in Society: The Development of Higher Psychological Processes."

⁴⁶ Sulindra and G. Made., "Digital Tools as Cognitive Extensions in Constructivist Learning Environments."

⁴⁷ Eden, Avi Cohen, and Gal Shwartz, "Culturally Responsive PBL: Enhancing Relevance and Engagement for Diverse Learners."

⁴⁸ Song, Xin Li, and Lei Zhang, "Teacher Facilitation in Technology-Enhanced PBL: Strategies and Impacts."

⁴⁹ Desimone and Michael S. Garet., "Effective Professional Development in the Era of Digital Learning."

To address digital distractions, implement a dual strategy. Environmentally, use classroom management software to block distracting sites during PBL and closely monitor online work periods. Metacognitively, provide explicit instruction on self-regulation and time management, empowering learners to take ownership of their focus and accountability in digital learning.

- **Leverage Learner-Voiced, Low-Threshold Technologies to Boost Engagement**

The learners' expressed interest in tools such as vocabulary apps, PowerPoint, and digital storytelling platforms provides a clear roadmap for innovation. Teachers should prioritise incorporating these specific, learner-endorsed technologies that are perceived as both valuable and accessible. Starting with simple, high-impact tools can build learner confidence and digital self-efficacy. For example, integrating mobile-based vocabulary gamification, using presentation software for scaffolded multimodal composition, and employing basic video creation apps for narrative projects can make PBL more engaging and linguistically productive, directly responding to the learners' articulated needs.

- **Establish a Continuous Feedback Loop within PBL Cycles**

Institutionalise structured feedback in PBL by training teachers in formative feedback on language, content, and technology use. Use peer reviews on collaborative platforms. Regularly gather learner input on technology usability through surveys to iteratively refine tools and align practices with student needs.

CONCLUSION

This study investigated Grade 10 ESL learners' perceptions of technology in PBL, asking: "What are the challenges in using technology in PBL, and how does it impact language development and engagement?" Using a qualitative case study design, the findings revealed that while there are opportunities, the experiences of the participants were dominated by challenges. Key obstacles included digital inequity, with unreliable internet and device access, especially in rural areas, severely hindering participation. Although teacher presence was valued, support was often inconsistent in addressing students' technological and linguistic needs. The paradoxical nature of technology was also evident; while it allowed learning, it introduced digital distractions that disrupted focus. Critically, learners expressed an unmet desire for more engaging, diverse tools, such as vocabulary apps and presentation software. The study concludes that meaningful technology integration in PBL requires more than just hardware. It demands a systemic approach involving reliable infrastructure, context-responsive teacher training, strategic lesson design, and learner-centred tool selection. By providing ground-up insight into student experiences, this research underscores the need for multi-stakeholder efforts to create equitable, supportive environments in which technology can truly enhance language development and engagement for all learners.

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BIBLIOGRAPHY

- Alharbi, Abdullah. "E-Textbook Utilisation in Saudi High School Classrooms: Teachers' Perceptions and Practices." University of Exeter, 2022.
- Berenji, Sara. "Scaffolding in Technology-Enhanced Project-Based Learning: A Case Study of ESL Learners." *Language Learning & Technology* 25, no. 2 (2021): 36–52.
- Bhat, Shakeel, and Suad Alyahya. "Multimedia Integration in Language Learning: Effects on Comprehension and Motivation." *Journal of Educational Multimedia and Hypermedia* 32, no. 1 (2023): 45–67.
- Braun, Virginia, and Victoria Clarke. "Using Thematic Analysis in Psychology." *Qualitative Research in Psychology* 3, no. 2 (2006): 77–101.
- Creswell, J. W., and C. N. Poth. *Qualitative Inquiry and Research Design: Choosing among Five Approaches*. 4th ed. Sage, 2018.
- Desimone, Laura M., and Michael S. Garet. "Effective Professional Development in the Era of Digital Learning." *Educational Researcher* 49, no. 7 (2020): 479–87.
- Dontre, Alexander J. "The Influence of Technology on Student Distraction in the Classroom."

- Computers & Education* 168 (2021): 104208.
- Eden, Sigal, Avi Cohen, and Gal Schwartz. "Culturally Responsive PBL: Enhancing Relevance and Engagement for Diverse Learners." *Journal of Multicultural Education* 18, no. 1 (2024): 55–73.
- Facey-Shaw, Lisa. "Gamification for Language Learning: A Meta-Analysis of Its Effectiveness." *Interactive Learning Environments* 28, no. 5 (2020): 567–81.
- Jayothisa, Wipada, Lawrence Wong, and Wenli Chen. "Collaborative Digital Platforms in Language Education: A Study of Google Classroom and Microsoft Teams." *Educational Technology Research and Development* 69, no. 3 (2021): 1457–78.
- Kalyani, S. "Digital Literacy and Its Role in Enhancing Collaborative Learning Outcomes." *International Journal of Educational Technology* 21, no. 1 (2024): 34–50.
- Kvale, Steinar, and Svend Brinkmann. *InterViews: Learning the Craft of Qualitative Research Interviewing*. 3rd ed. Thousand Oaks, CA: Sage Publications, 2015.
- la Hoz, María De, and Javier López y Ana García. "Digital Inequity and Learner Engagement in Rural Educational Contexts." *Journal of Educational Equity and Access* 15, no. 3 (2023): 210–28.
- Lee, Jin, Hyejin Park, and Kim Soojin. "Digital Gaps in ESL Education: A Case Study of Rural Learners." *Language Teaching Research* 25, no. 4 (2021): 512–30.
- Lukas, B. A., and Melor Md Yunus. "ESL Teachers' Readiness in Integrating Technology into Under-Resourced Classrooms." *TESOL Quarterly* 55, no. 2 (2021): 345–67.
- Nghiem, Thanh, Linh Tran, and Hoa Nguyen. "Constructivism in Digital PBL: A Framework for Active Language Learning." *Journal of Language and Education* 11, no. 1 (2025): 89–105.
- Panagiotidis, Panagiotis, Panagiota Krystalli, and Panos Arvanitis. "Technology as a Gateway to Language Acquisition: Perspectives from Second Language Learners." *Computer Assisted Language Learning* 36, no. 4 (2023): 489–512.
- Piaget, Jean, and Margaret Cook. "The Construction of Reality in the Child," 1954.
- Pierce, Glenn, and Patricia Cleary. "The Digital Divide in Education: Access, Equity, and Policy Implications." *Educational Policy Review* 39, no. 2 (2024): 223–45.
- Primeast. "Usability and Cognitive Load in Learning Technology: Strategies for Improvement." *Journal of Interactive Learning Research* 35, no. 2 (2024): 189–205.
- Ravizza, Susan M., David Z. Hambrick, and Kimberly M. Fenn. "The Role of Attention in Effective Learning: Distractions and Multitasking." *Educational Psychology Review* 31, no.3(2019):487–505.
- Sangrà, Albert, Mercedes González-Sanmamed, and Javier Echeverría. "The Role of Digital Literacy in the Learning Process: A Study of Higher Education Students." *Computers in Human Behavior* 92 (2019): 20–29.
- Scotland, James. "Exploring the Philosophical Underpinnings of Research: Relating Ontology and Epistemology to the Methodology and Methods of the Scientific, Interpretive, and Critical Research Paradigms." *English Language Teaching* 5, no. 9 (2012): 9–16.
- Song, Yu, Xin Li, and Lei Zhang. "Teacher Facilitation in Technology-Enhanced PBL: Strategies and Impacts ." *Journal of Educational Computing Research* 62, no. 1 (2024): 154–78.
- Stanley, Graham. *Project-Based Learning in the Digital Age*. London: Routledge, 2021.
- Sulindra, I., and G. Made. "Digital Tools as Cognitive Extensions in Constructivist Learning Environments." *Educational Technology & Society* 27, no. 1 (2024): 112–26.
- Vygotsky, Lev S. "Mind in Society: The Development of Higher Psychological Processes." Harvard University Press, 1978.
- Xu, Di, Wei Huang, and Hai Wang. "Enhancing Critical Thinking through Project-Based Learning: A Meta-Analysis." *Educational Research Review* 100521 (2023): 39.
- Zamiri, Majid, and Ali Esmaeili. "Strategies, Methods, and Supports for Developing Skills within Learning Communities: A Systematic Review of the Literature." *Administrative Sciences* 14, no. 9 (2024): 231.
- Zhao, Yong, and Chun Lai. "Technology and Language Learning in Under-Resourced Contexts: Opportunities and Limitations." *Language Learning Journal*: 51, no. 2 (2023): 178–94.

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