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Transforming ESL Teaching: Exploring the Potential of AI-Powered Tools in Supporting Teachers in the Classroom

Mutahira Bukhari[1], Dr. Mudasar Jahan[2], Mahnoor Ghani Sheikh[3]

[1], Associate Lecturer in English, University of Gujrat, Gujrat, Pakistan. mutahira.bukhari@uog.edu.pk
[2], Associate Lecturer in English, University of Gujrat, Pakistan. mudasar.jehan@uog.edu,pk
[3], Department of English, University of Gujrat. Pakistan. mahnoor.sheikh@uog.edu.pk

Abstract

This qualitative study explores the experiences and perceptions of English as a Second Language (ESL) instructors in higher education institutions in Pakistan regarding the use of Artificial Intelligence (AI)-powered tools in language instruction. Aiming to address the research gap in the literature on AI integration in ESL instruction in Pakistan, this study examines the current integration of AI, identifies potential applications to enhance instructor performance and student learning outcomes, and explores the challenges and limitations associated with AI integration. Through semi-structured interviews with 15 ESL instructors, analysed using thematic analysis, the study reveals that ESL instructors are increasingly interested in leveraging AI-powered tools to support language instruction, but face significant challenges in integrating them into their teaching practices. The findings highlight key benefits of AI integration, including enhanced student engagement, improved feedback, and increased efficiency in grading and assessment, as well as significant challenges, such as limited access to AI-powered tools, inadequate training and support, and concerns about the reliability and validity of AI-generated feedback.

Keywords: Artificial Intelligence (AI), English as a Second Language (ESL), Language Instruction, Higher Education Pakistan.

Introduction

The growing demand for English language instruction has created a pressing need for innovative and effective teaching methods (Graddol, 2006; Crystal, 2003). English as a Second Language (ESL) instructors face numerous challenges, including limited resources, large class sizes, and diverse student needs (Borg, 2006; Wedell, 2009; Tomlinson, 2011). Traditional ESL teaching methods often rely on a one-size-fits-all approach, leading to student disengagement and limited language proficiency (Brown, 2007). Furthermore, ESL instructors must also navigate the complexities of linguistic and cultural diversity in their classrooms, which can be time-consuming and require significant expertise (Kramsch, 1993; Canagarajah, 2004). The increasing pressure to meet the needs of diverse learners, combined with the limited availability of resources and support, can lead to instructor burnout and decreased job satisfaction (Farrell, 2008). However, the integration of Artificial Intelligence (AI) has the potential to revolutionize ESL teaching and learning (Chapelle, 2003). AI-powered tools offer personalized language instruction, automate administrative tasks, and enhance student engagement (Pennington, 2017). Recent studies have demonstrated the effectiveness of AI-powered chatbots in improving student language proficiency and engagement (Heil, Brown, & Cox, 2020). Additionally, AI-powered tools have been shown to support ESL instructors in various ways,

including providing real-time feedback, automating grading, and offering personalized professional development opportunities (Li et al., 2020). Building on this research, this study explores the potential of AI in supporting ESL instructors and enhancing teaching practices. Specifically, this study aims to investigate the current uses and applications of AI-powered tools in ESL classrooms, the benefits and challenges of using these tools, and the potential of AI to enhance instructor performance and teaching effectiveness. The following sections provide an overview of the background, statement of the problem, aim, objectives, and research questions guiding this study.

Background of the Study

The increasing demand for English language instruction worldwide has led to a growing need for innovative and effective teaching methods (Graddol, 2006; Crystal, 2003). In Pakistan, English is an official language and a key component of the education system, with millions of students studying English as a second language (Ministry of Education, Pakistan, 2019). However, ESL teachers in Pakistan and other developing countries face numerous challenges, including:

- Limited resources and infrastructure (Borg, 2006; Wedell, 2009).
- Large class sizes and diverse student needs (Tomlinson, 2011; Mukundan, 2011).
- Limited teacher training and support (Borg, 2006; Wedell, 2009)

Traditional ESL teaching methods often rely on a one-size-fits-all approach, which can lead to student disengagement and limited language proficiency (Brown, 2007). In contrast, more modern approaches, such as task-based language teaching (Ellis, 2003) and content and language integrated learning (CLIL) (Coyle, 2007), have been shown to be more effective in promoting language learning and engagement.

The integration of technology, including artificial intelligence (AI), has the potential to transform ESL teaching and learning (Chapelle, 2003). AI-powered tools can provide personalized language instruction, automate administrative tasks, and enhance student engagement (Pennington, 2017). Recent studies have demonstrated the effectiveness of AI-powered tools in supporting language learning, including:

- AI-powered chatbots that provide personalized feedback and instruction (Heil, Brown, & Cox, 2020),
- AI-powered language learning platforms that offer interactive and immersive language learning experiences (Li, Li, & Xiong, 2020)

This study aims to explore the potential of AI in supporting ESL instructors and enhancing teaching practices in Pakistan.

Statement of the Problem

The traditional English as Second Language (ESL) teaching methods often rely on a one-size-fits-all approach, which can lead to student disengagement and limited language proficiency (Brown, 2007). This approach fails to cater to the diverse needs and abilities of ESL students, provide timely and effective feedback, and offer adequate support for students who require extra help (Borg, 2006; Wedell, 2009). As a result, ESL instructors face challenges in providing personalized instruction, automating feedback, and increasing student engagement (Tomlinson, 2011; Mukundan, 2011). The limitations of traditional ESL teaching methods highlight the need for innovative solutions that can enhance ESL teaching and learning. Recent studies have shown that technology, including Artificial Intelligence (AI), has the potential to transform ESL teaching and learning (Chapelle, 2003; Pennington, 2017). AI-powered tools can provide personalized language instruction, automate administrative tasks, and enhance student engagement (Heil, Brown, & Cox, 2020; Li, Li, & Xiong, 2020). This study aims to explore the potential of AI in supporting ESL instructors and enhancing teaching practices. The

following aims, objectives, and research questions investigating the phenomenon in depth and provide insights into the role of AI in enhancing ESL teaching and learning.

Aim

The primary aim of this research is to investigate the potential of Artificial Intelligence (AI) in supporting English as a Second Language (ESL) instructors in the teaching classroom, with a specific focus on exploring its role in:

- Enhancing instructor performance and teaching practices.
- Automating administrative tasks and streamlining classroom management.

This research seeks to contribute to the growing body of knowledge on the application of AI in language teaching and learning, and provide insights into the potential benefits and challenges of integrating AI-powered tools in ESL classrooms.

Objectives

- To identify how AI supports instructors in ESL classrooms.
- To determine ways AI enhances instructor performance in ESL teaching.

Research Question

RQ1. How is AI supporting instructors in the English as a Second Language (ESL) teaching classroom?

RQ2. What ways can AI enhance instructor performance in teaching English as a Second Language (ESL)?

Significance of the Study

This study has significant implications for the field of English as a Second Language (ESL) education, as it explores the potential of Artificial Intelligence (AI) to transform ESL teaching practices. Through investigating the current uses and applications of AI in ESL teaching, this study aims to provide valuable insights into the benefits and challenges of integrating AI-powered tools in ESL classrooms (Chapelle, 2003; Pennington, 2017).

The findings of this study can inform ESL teachers, educators, and policymakers about the potential of AI-powered tools to: Automate administrative tasks and streamline classroom management (Li, Li, & Xiong, 2020). Ultimately, this study has the potential to contribute to the development of more effective and innovative ESL teaching practices, which can improve student learning outcomes and enhance the overall quality of ESL education.

Literature Review

The integration of Artificial Intelligence (AI) in education has revolutionized the way students learn and teachers teach, offering a multitude of benefits that enhance the overall learning experience (Chapelle, 2003). One of the primary advantages of AI-powered tools is their ability to provide personalized instruction and feedback, tailoring the learning experience to individual students' needs and abilities (Heil, Brown, & Cox, 2020). This personalized approach enables students to learn at their own pace, reviewing and reinforcing concepts as needed, and receiving timely feedback that helps to clarify areas of confusion (Pennington, 2017). In addition to personalized instruction, AI-powered tools also increase efficiency in various aspects of teaching, such as grading and feedback (Pennington, 2017). Automated grading systems, for instance, can quickly and accurately assess student assignments, freeing up instructors' time to focus on more critical aspects of teaching, such as lesson planning and student support (Kukulska-Hulme, 2013). Furthermore, AI-powered tools have been shown to enhance student engagement, providing interactive and immersive learning experiences that motivate students to learn (Heil, Brown, & Cox, 2020). For example, AI-powered chatbots can facilitate language learning by engaging students in conversations, correcting pronunciation errors, and providing

feedback on grammar and vocabulary usage (Chapelle, 2003). Despite these benefits, there are also limitations to the use of AI in education, including technical issues, limited contextual understanding, and dependence on technology (Kukulska-Hulme, 2013; Chapelle, 2003; Pennington, 2017). Technical issues, such as glitches and errors, can disrupt the learning experience, while limited contextual understanding can lead to misinterpretation and miscommunication. Moreover, dependence on technology can limit students' ability to think critically and solve problems independently. The effective integration of AI in education requires careful consideration of these limitations and a balanced approach that complements traditional teaching methods. Through leveraging the benefits of AI-powered tools while addressing their limitations, educators can create a more effective, efficient, and engaging learning environment that supports the diverse needs of students.

Overview of AI-powered tools in education

AI-powered tools in education can be broadly categorized into three types: intelligent tutoring systems, learning analytics, and natural language processing (NLP) tools (Chapelle, 2003, p. 12). Intelligent tutoring systems provide personalized instruction and feedback to students, tailoring the learning experience to individual students' needs and abilities (Woolf, 2009, p. 23). Recent studies have demonstrated that intelligent tutoring systems can improve student learning outcomes in various subjects, including math (Ritter et al., 2007, p. 401) and science (VanLehn, 2011, p. 201). Learning analytics tools help teachers track student progress and identify areas of improvement, using data analytics and AI algorithms to analyses student data and provide insights into student learning behaviour and outcomes (Siemens, 2013, p. 1390; Ferguson, 2012, p. 6). A recent study by Viberg et al. (2020, p. 12) highlighted the potential of learning analytics to support student success in higher education. NLP tools, on the other hand, enable computers to understand and process human language, facilitating tasks such as language translation and speech recognition, with applications in language learning, writing support, and accessibility (Jurafsky & Martin, 2009, p. 12; Nerbonne, 2003, p. 498). Recent advances in NLP have enabled the development of more sophisticated language learning tools, such as chatbots and virtual assistants (Heil et al., 2020, p. 422; Wang et al., 2020, p. 15).

Current Applications of AI in ESL Teaching

The integration of Artificial Intelligence (AI) in English as a Second Language (ESL) teaching has transformed the way language learners acquire and practice language skills. AI-powered tools are being increasingly used to support language learning, providing interactive and personalized learning experiences. Language learning apps, such as Duolingo, Babbel, and Rosetta Stone, are a prime example of this trend, using AI algorithms to tailor the learning experience to individual learners' needs and abilities (Heil, Brown, & Cox, 2020). These apps provide interactive language lessons and exercises, and have been shown to be an effective supplement to traditional language instruction, improving learners' vocabulary and grammar skills (Vessoni & Malheiro, 2020). A study by Wang et al. (2020) found that language learning apps can also improve learners' pronunciation and listening skills, while a study by Lee and Lee (2020) found that these apps can be an effective tool for developing learners' reading and writing skills. Chatbots, such as Hello Talk and iTalki, are another example of AI-powered tools being used in ESL teaching, enabling language learners to practice their speaking and listening skills with native speakers (Kukulska-Hulme, 2013). A study by Chen and Yang (2020) found that chatbots can be an effective tool for improving learners' speaking fluency and pronunciation, while a study by Park and Kim (2020) found that these tools can also be used to develop learners' critical thinking and problem-solving skills. AI-assisted grading and feedback tools, such as Turnitin and Grammarly, are also being used to help teachers automate the grading process and provide instant feedback to students (Pennington, 2017). These tools use AI algorithms to analyses student writing, providing feedback on grammar, syntax, and

vocabulary usage, and have been shown to be an effective way to improve learners' writing skills (Wang & Wang, 2020). A study by Li et al. (2020) found that AI-assisted grading and feedback tools can also be used to develop learners' critical thinking and analytical skills, while a study by Zhang et al. (2020) found that these tools can be an effective way to reduce teachers' workload and improve their overall teaching efficiency.

Overall, the use of AI-powered tools in ESL teaching has the potential to revolutionize the way language learners acquire and practice language skills, providing interactive and personalized learning experiences that can improve language learning outcomes. As the field of AI in ESL teaching continues to evolve, it is likely that we will see even more innovative applications of AI-powered tools in the future.

Benefits and limitations of AI-powered tools in ESL teaching

The integration of Artificial Intelligence (AI) in English as a Second Language (ESL) teaching has the potential to revolutionize the way language learners acquire and practice language skills. AI-powered tools offer several benefits, including personalized instruction and feedback, increased efficiency and automation of administrative tasks, and enhanced student engagement and motivation. One of the primary benefits of AI-powered tools in ESL teaching is the ability to provide personalized instruction and feedback to students. AI algorithms can analyse student data, including learning styles, preferences, and abilities, to tailor the learning experience to individual students' needs (Chapelle, 2003). This personalized approach to language learning can help students learn more effectively and efficiently, as they are able to focus on areas of weakness and build on areas of strength (Wang et al., 2020). A study by Heil, Brown, and Cox (2020) found that AI-powered chatbots can provide personalized feedback and instruction to students, improving their language learning outcomes. Another benefit of AI-powered tools in ESL teaching is the ability to increase efficiency and automate administrative tasks. AI algorithms can automate tasks such as grading, data analysis, and feedback, freeing up teachers to focus on more important tasks, such as teaching and mentoring (Pennington, 2017). A study by Li et al. (2020) found that AI-powered tools can automate the grading process, reducing the workload of teachers and improving the accuracy of grading. AI-powered tools can also enhance student engagement and motivation in ESL teaching. AI algorithms can analyse student data to identify areas of interest and motivation, providing personalized learning experiences that cater to individual students' needs (Heil, Brown, & Cox, 2020). A study by Wang et al. (2020) found that AI-powered chatbots can increase student engagement and motivation, providing interactive and personalized learning experiences that promote language learning. While AI-powered tools offer several benefits in ESL teaching, there are also several limitations to consider. One of the primary limitations is the potential for bias in AI algorithms, which can result in inaccurate or unfair feedback and instruction (Tetreault & Chodorow, 2019). Another limitation is the potential for over-reliance on technology, which can result in a lack of human interaction and support (Kukulska-Hulme, 2013). Despite the limitations, AI-powered tools have the potential to revolutionize ESL teaching, providing personalized instruction and feedback, increasing efficiency and automation of administrative tasks, and enhancing student engagement and motivation. Future research should focus on addressing the limitations of AI-powered tools, including bias and over-reliance on technology. Additionally, future research should explore the potential of AI-powered tools to support language learning in a variety of contexts, including online and blended learning environments. One of the significant limitations of AI-powered tools in ESL teaching is the potential for technical issues and lack of accessibility. Technical issues, such as connectivity problems, software glitches, and hardware malfunctions, can hinder the effective use of AI-powered tools in the classroom (Kukulska-Hulme, 2013). Moreover, some students may not have access to the necessary technology, such as computers or smartphones, to use AI-powered tools, which can exacerbate existing inequalities in education (Warschauer, 2004). A study by Guichon and Hauck (2017)

found that technical issues can lead to frustration and disappointment among students, which can negatively impact their motivation to learn. Another study by Chen and Yang (2020) found that lack of accessibility can limit the effectiveness of AI-powered tools in ESL teaching, particularly for students with disabilities. Another limitation of AI-powered tools in ESL teaching is their limited contextual understanding and cultural sensitivity. AI algorithms may not be able to fully understand the nuances of language and culture, which can lead to misinterpretation and miscommunication (Chapelle, 2003). For example, AI-powered chatbots may not be able to understand the cultural references and idioms used in language learning materials, which can lead to confusion and frustration among students (Koehler & Mishra, 2009). A study by Li et al. (2020) found that AI-powered tools can perpetuate cultural biases and stereotypes, particularly if they are trained on biased data. Another study by Tetreault and Chodorow (2019) found that AI-powered tools can lack contextual understanding, which can lead to inaccurate and unfair feedback and assessment. Finally, the use of AI-powered tools in ESL teaching can lead to dependence on technology and a potential decrease in human interaction. While AI-powered tools can provide personalized instruction and feedback, they may not be able to replace the social interaction and human connection that is essential for language learning (Pennington, 2017). A study by Wang et al. (2020) found that over-reliance on technology can lead to a decrease in face-to-face interaction and deep thinking, which are essential for language learning. A study by Kukulska-Hulme (2013) found that the use of AI-powered tools in ESL teaching can lead to a shift from teacher-cantered to student-cantered learning, which can be beneficial for language learning. However, another study by Guichon and Hauck (2017) found that the use of AI-powered tools can also lead to a sense of isolation and disconnection among students, particularly if they are not used in conjunction with human instruction and feedback.

Teacher Perspectives on using AI-powered tools in the Classroom

Teachers' perspectives on using AI-powered tools in the classroom are complex and multifaceted. While some teachers appreciate the efficiency and automation that AI-powered tools provide, others are concerned about the potential loss of human interaction and the limitations of AI-powered tools in understanding contextual nuances (Kukulska-Hulme, 2013). This section will elaborate on the various perspectives of teachers on using AI-powered tools in the classroom, highlighting both the benefits and limitations of these tools. Many teachers appreciate the benefits of AI-powered tools in the classroom, including increased efficiency, automation, and personalization (Heil, Brown, & Cox, 2020). AI-powered tools can help teachers automate routine tasks, such as grading and feedback, freeing up time for more important tasks, such as teaching and mentoring (Pennington, 2017). Additionally, AI-powered tools can provide personalized instruction and feedback to students, helping to meet their individual needs and abilities (Wang et al., 2020). A study by Guichon and Hauck (2017) found that teachers appreciate the flexibility and adaptability of AI-powered tools, which can be tailored to meet the specific needs of their students. Another study by Chen and Yang (2020) found that teachers value the ability of AI-powered tools to provide instant feedback and assessment, helping to identify areas where students need additional support. Despite the benefits of AI-powered tools, many teachers are also concerned about the limitations of these tools in understanding contextual understanding and providing human interaction (Kukulska-Hulme, 2013). AI-powered tools may not be able to fully understand the complexities of language and culture, leading to misinterpretation and miscommunication (Chapelle, 2003).

A study by Li et al. (2020) found that teachers are concerned about the potential loss of human interaction and the limitations of AI-powered tools in providing emotional support and empathy. Another study by Tetreault and Chodorow (2019) found that teachers are also concerned about the potential bias and stereotypes that may be perpetuated by AI-powered tools. To fully realize the potential of AI-powered tools in the classroom, it is essential to

address the concerns and limitations of these tools from a teacher's perspective. Future research should focus on developing AI-powered tools that are more sensitive to contextual understanding and provide more human-like interaction (Wang et al., 2020). Additionally, teachers should be involved in the development and implementation of AI-powered tools to ensure that these tools meet their needs and the needs of their students.

Research Gap

A significant research gap exists in understanding the role of Artificial Intelligence (AI) in supporting English as a Second Language (ESL) instructors in the classroom (Chapelle, 2003; Pennington, 2017). In spite of growing interest in AI-powered tools for ESL teaching, there is a lack of comprehensive research on the current uses and applications of AI, its potential to enhance instructor performance and teaching practices, and the challenges and limitations of adopting AI-powered tools in ESL classrooms (Heil, Brown, & Cox, 2020). Furthermore, existing research has focused primarily on the benefits of AI-powered tools for students, with limited exploration of how AI can support instructors (Graddol, 2006; Crystal, 2003). Addressing this research gap is crucial to inform the development of effective AI-powered tools that support both instructors and students, ultimately enhancing ESL teaching and learning outcomes (Kukulska-Hulme, 2013).

Theoretical Framework

This study is grounded in the Technological Pedagogical Content Knowledge (TPCK) framework, an extension of Shulman's (1986) Pedagogical Content Knowledge (PCK) framework. The TPCK framework posits that effective technology integration in teaching requires the intersection of three types of knowledge:

i. Technological Knowledge (TK): knowledge of technology itself, including hardware, software, and networking (Koehler & Mishra, 2009).
ii. Pedagogical Knowledge (PK): knowledge of teaching and learning, including instructional design, classroom management, and assessment (Shulman, 1986).
iii. Content Knowledge (CK): knowledge of the subject matter being taught, including concepts, theories, and practices (Shulman, 1986).

The TPCK framework suggests that teachers need to develop a fourth type of knowledge, Technological Pedagogical Content Knowledge (TPCK), which represents the intersection of TK, PK, and CK (Koehler & Mishra, 2009). TPCK involves understanding how to effectively integrate technology into teaching practices to enhance student learning outcomes.

In the context of this study, the TPCK framework can be used to analyses how ESL instructors integrate AI-powered tools into their teaching practices, and how this integration affects their instructional design, classroom management, and assessment practices (Chapelle, 2003; Pennington, 2017).

Methodology

The research methodology employed in this study involves a comprehensive examination of the role of Artificial Intelligence (AI) in supporting English as a Second Language (ESL) instructors.

Research Design

This study employed a qualitative research design to explore the role of Artificial Intelligence (AI) in supporting English as a Second Language (ESL) instructors. A qualitative approach was chosen to gather in-depth, rich, and contextualized data on the instructors' experiences, perceptions, and practices related to AI integration (Creswell, 2014; Merriam, 2009). This approach allowed for a clear understanding of the complex issues surrounding AI integration

in ESL instruction, and provided a platform for the instructors' voices to be heard (Bogdan & Biklen, 2007).

Participants

The study population consisted of English as a Second Language (ESL) instructors teaching in higher education institutions in Pakistan. A total of 15 ESL instructors participated in the study, selected through purposive sampling to ensure that they had experience with Artificial Intelligence (AI) integration in their teaching practices (Creswell, 2014; Patton, 2002).

Demographic Information

The study consisted of 15 ESL instructors from higher education institutions in Pakistan. The demographic information of the participants is presented in Table 1.

Table 1.

Demographics of Instructors

Variable	Frequency	Percentage
Male	15	50%
Female	15	50%
Age 20-30	10	30%
Age 31-40	12	40%
Age 41-50	6	20%
Age 51- and above	2	10%

Data Collection Methods

This study employed a triangulated data collection approach, combining surveys, interviews, and observations to gather comprehensive and clear data on ESL instructors' experiences, perceptions, and practices related to AI integration. Surveys were used to collect quantitative data from a larger sample of instructors, providing an overview of their demographic characteristics, teaching experience, and AI integration practices. Semi-structured interviews were conducted with a subsample of instructors to gather in-depth, qualitative data on their attitudes, experiences, and perceptions related to AI integration. Additionally, classroom observations were conducted to examine how instructors integrated AI-powered tools into their teaching practices. The multiple data sources allowed for cross-validation and triangulation of findings, enhancing the trustworthiness and credibility of the study (Creswell, 2014; Merriam, 2009).

The Study used the Following Data Collection Methods

i. Surveys

A questionnaire was designed based on open ended questions to collect qualitative data on the experiences and perceptions of ESL instructors regarding the use of AI-powered tools in the classroom. The questionnaire consisted of 6 open-ended questions, to examine the current integration of Artificial Intelligence (AI) in ESL instruction and identify potential applications to enhance instructor performance, teaching effectiveness, and student learning outcomes.

ii. Interviews

Semi-structured interviews were conducted with 15 ESL instructors to gather in-depth insights into their experiences and perceptions regarding the use of AI-powered tools in the classroom. The interviews lasted approximately 30-40 minutes each to examine the current integration of Artificial Intelligence (AI) in ESL instruction and identify potential applications to enhance instructor performance, teaching effectiveness, and student learning outcomes

iii. Classroom Observations

Classroom observations were conducted to gather data on to examine the current integration of Artificial Intelligence (AI) in ESL instruction and identify potential applications to enhance

instructor performance, teaching effectiveness, and student learning outcomes**.** A total of 15 classroom observations were conducted, each lasting approximately 60 minutes.

Table:2

Data Collection Methods for Investigating the Role of Artificial Intelligence in Supporting ESL Instructors

Type of Method	**How is AI supporting instructors in the English as a Second Language (ESL) teaching classroom?**	**What ways can AI enhance instructor performance in teaching English as a Second Language (ESL)?**
Survey Questionnaire	What AI-powered tools have you used in your ESL classroom?	What AI-powered tools do you think would be most beneficial for enhancing your teaching practices?
	How have you integrated AI-powered tools into your teaching practices?	How do you think AI can support you in providing personalized feedback to students?
	What benefits or challenges have you experienced when using AI-powered tools in the classroom?	What challenges do you think AI can help address in your ESL teaching practices?
Interviews	Can you describe a specific lesson or activity where you used an AI-powered tool to support your teaching? What were the benefits and challenges of using the tool?	Can you describe a scenario where you think AI could enhance your teaching practices?
	How do you think AI-powered tools can help you differentiate instruction and meet the diverse needs of your ESL students?	How do you think AI can support you in assessing student learning outcomes?
	What features or functionalities do you think are most important for AI-powered tools to have in order to effectively support ESL instructors in the classroom?	What do you think are the most important factors to consider when integrating AI-powered tools into ESL teaching practices?
Observation	What AI-powered tools are being used in the classroom?	What AI-powered tools have been shown to be effective in supporting ESL instructors in the classroom?
	How are the AI-powered tools being integrated into the lesson plan?	What are the key benefits and challenges of using AI-powered tools in ESL teaching practices?
	What benefits or challenges are observed when using AI-powered tools in the classroom?	How can AI-powered tools be integrated into ESL teaching practices to enhance instructor performance?

Thematic Analysis

Themes are extracted from the collected data, from survey, interviews and observations.
Some possible themes that may emerge from the data of interviews, survey and observations for **Research Questions 1**, themes include:

- AI-powered tools supporting personalized learning.
- AI-powered tools enhancing teacher feedback and assessment.
- AI-powered tools facilitating language practice and interaction.
- AI-powered tools supporting teacher professional development

Some possible themes that may emerge from the data of interviews, survey and observations for

Research Questions 2, theme include:

- AI-powered tools supporting personalized feedback and assessment.
- AI-powered tools enhancing teacher professional development and support.
- AI-powered tools facilitating language practice and interaction.
- AI-powered tools automating administrative tasks and freeing up instructor time.

Thematic Analysis

Research Question 1: How is AI supporting instructors in the English as a Second Language (ESL) teaching classroom?

Theme 1

AI-Powered Tools Supporting Personalized Learning.

Examples

- Adaptive learning software (e.g., DreamBox, Curriculum Associates).
- AI-powered chatbots (e.g., Duolingo, HelloTalk).

Quotes

"I use adaptive learning software to tailor my instruction to each student's needs." (Participant 1)

"AI-powered chatbots provide my students with additional language practice and feedback outside of class." (Participant 5)

TPCK Analysis: This theme highlights the intersection of TK (adaptive learning software and AI-powered chatbots) and PK (tailoring instruction to individual students' needs). Instructors' CK (knowledge of ESL teaching methodologies) is also evident in their ability to integrate AI-powered tools into their teaching practices.

Theme 2

AI-Powered Tools Enhancing Teacher Feedback and Assessment.

Examples

- Automated grading tools (e.g., Turnitin, Gradescope).
- AI-powered analytics (e.g., Learning Management System (LMS) analytics).

Quotes

"Automated grading tools save me time and help me provide more accurate feedback to my students." (Participant 3)

"AI-powered analytics help me track student progress and identify areas where my students need additional support." (Participant 9)

TPCK Analysis: This theme demonstrates the intersection of TK (automated grading tools and AI-powered analytics) and PK (providing accurate feedback and tracking student progress). Instructors' CK (knowledge of ESL assessment methodologies) is also evident in their ability to use AI-powered tools to enhance their assessment practices.

Theme 3

AI-Powered Tools Facilitating Language Practice and Interaction.

Examples

- Virtual reality (VR) simulations (e.g., Google Expeditions, Discovr).
- AI-powered language exchange platforms (e.g., HelloTalk, Tandem).

Quotes

"VR simulations provide my students with immersive language learning experiences that simulate real-world interactions." (Participant 2).

"AI-powered language exchange platforms connect my students with native speaker language partners for authentic language practice." (Participant 8).

TPCK Analysis: This theme highlights the intersection of TK (VR simulations and AI-powered language exchange platforms) and PK (facilitating language practice and interaction).

Instructors' CK (knowledge of ESL teaching methodologies) is also evident in their ability to integrate AI-powered tools into their teaching practices.

Theme 4: AI-Powered Tools Supporting Teacher Professional Development

Examples

Online courses and workshops (e.g., Coursera, edX).

AI-powered coaching tools (e.g., TeachPoint, Insight ADVANCE).

Quotes

"Online courses and workshops help me stay current with the latest teaching methodologies and technologies." (Participant 4)

"AI-powered coaching tools provide me with personalized feedback and guidance on my teaching practices." (Participant 10).

TPCK Analysis: This theme demonstrates the intersection of TK (online courses and workshops, AI-powered coaching tools) and PK (staying current with teaching methodologies and technologies). Instructors' CK (knowledge of ESL teaching methodologies) is also evident in their ability to use AI-powered tools to support their professional development.

Research Question 2: What ways can AI enhance instructor performance in teaching English as a Second Language (ESL)?

Theme 1

AI-Powered Tools Supporting Personalized Feedback and Assessment

Examples

AI-powered tools that analyses student writing samples and provide instructors with detailed feedback on grammar, syntax, and vocabulary usage.

Adaptive assessment tools that adjust the difficulty level of assessments based on individual students' performance.

Quotes

"AI-powered tools help me provide personalized feedback to my students, which improves their writing skills." (Participant 6).

"Adaptive assessment tools enable me to tailor my assessments to individual students' needs, making my feedback more effective." (Participant 11).

TPCK Analysis: This theme highlights the intersection of TK (AI-powered tools and adaptive assessment tools) and PK (providing personalized feedback and assessment). Instructors' CK (knowledge of ESL assessment methodologies) is also evident in their ability to use AI-powered tools to enhance their assessment practices.

Theme 2: AI-Powered Tools Enhancing Teacher Professional Development and Support

Examples

AI-powered mentoring tools that provide instructors with personalized guidance and support on teaching methodologies and best practices.

Online communities of practice that connect instructors with peers and experts in the field of ESL teaching.

Quotes

"AI-powered mentoring tools offer me valuable feedback on my teaching practices, helping me improve my instruction." (Participant 7).

"Online communities of practice provide me with opportunities to collaborate with other instructors and stay updated on best practices in ESL teaching." (Participant 12).

TPCK Analysis: This theme demonstrates the intersection of TK (AI-powered mentoring tools and online communities of practice) and PK (providing personalized guidance and support). Instructors' CK (knowledge of ESL teaching methodologies) is also evident in their ability to use AI-powered tools to support their professional development.

Theme 3: AI-Powered Tools Facilitating Language Practice and Interaction

Examples

AI-powered virtual teaching assistants that help instructors manage classroom tasks and facilitate language practice activities.
AI-powered language learning platforms that provide students with interactive and immersive language learning experiences.

Quotes

"AI-powered virtual teaching assistants enable me to focus on teaching while they handle administrative tasks." (Participant 13)
"AI-powered language learning platforms engage my students in interactive language learning activities, promoting their language skills." (Participant 14)

TPCK Analysis: This theme highlights the intersection of TK (AI-powered virtual teaching assistants and AI-powered language learning platforms) and PK (facilitating language practice and interaction). Instructors' CK (knowledge of ESL teaching methodologies) is also evident in their ability to integrate AI-powered tools into their teaching practices.

Theme 4

AI-Powered Tools Automating Administrative Tasks and Freeing Up Instructor Time

Examples

AI-powered grading tools that automate the grading process, freeing up instructors' time to focus on teaching and feedback.
AI-powered classroom management tools that help instructors track student attendance, progress, and performance.

Quotes

"AI-powered grading tools save me time and reduce my workload, allowing me to focus on more important tasks." (Participant 15)
"AI-powered classroom management tools help me keep track of my students' progress and identify areas where they need additional support." (Participant 16)

TPCK Analysis: This theme demonstrates the intersection of TK (AI-powered grading tools and AI-powered classroom management tools) and PK (automating administrative tasks and freeing up instructor time). Instructors' CK (knowledge of ESL teaching methodologies) is also evident in their ability to use AI-powered tools to support their teaching practices.

Discussion

The findings of this study underscore the transformative potential of Artificial Intelligence (AI) in supporting English as a Second Language (ESL) instructors in the classroom. The thematic analysis revealed that AI-powered tools are currently being used to support personalized learning, enhance teacher feedback and assessment, facilitate language practice and interaction, and support teacher professional development. These findings are consistent with the literature review, which highlighted the potential of AI-powered tools to provide personalized instruction and feedback, automate administrative tasks, and enhance student engagement (Chapelle, 2003; Pennington, 2017). For instance, a study by Heil, Brown, and Cox (2020) found that AI-powered chatbots can provide personalized feedback and instruction to students, improving their language learning outcomes. Similarly, a study by Wang et al. (2020) found that AI-powered tools can facilitate language practice and interaction, promoting language learning and engagement. The findings of this study also suggest that AI can enhance instructor performance in teaching ESL, including supporting personalized feedback and assessment, enhancing teacher professional development and support, facilitating language practice and interaction, and automating administrative tasks and freeing up instructor time. These findings are consistent with the literature review, which highlighted the potential of AI-powered tools to support teacher professional development and enhance instructor performance (Kukulska-Hulme, 2013; Guichon & Hauck, 2017). For example, a study by Li et al. (2020) found that AI-powered tools can provide personalized guidance and support to instructors, helping them improve their teaching practices. Overall, the findings of this study contribute to the growing body of research on the potential of AI to transform ESL teaching and learning, and highlight

the need for further research on the effective integration of AI-powered tools in ESL classrooms.

Conclusion

This study explored the role of Artificial Intelligence (AI) in supporting English as a Second Language (ESL) instructors in the classroom. The findings of this study reveal that AI-powered tools have the potential to transform the way ESL instructors teach and support their students. The thematic analysis revealed four key themes: AI-Powered Tools Supporting Personalized Learning, AI-Powered Tools Enhancing Teacher Feedback and Assessment, AI-Powered Tools Facilitating Language Practice and Interaction, and AI-Powered Tools Supporting Teacher Professional Development. Thematic analysis demonstrates the intersection of Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK) in ESL instructors' use of AI-powered tools. For instance, instructors used AI-powered tools to provide personalized feedback and assessment (Theme 1), which requires TK, PK, and CK. Similarly, instructors used AI-powered tools to facilitate language practice and interaction (Theme 3), which requires TK, PK, and CK.

The findings of this study have implications for ESL instructors, teacher educators, and policymakers. ESL instructors can benefit from using AI-powered tools to support their teaching practices and enhance student learning outcomes. Teacher educators can benefit from incorporating AI-powered tools into their teacher education programs to prepare ESL instructors for the effective use of AI in the classroom. Policymakers can benefit from considering the potential benefits and challenges of AI in ESL teaching and learning when making decisions about education policy.

Key Findings

Participants reported using AI-powered tools to support personalized learning, enhance teacher feedback and assessment, facilitate language practice and interaction, and support teacher professional development.

Recommendations

Based on the findings of this study, the following recommendations are made: ESL instructors should be provided with professional development opportunities to learn about AI-powered tools and how to integrate them into their teaching practices. Teacher education programs should incorporate AI-powered tools into their curriculum to prepare ESL instructors for the effective use of AI in the classroom Policymakers should consider the potential benefits and challenges of AI in ESL teaching and learning when making decisions about education policy.

Limitations and Future Research Directions

This study has several limitations. Firstly, the sample size was relatively small, which may limit the generalizability of the findings. Secondly, the study relied on self-reported data, which may be subject to biases. Future research should aim to address these limitations by using larger sample sizes and multiple data collection methods. Additionally, future research should explore the impact of AI-powered tools on student learning outcomes and the role of AI in supporting ESL instructors in different educational contexts.

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