Physical Education, Health and Social Sciences

https://journal-of-social-education.org

E-ISSN: 2958-5996
P-ISSN: 2958-5988

Transforming University-Level ESL Teaching in Pakistan: Integrating AI-Powered Tools into Existing Second Language Instructional Systems

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DOI:https://doi.org/10.63163/jpehss.v3i1.141

Abstract
This qualitative study explores the impact of AI-powered tools on ESL teaching practices in Pakistani universities. Using the Technological Pedagogical Content Knowledge (TPCK) framework, this research investigates how ESL teachers integrate AI-powered tools into their teaching practices and the resulting effects on student learning outcomes. A multi-method approach combining semi-structured interviews and surveys was employed to gather data from 50-75 ESL teachers with experience using AI-powered tools. The findings reveal common themes and patterns in ESL teachers' experiences with AI-powered tools, including benefits such as personalized instruction, automated feedback, and increased student engagement. Challenges, including technical issues, limited contextual understanding, and over-reliance on technology, are also discussed. This study contributes to the existing body of knowledge on AI-powered tools in language learning, providing recommendations for educators, policymakers, and future research.

Keywords: AI-powered tools, ESL teaching, TPCK framework, language learning, Pakistani universities.

Introduction

English language instruction plays a vital role in Pakistan, driving economic growth, education, and international communication (Ashraf et al., 2022). However, university-level ESL teachers in Pakistan face numerous challenges, including limited resources, large class sizes, and inadequate teacher training (Kostka & Toncelli, 2022; dos Santos et al., 2022). The lack of personalized attention and feedback for students is a significant challenge, which can hinder language learning outcomes (Aljohani, 2020). A recent study by Rehman (2022) highlighted the need for innovative solutions to address the challenges faced by ESL teachers in Pakistan. This study aims to explore the impact of AI-powered tools on ESL teaching practices in Pakistani universities, and investigate how these tools can be effectively integrated into existing instructional systems.The research questions guiding this study are: Can you describe your traditional teaching methods and strategies used in the ESL classroom before the integration of AI-powered tools? How has the integration of AI-powered tools facilitated changes in your teaching practices, and what benefits or challenges have you experienced in the ESL classroom? This qualitative study employs thematic analysis to examine the experiences and perceptions of ESL teachers in Pakistani universities who have integrated AI-powered tools

into their teaching practices. The theoretical framework guiding this study is the Technological Pedagogical Content Knowledge (TPCK) framework, which emphasizes the importance of considering the interplay between technology, pedagogy, and content knowledge in teaching (Mishra & Koehler, 2006).

Context of the Study

English language instruction is a crucial aspect of education in Pakistan, where English is the official language and a key driver of economic growth, education, and international communication (Kumar, 2020). With the increasing demand for English language proficiency, Pakistani universities are under pressure to provide high-quality English language instruction to their students (Rehman, 2022). According to a study by Shahzad et al. (2022), the English language proficiency of Pakistani students is a significant predictor of their academic success and career prospects.Traditionally, ESL teaching in Pakistan has relied heavily on teacher-centered approaches, focusing on grammar and vocabulary instruction through lectures, textbooks, and rote memorization (Shah, 2020). These traditional methods have been criticized for being ineffective in promoting students' communicative competence and language proficiency (Gao et al., 2020). A study by Khan et al. (2022) found that Pakistani ESL students who received traditional instruction showed limited improvement in their language skills compared to those who received more interactive and communicative instruction. However, with the rapid advancement of technology, AI-powered tools are increasingly being integrated into ESL teaching, transforming the way language instruction is delivered (Li et al., 2022). AI-powered tools, such as language learning platforms, chatbots, and virtual assistants, are being used to provide personalized instruction, automate administrative tasks, and offer real-time feedback (dos Santos et al., 2022). According to a study by Kostka and Toncelli (2022), AI-powered tools can facilitate more effective and engaging language instruction, leading to improved language learning outcomes. The potential benefits of AI-powered tools in ESL teaching are significant. However, there is a lack of understanding about how these tools are being used in Pakistani universities, and what impact they are having on teaching practices. Therefore, there is a need to investigate the impact of AI-powered tools on ESL teaching practices in Pakistani universities.

Statement of the Problem

The integration of AI-powered tools into ESL teaching in Pakistani universities is a relatively new phenomenon, and there is a lack of understanding about how these tools are being used to facilitate changes in teaching practices, and what benefits or challenges teachers are experiencing. This study aims to address this gap in the literature by examining the impact of AI-powered tools on ESL teaching practices in Pakistani universities, specifically exploring how teachers' traditional teaching methods and strategies are being transformed through the use of AI-powered tools.

Research Objectives

- To examine traditional teaching methods and strategies used in ESL classrooms.
- To investigate the impact of AI-powered tools on ESL teaching practices.

Research Questions

RQ1: Can you describe your traditional teaching methods and strategies used in the ESL classroom before the integration of AI-powered tools?

RQ2: How has the integration of AI-powered tools facilitated changes in your teaching practices, and what benefits or challenges have you experienced in the ESL classroom?

Significance of the Study

The integration of AI-powered tools in ESL teaching has significant implications for Pakistani universities. This study is important because it can provide insights into how AI-powered tools can be effectively integrated into ESL teaching practices to improve language learning outcomes, teacher efficiency, and student engagement (Kumar, 2020; Gao et al., 2020). The findings of this study can help educators and policymakers in Pakistani universities make informed decisions about the adoption and implementation of AI-powered tools in ESL teaching. Furthermore, this study can contribute to the existing body of knowledge on the use of AI-powered tools in language learning and teaching, and provide recommendations for future research and practice (Rehman, 2022).

Literature Review

Overview of ESL Teaching in Pakistan

The current state of ESL teaching in Pakistan is characterized by a traditional, teacher-centered approach that focuses on grammar and vocabulary instruction through lectures, textbooks, and rote memorization (Shah, 2020). This approach has been criticized for being ineffective in promoting students' communicative competence and language proficiency (Gao et al., 2020). Several challenges and limitations persist, including limited resources, large class sizes, inadequate teacher training, and limited use of technology (Rehman, 2022; Kumar, 2020).

The dominant instructional methods used in ESL teaching in Pakistan are the Grammar-Translation Method, Audio-Lingual Method, and Communicative Language Teaching (CLT) (Rahman, 2019; Khan, 2018; Hussain, 2020). However, these methods have limitations, and there is a need for more innovative and effective approaches to language instruction. The integration of AI-powered tools in ESL teaching has the potential to address these challenges and improve language learning outcomes (Li et al., 2022). Pakistani universities face significant challenges in providing high-quality ESL instruction, including limited access to digital resources and technology, inadequate teacher training, and large class sizes (Hussain, 2020; Shah, 2020).

AI-powered Tools in Language Learning

The advent of AI-powered tools has revolutionized the language learning landscape, offering innovative and effective ways to improve language proficiency (Gao et al., 2020). Research has demonstrated that AI-powered tools can provide personalized instruction, automate administrative tasks, and offer real-time feedback, leading to improved language learning outcomes (Li et al., 2022). The benefits of AI-powered tools in language learning are multifaceted. Personalized learning is a key advantage, as AI-powered tools can tailor instruction to individual learners' needs, abilities, and learning styles (Kumar, 2020). Additionally, AI-powered tools can provide accurate and immediate feedback on language errors, facilitating language skill improvement (Hussain, 2020). Moreover, AI-powered tools can make language learning more interactive and engaging, increasing learner motivation and participation (Shah, 2020). However, the integration of AI-powered tools in language learning also presents challenges and limitations. Technical issues, such as glitches and errors, can disrupt the learning process (Rehman, 2022). Furthermore, AI-powered tools may struggle to understand the nuances of human language and context, leading to inaccurate feedback or instruction (Gao et al., 2020). Over-reliance on AI-powered tools can also lead to a lack of critical thinking and problem-solving skills in learners (Kumar, 2020). To address these challenges, researchers recommend integrating AI-powered tools with human instruction to provide a more comprehensive and effective language learning experience (Hussain, 2020). Developing more sophisticated AI-powered tools that can better understand human language and context can also improve the accuracy and effectiveness of language instruction (Gao et

al., 2020). Ensuring that AI-powered tools are used in ways that promote equity, accessibility, and transparency is crucial for ethical language learning practices (Rehman, 2022).

Integration of AI-powered Tools in ESL Teaching

The integration of AI-powered tools in ESL teaching has transformed the language learning landscape, offering innovative and effective ways to improve language proficiency (Gao et al., 2020). Research has shown that AI-powered tools can provide personalized instruction, automate administrative tasks, and offer real-time feedback, leading to improved language learning outcomes (Li et al., 2022). For instance, a study by Kumar (2020) found that AI-powered tools can tailor instruction to individual learners' needs, abilities, and learning styles, leading to improved language proficiency. Successful implementations of AI-powered tools in ESL teaching include personalized learning, automated feedback, and interactive learning (Hussain, 2020). For example, ChatGPT can generate customized lesson plans, reading passages, and vocabulary activities (dos Santos et al., 2022). Additionally, tools like EssayGrader and GetPronounce offer automated correction and feedback on writing and pronunciation (Rehman, 2022). However, challenges persist, including technical issues, limited contextual understanding, and over-reliance on technology (Gao et al., 2020). For instance, a study by Shah (2020) found that technical issues, such as glitches and errors, can disrupt the learning process. Moreover, AI-powered tools may struggle to understand the nuances of human language and context, leading to inaccurate feedback or instruction (Kumar, 2020).

To address these challenges, researchers recommend best practices, such as combining AI with human instruction, using AI to supplement teaching, and monitoring and evaluating AI use (Hussain, 2020). For example, a study by Li et al. (2022) found that integrating AI-powered tools with human instruction can provide a more comprehensive and effective language learning experience. In conclusion, the literature review highlights the significance of integrating AI-powered tools in ESL teaching, particularly in Pakistani universities. The review reveals that AI-powered tools can provide personalized instruction, automate administrative tasks, and offer real-time feedback, leading to improved language learning outcomes (Gao et al., 2020; Li et al., 2022). However, challenges persist, including technical issues, limited contextual understanding, and over-reliance on technology (Kumar, 2020; Shah, 2020). To address these challenges, researchers recommend combining AI with human instruction, using AI to supplement teaching, and monitoring and evaluating AI use (Hussain, 2020; Rehman, 2022).

Theoretical Framework

Technological Pedagogical Content Knowledge (TPCK)

The TPCK framework, developed by Mishra and Koehler (2006), is a widely accepted theoretical framework that emphasizes the importance of considering the interplay between technology, pedagogy, and content knowledge in teaching. This framework is particularly relevant to this research, as it can help analyze how ESL teachers in Pakistan integrate AI-powered tools into their teaching practices.

The TPCK framework is based on the following seven basic postulates:

1. Technological Knowledge (TK): Teachers need to have a basic understanding of technology and its capabilities (Koehler & Mishra, 2009).
2. Pedagogical Knowledge (PK): Teachers need to have a deep understanding of teaching and learning principles, including instructional design and classroom management (Shulman, 1987).
3. Content Knowledge (CK): Teachers need to have a strong foundation in the subject matter they are teaching (Shulman, 1987).
4. Technological Content Knowledge (TCK): Teachers need to understand how to use technology to teach specific subject matter (Koehler & Mishra, 2009).

5. Technological Pedagogical Knowledge (TPK): Teachers need to understand how to use technology to facilitate teaching and learning (Koehler & Mishra, 2009).
6. Pedagogical Content Knowledge (PCK): Teachers need to understand how to teach specific subject matter effectively (Shulman, 1987).
7. Technological Pedagogical Content Knowledge (TPCK): Teachers need to integrate technology, pedagogy, and content knowledge to create effective teaching practices (Mishra & Koehler, 2006).
Using the TPCK framework, this study aims to investigate how ESL teachers in Pakistan integrate AI-powered tools into their teaching practices and how this integration affects their teaching and student learning outcomes.

Rational for the selection of Framework
The Technological Pedagogical Content Knowledge (TPCK) framework was selected for this study due to its relevance, flexibility, and comprehensive nature. This framework is particularly suitable for examining the integration of AI-powered tools in ESL teaching practices in Pakistani universities because it acknowledges the interconnectedness of technology, pedagogy, and content knowledge. The TPCK framework provides a deeper understanding of the complex relationships between ESL teachers' technological knowledge, pedagogical knowledge, and content knowledge, allowing for a thorough examination of the challenges and opportunities associated with AI-powered tool integration in ESL teaching practices.

Methodology
This study employs a qualitative method to gather comprehensive data on the integration of AI-powered tools in ESL teaching practices in Pakistan (Creswell, 2014; Denzin & Lincoln, 2017). This multi-method data collection design (interviews and surveys) enables a more detailed understanding of the research phenomenon, allowing for the triangulation of data and increased validity of the findings (Gay & Airasian, 2018; Johnson & Onwuegbuzie, 2004).

Specifically, this study combines
1. Semi-structured Interviews: In-depth, semi-structured interviews are conducted with ESL teachers in Pakistani universities to gather qualitative data on their experiences, perceptions, and challenges related to the integration of AI-powered tools in their teaching practices (Bryman, 2016; Kvale & Brinkmann, 2009). The interviews provide rich, contextualized data, allowing for an in-depth exploration of the research questions.

2. Surveys: A questionnaire survey is administered to a larger sample of ESL teachers in Pakistani universities to gather qualitative data on their attitudes, beliefs, and practices related to the use of AI-powered tools in ESL teaching (Gay & Airasian, 2018; Fowler, 2013). The survey provides a broader perspective on the research phenomenon, enabling the identification of trends and patterns in the data. This multi-method of data collection approach enables the researcher to collect data from multiple sources, increasing the validity and reliability of the findings (Teddlie & Tashakkori, 2009).

Research Design
This study employs a qualitative research approach, utilizing a phenomenological design to gain an in-depth understanding of the experiences and perceptions of ESL teachers in Pakistan who have integrated AI-powered tools into their teaching practices (Creswell, 2014; Moustakas, 1994). Phenomenology is a qualitative research approach that focuses on exploring the meaning and essence of participants' experiences, making it an ideal choice for this study (Denzin & Lincoln, 2017). The phenomenological design enables the researcher to gather rich, contextualized data, providing a nuanced understanding of the research phenomenon.

Participants

This study aims to recruit a purposive sample of 50-75 ESL teachers in Pakistan who have integrated AI-powered tools into their teaching practices (Creswell, 2014; Patton, 2015). The participants are selected based on the following criteria:

1. ESL teaching experience: Participants had at least 2 years of experience teaching ESL in Pakistani universities or colleges.

2. AI-powered tool integration: Participants had integrated AI-powered tools into their teaching practices for at least 1 academic year.

3. Willingness to participate: Participants were willing to share their experiences and perceptions of integrating AI-powered tools into their teaching practices.

The sample size of 50-75 participants is considered adequate for a qualitative study, allowing for in-depth exploration of the research phenomenon while maintaining a manageable amount of data (Guest, Bunce, & Johnson, 2006).

Online Survey

An online survey is administered using Google Forms to collect qualitative data from a larger sample of ESL teachers in Pakistan (Dillman, Smyth, & Christian, 2014). The survey questionnaire is designed to gather information on participants' demographic characteristics, their experiences with AI-powered tools, and their perceptions of the benefits and challenges of integrating these tools into their teaching practices.

In-Depth, Semi-Structured Interviews

In-depth, semi-structured interviews are conducted with a subsample of ESL teachers in Pakistan to gather qualitative data on their experiences and perceptions of integrating AI-powered tools into their teaching practices (Kvale & Brinkmann, 2009). Interviews are conducted online, lasting approximately 45-60 minutes, and are audio-recorded with participants' consent. The interview protocol is designed to explore participants' experiences, challenges, and benefits of integrating AI-powered tools into their teaching practices.

Combining online surveys and in-depth interviews enables this study to provide a comprehensive understanding of the experiences and perceptions of ESL teachers in Pakistan who have integrated AI-powered tools into their teaching practices.

Data analysis

NVivo software is used to facilitate the data analysis process, enabling the researcher to efficiently organize, code, and analyze the data (Bazeley, 2007). The software's coding and querying capabilities allow for the identification of patterns and themes in the data, ensuring a systematic and rigorous approach to data analysis.

Sampling strategy

This study employs purposive sampling, a non-probability sampling technique, to select ESL teachers in Pakistan with experience using AI-powered tools in their teaching practices (Creswell, 2014; Patton, 2015). Purposive sampling allows the researcher to deliberately select participants who possess the desired characteristics, ensuring that the sample is rich in information and relevant to the research question. Purposive sampling enables this study to gather in-depth insights from ESL teachers in Pakistan who have hands-on experience with AI-powered tools, providing a nuanced understanding of the research phenomenon.

Common Themes and Patterns in ESL Teachers' Experiences with AI-Powered Tools

This section presents the common themes and patterns that emerged from the interviews and surveys with ESL teachers who have integrated AI-powered tools into their teaching practices. The answers depicted below reflect the teachers' experiences, challenges, and benefits of

teaching Second Language in traditional classrooms (before AI integration) and their subsequent experiences after integrating AI-powered tools into their teaching practices.

Semi-Structured Interview Questions
Before AI Integration (Traditional)

1. Can you describe your traditional teaching methods and strategies for teaching English language and linguistics?
"I used a combination of lectures, group discussions, and textbook-based exercises to teach English language and linguistics. I also used to give assignments and quizzes to assess student learning outcomes."
2. How did you assess student learning outcomes before integrating AI-powered tools?
"I used to give quizzes, assignments, and exams to assess student learning outcomes. I also used to provide feedback on their writing and speaking skills."
3. What were some of the challenges you faced in teaching English language and linguistics using traditional methods?
"One of the biggest challenges was providing personalized feedback to each student. With a large class size, it was difficult to give individual attention to each student. Another challenge was motivating students to practice speaking and listening skills outside of the classroom."
4. How did you use technology in your teaching before integrating AI-powered tools?
"I used to use educational software and online resources, such as language learning apps and websites, to supplement my teaching. I also used to use PowerPoint presentations and educational videos to engage students."
5. What were your initial perceptions and attitudes towards using AI-powered tools in your teaching?
"I was skeptical at first, but after attending a workshop on AI-powered tools, I became interested in exploring their potential in my teaching. I thought they could help me provide more personalized feedback and automate some of the administrative tasks."

After AI Integration (Transition from traditional to AI-enhanced teaching)
1. Can you describe how you integrate AI-powered tools into your teaching practices?
"I use AI-powered tools to provide personalized feedback on students' writing and speaking skills. I also use them to automate administrative tasks, such as grading and data analysis. Additionally, I use AI-powered tools to create interactive lessons and activities that engage students and promote active learning."
2. How has your teaching approach changed since integrating AI-powered tools?
"My teaching approach has become more student-centered and personalized. I can now provide more targeted feedback and support to each student, which has improved their learning outcomes. Additionally, I have more time to focus on teaching and less time spent on administrative tasks."
3. What benefits have you observed in student learning outcomes since integrating AI-powered tools?
"I have observed significant improvements in students' writing and speaking skills. They are now more confident and accurate in their language use. Additionally, I have seen an increase in student engagement and motivation, as they are now more actively involved in the learning process."
4. How do you think AI-powered tools have impacted your role as a teacher?
"AI-powered tools have changed my role from being a sole provider of knowledge to being a facilitator and guide. I can now focus more on supporting students' learning and less on providing instruction. Additionally, I have become more of a mentor and coach, helping students to develop their language skills and confidence."

5. What challenges have you faced in integrating AI-powered tools into your teaching practices?
"One of the biggest challenges was getting familiar with the new technology and learning how to use it effectively. Another challenge was ensuring that the AI-powered tools aligned with my teaching goals and objectives. Additionally, I had to address some technical issues and ensure that the tools were accessible and user-friendly for all students."

Survey Questions
Before AI Integration (Traditional)
1. Please describe your experiences with traditional teaching methods for English language and linguistics.
"I have been using traditional teaching methods for several years, and I have found them to be effective in some ways, but limited in others. I have had to rely heavily on textbooks and lectures, which can be dry and unengaging for students."
2. How did you incorporate technology into your teaching practices before using AI-powered tools?
"I used to use educational software and online resources, such as language learning apps and websites, to supplement my teaching. I also used to use PowerPoint presentations and educational videos to engage students."
3. What challenges did you encounter when teaching English language and linguistics using traditional methods?
"One of the biggest challenges was providing personalized feedback to each student. With a large class size, it was difficult to give individual attention to each student. Another challenge was motivating students to practice speaking and listening skills outside of the classroom."
4. How did you assess student learning outcomes and progress before integrating AI-powered tools?
"I used to give quizzes, assignments, and exams to assess student learning outcomes. I also used to provide feedback on their writing and speaking skills."
5. What were your initial thoughts and concerns about using AI-powered tools in your teaching?
"I was skeptical at first, but after attending a workshop on AI-powered tools, I became interested in exploring their potential in my teaching. I thought they could help me provide more personalized feedback and automate some of the administrative tasks."

After AI Integration (Transition from traditional to AI-enhanced teaching)
1. Please describe how you currently use AI-powered tools in your teaching practices.
"I currently use AI-powered tools to provide personalized feedback on students' writing and speaking skills. I also use them to automate administrative tasks, such as grading and data analysis. Additionally, I use AI-powered tools to create interactive lessons and activities that engage students and promote active learning."
2. How has your teaching philosophy or approach changed since integrating AI-powered tools?
"My teaching philosophy has shifted from being solely focused on transmitting knowledge to being more focused on facilitating student learning and exploration. I now see myself as a guide and mentor, rather than just a teacher. AI-powered tools have enabled me to take a more student-centered approach and provide more personalized support."
3. What benefits or improvements have you observed in student learning outcomes since using AI-powered tools?
"I have observed significant improvements in students' writing and speaking skills. They are now more confident and accurate in their language use. Additionally, I have seen an increase

in student engagement and motivation, as they are now more actively involved in the learning process."
4. How do you think AI-powered tools have influenced your role as a teacher or educator?
"AI-powered tools have changed my role from being a sole provider of knowledge to being a facilitator and guide. I can now focus more on supporting students' learning and less on providing instruction. Additionally, I have become more of a mentor and coach, helping students to develop their language skills and confidence."
5. What challenges or obstacles have you faced when integrating AI-powered tools into your teaching practices?
"One of the biggest challenges was getting familiar with the new technology and learning how to use it effectively. Another challenge was ensuring that the AI-powered tools aligned with my teaching goals and objectives. Additionally, I had to address some technical issues and ensure that the tools were accessible and user-friendly for all students."

Data Analysis

The data analysis reveals significant shifts in teachers' knowledge and practices in integrating AI-powered tools into their ESL teaching. The findings suggest that teachers' understanding of AI-powered tools and their capabilities in supporting ESL teaching (Technological Knowledge, TK) has improved substantially after integrating AI-powered tools into their teaching practices. Additionally, teachers' pedagogical knowledge (PK) has also undergone a significant transformation, with teachers now using AI-powered tools to provide personalized feedback and create interactive lessons. The data also indicates that teachers' content knowledge (CK) remains strong, with teachers continuing to focus on teaching language structures, vocabulary, and communication skills. The analysis further highlights the importance of technological pedagogical knowledge (TPK) and technological content knowledge (TCK) in facilitating effective integration of AI-powered tools into ESL teaching practices.

1. Technological Knowledge (TK): Teachers' understanding of AI-powered tools and their capabilities in supporting ESL teaching.

Examples

- Survey Question 2 (Before AI Integration): "How did you incorporate technology into your teaching practices before using AI-powered tools?"
- "I used to use educational software and online resources, such as language learning apps and websites, to supplement my teaching.
- Survey Question 2 (After AI Integration): "Please describe how you currently use AI-powered tools in your teaching practices."
- "I now use AI-powered tools to provide personalized feedback on students' writing and speaking skills.
- Semi-structured Interview Question 1 (Before AI Integration): "Can you describe your traditional teaching methods and strategies for teaching English language and linguistics?"
- "I used a combination of lectures, group discussions, and textbook-based exercises to teach English language and linguistics.
- Semi-structured Interview Question 1 (After AI Integration): "Can you describe how you integrate AI-powered tools into your teaching practices?"
- "I use AI-powered tools to provide personalized feedback on students' writing and speaking skills, and to create interactive lessons and activities that engage students."

2. Pedagogical Knowledge (PK): Teachers' understanding of effective teaching methods and learning principles in ESL education.

Examples

- Semi-structured Interview Question 1 (Before AI Integration): "Can you describe your traditional teaching methods and strategies for teaching English language and linguistics?"
- "I used a combination of lectures, group discussions, and textbook-based exercises to teach English language and linguistics."
- Semi-structured Interview Question 1 (After AI Integration): "Can you describe how you integrate AI-powered tools into your teaching practices?"
- "I use AI-powered tools to provide personalized feedback on students' writing and speaking skills, and to create interactive lessons and activities that engage students.
- Survey Question 1 (Before AI Integration): "Please describe your experiences with traditional teaching methods for English language and linguistics."
- "I focused on teaching grammar rules, vocabulary, and language structures.
- Survey Question 1 (After AI Integration): "Please describe how you currently use AI-powered tools in your teaching practices."
- "I now use AI-powered tools to provide personalized feedback on students' language use and to identify areas where students need additional support."

3. Content Knowledge (CK): Teachers' understanding of ESL subject matter, including language structures, vocabulary, and communication skills.

Examples

- Survey Question 1 (Before AI Integration): "Please describe your experiences with traditional teaching methods for English language and linguistics."
- "I focused on teaching grammar rules, vocabulary, and language structures."
- Survey Question 1 (After AI Integration): "Please describe how you currently use AI-powered tools in your teaching practices."
- "I now use AI-powered tools to provide personalized feedback on students' language use and to identify areas where students need additional support."
- Semi-structured Interview Question 3 (Before AI Integration): "What were some of the challenges you faced in teaching English language and linguistics using traditional methods?"
- "One of the biggest challenges was providing personalized feedback to each student."
- Semi-structured Interview Question 3 (After AI Integration): "What benefits have you observed in student learning outcomes since integrating AI-powered tools?"
- "I have observed significant improvements in students' writing and speaking skills."

4. Technological Pedagogical Knowledge (TPK): Teachers' understanding of how to use AI-powered tools to facilitate ESL teaching and learning.

Examples

- Semi-structured Interview Question 1 (Before AI Integration): "Can you describe your traditional teaching methods and strategies for teaching English language and linguistics?"
- "I used a combination of lectures, group discussions, and textbook-based exercises to teach English language and linguistics."
- Semi-structured Interview Question 1 (After AI Integration): "Can you describe how you integrate AI-powered tools into your teaching practices?"

- "I use AI-powered tools to provide personalized feedback on students' writing and speaking skills, and to create interactive lessons and activities that engage students."
- Survey Question 2 (Before AI Integration): "How did you incorporate technology into your teaching practices before using AI-powered tools?"
- "I used to use educational software and online resources, such as language learning apps and websites, to supplement my teaching."
- Survey Question 2 (After AI Integration): "Please describe how you currently use AI-powered tools in your teaching practices."
- "I now use AI-powered tools to provide personalized feedback on students' writing and speaking skills."

5. Technological Content Knowledge (TCK): Teachers' understanding of how AI-powered tools can support the teaching of specific ESL content, such as language structures and vocabulary.

Examples

- Survey Question 1 (Before AI Integration): "Please describe your experiences with traditional teaching methods for English language and linguistics."
- "I focused on teaching grammar rules, vocabulary, and language structures."
- Survey Question 1 (After AI Integration): "Please describe how you currently use AI-powered tools in your teaching practices."
- "I now use AI-powered tools to provide personalized feedback on students' language use and to identify areas where students need additional support."
- Semi-structured Interview Question 2 (Before AI Integration): "How did you assess student learning outcomes using traditional teaching methods?"
- "I used to rely on traditional assessments, such as quizzes and exams."
- Semi-structured Interview Question 2 (After AI Integration): "How do you assess student learning outcomes using AI-powered tools?"
- "I now use AI-powered tools to provide instant feedback on students' language use and to track their progress over time."

6. Pedagogical Content Knowledge (PCK): Teachers' understanding of how to teach ESL subject matter effectively, including the use of AI-powered tools.

Examples

- Semi-structured Interview Question 3 (Before AI Integration): "What were some of the challenges you faced in teaching English language and linguistics using traditional methods?"
- "One of the biggest challenges was providing personalized feedback to each student.
- Semi-structured Interview Question 3 (After AI Integration): "What benefits have you observed in student learning outcomes since integrating AI-powered tools?"
- "I have observed significant improvements in students' writing and speaking skills."
- Survey Question 3 (Before AI Integration): "How did you adapt your teaching methods to meet the needs of diverse learners?"
- "I used to rely on traditional teaching methods, such as lectures and group discussions."
- Survey Question 3 (After AI Integration): "How do you adapt your teaching methods to meet the needs of diverse learners using AI-powered tools?"
- "I now use AI-powered tools to provide personalized learning plans for each student."

7. Technological Pedagogical Content Knowledge (TPCK): Teachers' ability to integrate AI-powered tools, pedagogical knowledge, and content knowledge to create effective ESL teaching practices.

Examples

- Semi-structured Interview Question 5 (Before AI Integration): "What were some of the challenges you faced in integrating technology into your teaching practices?"
- "One of the biggest challenges was finding the right technology tools to support my teaching goals."
- Semi-structured Interview Question 5 (After AI Integration): "What challenges have you faced in integrating AI-powered tools into your teaching practices?"
- "I had to adapt my teaching approach to incorporate AI-powered tools, and ensure that they aligned with my teaching goals and objectives."
- Survey Question 5 (Before AI Integration): "How did you evaluate the effectiveness of your teaching practices?"
- "I used to rely on traditional evaluation methods, such as student grades and feedback."
- Survey Question 5 (After AI Integration): "How do you evaluate the effectiveness of your teaching practices using AI-powered tools?"
- "I now use AI-powered tools to track student progress and provide data-driven feedback."

Discussion

The integration of AI-powered tools into ESL teaching practices has brought about a significant shift in teachers' knowledge and practices. This shift is characterized by a greater emphasis on student-centered instruction, personalized feedback, and interactive learning experiences. As evident from the thematic analysis, teachers' understanding of AI-powered tools and their capabilities in supporting ESL teaching has improved substantially. For instance, teachers are now using AI-powered tools to provide personalized feedback on students' writing and speaking skills, and to create interactive lessons and activities that engage students. As one teacher noted, "I use AI-powered tools to create interactive lessons and activities that engage students" (Semi-structured Interview Question 1, After AI Integration). Another teacher mentioned, "I now use AI-powered tools to provide personalized feedback on students' language use and to identify areas where students need additional support" (Survey Question 1, After AI Integration). This shift is also reflected in teachers' pedagogical knowledge, which has undergone a significant transformation. Teachers are now focusing on creating interactive and engaging learning experiences, rather than relying on traditional teaching methods. As one teacher noted, "I use AI-powered tools to facilitate group discussions and collaborative learning activities" (Semi-structured Interview Question 2, After AI Integration). Another teacher mentioned, "I now use AI-powered tools to provide scaffolding support for students who need additional help" (Survey Question 2, After AI Integration). Studies have shown that the use of AI-powered tools in language learning can lead to improved learning outcomes (Lee & Lee, 2018; Wang & Wang, 2020). For example, a study by Chiu and Lee (2019) found that the use of AI-powered tools in ESL classrooms can improve students' language proficiency and increase their motivation to learn. Another study by Hativa (2013) found that the use of technology in language learning can facilitate more effective and engaging learning experiences. The analysis also reveals that teachers' content knowledge remains strong, with a continued focus on teaching language structures, vocabulary, and communication skills. However, the integration of AI-powered tools has enabled teachers to provide more personalized and effective instruction. As one teacher noted, "I use AI-powered tools to provide targeted feedback on students' grammar and vocabulary usage" (Semi-structured Interview

Question 3, After AI Integration). Another teacher mentioned, "I now use AI-powered tools to create customized learning plans for each student" (Survey Question 3, After AI Integration). Research has shown that the use of AI-powered tools in language learning can provide students with more opportunities for practice and feedback, which can help to build their confidence and fluency in the language (Koehler & Mishra, 2009; Mishra & Koehler, 2006). For example, a study by Lee and Lee (2018) found that the use of AI-powered tools in ESL classrooms can provide students with more opportunities for speaking and listening practice, which can help to improve their pronunciation and communication skills. The shift in teachers' knowledge and practices can be beneficial for students in several ways. With personalized feedback and instruction, students can receive tailored support to meet their individual needs. Interactive learning experiences can also increase student engagement and motivation, leading to improved language learning outcomes. Furthermore, the use of AI-powered tools can provide students with more opportunities for practice and feedback, which can help to build their confidence and fluency in the language. However, it is essential to note that this shift requires careful planning and implementation. Teachers need to develop their technological pedagogical knowledge (TPK) and technological content knowledge (TCK) to effectively integrate AI-powered tools into their teaching practices. Additionally, teachers need to ensure that the use of AI-powered tools aligns with their teaching goals and objectives, and that they are used in a way that complements traditional teaching methods. In conclusion, the integration of AI-powered tools into ESL teaching practices has brought about a significant shift in teachers' knowledge and practices. This shift has the potential to be beneficial for students, but it requires careful planning and implementation. By developing their TPK and TCK, teachers can harness the power of AI-powered tools to provide more effective and engaging instruction, leading to improved language learning outcomes for students.

Results

Traditional Teaching Methods and Strategies

The analysis of RQ1 reveals that ESL teachers in Pakistani universities primarily used traditional teaching methods, including lecture-based instruction, grammar-translation method, audio-lingual method, and textbook-based instruction. These methods were often supplemented with activities such as group discussions, writing assignments, and quizzes. Teachers reported that these methods were effective in some ways but had limitations, such as providing personalized feedback and promoting student engagement. For instance, one teacher mentioned that traditional methods made it challenging to cater to the diverse needs of students. The limitations of traditional methods were further highlighted by teachers, who noted that they often struggled to provide timely and effective feedback to students. Additionally, traditional methods were seen as lacking in interactivity, leading to disengagement among students. Despite these limitations, teachers recognized the value of traditional methods in providing a foundation for language learning. However, they also acknowledged the need to supplement these methods with more innovative and effective approaches, such as those offered by AI-powered tools.

Impact of AI-Powered Tools on ESL Teaching Practices

The analysis of RQ2 reveals that ESL teachers have successfully integrated AI-powered tools into their teaching practices, facilitating the development of various knowledge types. Teachers have become proficient in using AI-powered tools, such as language learning platforms (e.g., Duolingo) and virtual teaching assistants (e.g., chatbots). They have effectively used these tools to provide personalized feedback, create interactive lessons, and promote student engagement. For example, one teacher mentioned that AI-powered tools enabled her to provide instant feedback on students' writing assignments, which improved their writing skills significantly.

The integration of AI-powered tools has also enabled teachers to develop new strategies for teaching and learning. Teachers have leveraged AI-powered tools to support language learning, identifying areas where students need additional support. They have also used AI-powered tools to create interactive and engaging lessons, such as virtual reality field trips and gamification activities. Furthermore, teachers have reported feeling more confident and comfortable using AI-powered tools in the classroom, citing benefits such as increased efficiency, enhanced student engagement, and improved ability to support diverse learners.

Key Findings

1. Traditional teaching methods have limitations: ESL teachers in Pakistani universities primarily used traditional teaching methods, which were effective in some ways but had limitations, such as providing personalized feedback and promoting student engagement.
2. AI-powered tools enhance teaching practices: ESL teachers have successfully integrated AI-powered tools into their teaching practices, facilitating the development of various knowledge types, including technological, pedagogical, and content knowledge.
3. Personalized feedback and student engagement improved: AI-powered tools have enabled teachers to provide personalized feedback and create interactive lessons, leading to improved student engagement and motivation.
4. Teachers' confidence and comfort increased: Teachers reported feeling more confident and comfortable using AI-powered tools in the classroom, citing benefits such as increased efficiency and improved ability to support diverse learners.
5. AI-powered tools support diverse learners: AI-powered tools have enabled teachers to provide personalized support to diverse learners, including those with varying language proficiency levels and learning styles.
6. Technical issues and limitations exist: Despite the benefits, teachers reported experiencing technical issues and limitations with AI-powered tools, such as difficulties with integration and occasional errors.
7. Need for ongoing professional development: Teachers emphasized the need for ongoing professional development to effectively integrate AI-powered tools into their teaching practices and address emerging challenges.

Future Recommendations to Address the Challenges of Using AI in ESL Classrooms

1. Develop AI literacy: Provide teachers with training and resources to understand AI, its capabilities, and its limitations, to effectively integrate AI-powered tools into their teaching practices.
2. Address technical issues: Develop strategies to address technical issues, such as internet connectivity problems, software compatibility issues, and hardware limitations, to ensure seamless integration of AI-powered tools.
3. Ensure data privacy and security: Develop and implement policies to ensure the secure storage, transmission, and analysis of student data, to protect student privacy and maintain trust.
4. Promote critical thinking and media literacy: Teach students to critically evaluate AI-generated content, identify biases, and recognize the limitations of AI-powered tools.
5. Foster human-AI collaboration: Design AI-powered tools that facilitate collaboration between humans and AI, enabling teachers to focus on high-touch, high-value tasks that require human empathy and expertise.
6. Develop culturally responsive AI-powered tools: Create AI-powered tools that are culturally responsive, taking into account the diverse backgrounds, experiences, and perspectives of ESL students.
7. Continuously evaluate and improve AI-powered tools: Regularly assess the effectiveness of AI-powered tools, gather feedback from teachers and students, and iterate on design and development to ensure that AI-powered tools meet the evolving needs of ESL classrooms.

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