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Research Paper

Exploring the Efficacy of ChatGPT in Personalized Language Learning: An Intervention Study in Iranian ESL Classrooms

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Abstract

With the advent of artificial intelligence (AI) tools, language teachers are presented with new possibilities for addressing challenges in language education. This intervention study aimed to investigate views from ESL teachers on the benefits and challenges of integrating ChatGPT, An artificial intelligence (AI) language model created by OpenAI in 2023, into ESL classrooms for personalized language learning. The study carried out in two upper-secondary schools, combines teacher questionnaires and interviews with a personalized learning intervention based on ChatGPT. The primary focus was on understanding the effect of ChatGPT-based personalized learning assignments on learners' grammatical knowledge in a local classroom setting. Through the questionnaire, initial teacher concerns regarding the precision, dependability, and helpful application of AI tools were investigated. Despite these reservations, the intervention demonstrated a notable decrease in grammatical errors in student writing. Subsequent interviews revealed a positive shift in teacher perceptions, indicating increased receptivity to AI-based approaches after witnessing positive outcomes. The study highlights the importance of teacher training and hands-on experience in overcoming initial hesitations associated with AI tool adoption in pedagogical practices. Moreover, the promising results suggest that AI-powered instruments, like ChatGPT, have the potential to enhance personalized language learning. This underscored the significance of educators cultivating their Technological Pedagogical Content Knowledge (TPACK) to overcome hesitations and effectively harness the potential of ChatGPT for augmenting individualized learning. The study's findings provided evidence supporting the utilization of ChatGPT-based personalized learning assignments to meet the specific requirements of the schools in question.

Keywords: AI-powered tools, ChatGPT, Customized tasks, ESL classroom, Personalized language learning

Artificial Intelligence (AI) advances have opened up new avenues for improving the state of education, particularly through the lens of personalized learning. An increasing

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amount of research highlights how AI tools, like chatbots and AI-based apps, have the potential to improve learning by tailoring content to individual learners. This adaptability not only fosters learner autonomy but also augments engagement and motivation (Chiu et al., 2023; Lee et al.,2022; Tang et al., 2020; Li & Zhang, 2019; Ferguson et al., 2022; Bhutoria, 2022; Chatterjee & Bhattacharjee, 2020; Chen & Wu, 2018). The ZPD, which has its origins in Vygotsky's work (1978), represents the difference between a learner's present and potential abilities when given the right guidance and support. Results indicated positive impacts on learning outcomes, maintaining learning's experiential components in comparison to the control group.

While these findings are promising, the successful integration of AI tools into educational settings hinges not just on how well they work in particular situations but also on how prepared teachers are to use these resources in the classroom (Ayanawale et al., 2022). Previous studies note teachers' general enthusiasm for technology adoption but underscore practical considerations such as tool availability, user-friendliness, and the need for enhanced training (Chen & Wang, 2021; Kim et al., 2021; Wang et al., 2023).

The Iranian secondary school context exhibits a strong endorsement for the utilization of sophisticated digital tools for individualized education, as well as for the instruction of educators in their implementation. In the secondary school curriculum, the field of Education places significant emphasis on the personalizing of the learning experience. This is achieved through the provision of opportunities for students to exercise choice and autonomy, thereby facilitating their success (Nushi & Momeni, 2020). The curriculum places a strong focus on the importance of "individual options" and "student impact" and it also promotes the use of digital resources to improve the learning experience. Furthermore, the curriculum recognizes the escalating ubiquity of artificial intelligence in contemporary culture and underscores the imperative for the requirement for institutions of learning to confront its escalating importance through the integration of AI technologies within the educational setting. Additionally, they highlight a significant obstacle to the adoption of these tools, namely that teachers may lack the necessary knowledge and understanding to incorporate AI into their teaching methods effectively. This highlights the importance of providing educators with thorough training on AI so that they may effortlessly incorporate this sort of technology into their teaching methods.

Although there is growing recognition of the potential advantages of utilizing AI in educational environments, there is still a significant amount of knowledge to be acquired on its implementation for personalized learning. Specifically, scholars have not

extensively investigated the variables that impact teachers' inclination to adopt artificial intelligence (AI) in the educational environment or discuss their views on the ease of incorporating and effectiveness of these technologies for individualized learning. The increasing accessibility of AI tools poses a substantial problem for educators and educational institutions. Hence, it is imperative to rectify this deficiency in information and conduct further studies to provide teachers with what they need to utilize artificial intelligence tools in educational environments effectively.

Through the use of an initial survey, training for teachers, ChatGPT—an AI-based intervention, and follow-up interviews, this action research study explored teachers' viewpoints on the benefits and challenges of integrating artificial intelligence (AI) for customized instruction in English as a Second Language (ESL) courses. The goal of the study, which is being carried out in two upper-secondary schools, is to clarify the variables affecting teachers' willingness to adopt AI tools. Additionally, the intervention aims to test the hypothesis stating that an intervention using ChatGPT would improve students' grammar skills by utilizing customized tasks, this serves as evidence for the feasibility of future investigations. The study hopes to add to the body of knowledge on AI-based tools for personalized learning, which will be helpful to language teachers and legislators who are attempting to figure out how to incorporate AI into ESL classrooms.

Therefore, the present research investigation aims to ascertain the solutions to the following research questions:

1. What advantages, difficulties, and potential effectiveness do Iranian English language teachers see in personalized language learning using ChatGPT before and after putting it into practice in the classroom?
2. What aspects of their ChatGPT experience sway teachers' decisions to use AI-powered digital tools for personalized learning in Iranian English language classrooms?
3. Does the implementation of ChatGPT-generated personalized learning assignments address Iranian students' unique grammar deficiencies and produce a measurable increase in the grammar knowledge of learners?

Literature Review

The concept of personalized learning has long been intertwined with education, including phrases like "adaptive learning," "personalized education," "personalization," and "tailoring of instructional content." Minn (2022) introduces adaptive learning systems, using data analytics and technology to identify the distinct learning preferences, objectives, and skills of every student. These systems then use technology components

like data analytics, machine learning, and artificial intelligence to customize the lesson content. Yonezawa et al. (2012) advocate for personalized education initiated by problem analysis through an adaptive learning system, designing solutions that align with students' learning requirements and preferences. Knox (2020) emphasizes that personalized learning gives language learners a boost of enthusiasm and drive by enabling them to apply language skills in authentic situations while pursuing their interests.

Adaptive learning systems are widely believed to be advantageous for learners. This strategy efficiently tackles obstacles that are special to individual students, enabling them to advance at their own pace and receive personalized guidance. Consequently, personalized learning contributes to the improvement of students' proficiency in each subject. Conversely, Cook et al. (2018) argue that providing personalized instruction that integrates learning adaptations can enhance student engagement, motivation, and retention, leading to better learning outcomes. Adaptive techniques in the field of language acquisition can assist students in improving their syntax, words, and other skills at their desired pace and degree of proficiency.

The three broad classes of artificial intelligence are Artificial General Intelligence (AGI), Artificial Narrow Intelligence (ANI), and Artificial Super Intelligence (ASI). AGI involves systems capability of learning, adapting, and performing tasks requiring multiple cognitive abilities. In many ways, artificial superintelligence (ASI) is more intelligent than human intelligence. It is capable of sophisticated cognitive functions, decision-making, memory functions, and quick data processing. With human-like abilities, ANI is task-specific but limited in its capabilities. Examples include virtual assistants like Amazon's Alexa and Apple's Siri, as well as language translation services like Google Translate.

According to Chiu et al. (2023), AI-based chatbots consist of ANIs that replicate human conversation through the application of artificial intelligence technology, such as machine learning and natural language processing. An example of an ANI chatbot is ChatGPT, which employs an advanced language model built on the Generative Pre-trained Transformer (GPT) architecture. ChatGPT has undergone extensive training using extensive textual data sourced from the internet, hence facilitating its comprehension of contextual cues, semantic nuances, and linguistic intricacies (Khan, 2021; Bansla, 2012; Budzianowski & Vulić, 2019).

Multiple research emphasizes the capabilities and possibilities of ChatGPT and similar artificial intelligence in improving educational environments. Al-Qadri and Ahmed (2023) conducted a study wherein they utilized a predetermined set of statistical

assessment questions to evaluate the efficacy of ChatGPT with respect to fundamental principles of statistics. Their findings indicated that ChatGPT exhibited a robust comprehension of and proficiency in generating responses pertaining to significant statistical principles. In their work, Kalla and Smith (2023) investigated the influence of ChatGPT across many domains of research. The researchers successfully identified a number of significant benefits, including natural language processing skills and human-like responses.

ChatGPT and other AI-powered digital tools enable customized learning experiences based on each learner's requirements and preferences (Lee et al.,2022; Knox, 2020; Chatterjee & Bhattacharjee, 2020; Cook et al., 2018; Kasneci et al., 2023). According to Cook et al. (2020), AI can support mastery learning by giving students personalized, incremental feedback, adaptable learning pathways, and content that lets them study at their own pace.

Investigating AI-powered digital tools for individualized language development in the teaching of English has been conducted in a limited number of studies. In their study, Lee et al. (2022) examined the capacity of AI to develop language learning experiences that are tailored to the specific interests of Korean English language learners. The study demonstrated that the development and implementation of an AI-powered English learning assistance enhances contextual learning, resulting in improved learning results.

In their study, Haristiani and Rifa'i (2020) examined the creation of Gengobot, an artificially intelligent chatbot app that smoothly connects with the social networking platform LINE. The study revealed that Gengobot demonstrated practicality, user-friendliness, innovation, and utility in facilitating students' language acquisition, namely in the domain of grammar instruction. In order to effectively establish a personalized learning environment, considering the unique requirements of each student is crucial, regardless of the possible benefits provided by AI-based methods. The connection between learners and AI in the EFL environment was explored in a study undertaken by Wang et al. (2023). The study's results indicated the presence of four distinct groups of pupils, each demonstrating a distinct approach to interacting with the AI agent.

Regardless of any possible advantages, the implementation of AI-driven techniques for personalized learning necessitates a meticulous examination of teacher viewpoints, particularly in view of obstacles such as teachers' restricted teaching expertise, the absence of appropriate instructional resources, the complexity of artificial intelligence tools and the challenges of integrating them into existing teaching methods (Cheng & Wang, 2021; Lindner & Romeike, 2019). Ayanawale et al. (2022) examined the factors

that influence the behavioral intention and preparedness of Nigerian English teachers to include artificial intelligence (AI) in their instructional practices. The findings indicate that the teacher's level of trust in utilizing the AI tools had an influence on their inclination to employ them. Ahmad and Ghapar (2019) conducted a qualitative study to examine the teacher's opinion of an AI-based digital tool. Based on their research, the educators held the belief that the utilization of AI-driven educational resources had the potential to augment students' learning encounters, concurrently fostering increased levels of engagement and motivation.

Overall, multiple studies have shown the promise and value of tailored language learning approaches and highlighted the benefits of AI-driven digital tools, but there are still some areas that need further investigation. The methodology employed in the present study diverges in its objective to acquire insights subsequent to the implementation and evaluation of an artificial intelligence tool, as opposed to depending on broad or hypothetical viewpoints. This study specifically examines the perspectives of English educators regarding the utilization of artificial intelligence (AI) in personalized learning.

The study examines the effects of individualized learning activities using ChatGPT on students' understanding of grammar. Additionally, it explores the viewpoints of English language instructors regarding the advantages and difficulties associated with employing personalized learning with ChatGPT. Moreover, Considering their ChatGPT experience, teachers' willingness to use other AI-driven digital technologies in the classroom must be examined. Furthermore, through the analysis of teacher perspectives on the advantages and difficulties of utilizing AI, educators can acquire a thorough comprehension of the possible benefits and constraints linked to this technology.

The integration of technology in educational settings is facilitated by the Technological Pedagogical Content Knowledge (TPACK) framework, as proposed by Koehler et al. (2013) and Mishra & Koehler (2006). TPACK captures the dynamic interplay between knowledge of technology (TK), knowledge of education (PK), and knowledge of content (CK). TK entails being conversant with digital tools, software, and hardware as well as their possible uses in the classroom. PK includes classroom management, assessment techniques, instructional strategies, and student learning processes. CK is a comprehensive understanding of the subject matter, including concepts, principles, theories, and effective instructional delivery.

Kim et al. (2021) asserted that the utilization of TPACK holds significant value in comprehending the successful integration of AI-driven digital technologies for personalized learning. This comprehension aids educators in the selection and utilization

of appropriate artificial intelligence solutions for personalized language learning experiences. The TPACK framework places significant emphasis on the necessity for educators to have a comprehensive understanding that encompasses technological and pedagogical expertise. As Kim et al. state, technology integration is effective when educators deliberately integrate various domains to offer captivating and significant learning encounters.

The Zone of Proximal Development is a fundamental principle in the field of instructional psychology, established by Vygotsky. It identifies the range of actions a student can achieve with support, emphasizing learning through social interactions. The ZPD is crucial for constructing personalized learning experiences that are appropriately challenging. One of ZPD's core concepts is scaffolding. It involves providing support to narrow the disparity between existing and projected capabilities, gradually reducing assistance as learners gain competency. AI technologies, such as ChatGPT, can act as a form of scaffolding by dynamically modifying the course material to enhance learning inside the ZPD.

According to Vygotsky and Cole (1978), learning within the Zone of Proximal Development (ZPD) promotes cognitive development and fosters the acquisition of advanced thinking abilities. Ferguson et al. (2022) claim that the utilization of AI technology enables the optimization of the learning process within the Zone of Proximal Development (ZPD) through the dynamic adjustment of instructional content. This optimization results in improved educational results and an increased sense of self-directed learning engagement. In personalized learning environments, ChatGPT can serve as a scaffolding tool.

In the current research study, TPACK serves as a lens through which to understand Iranian English teachers' perceptions of ChatGPT implementation for personalized learning. Language teachers need proficiency in TK, PK, and CK to successfully apply AI to individualized language instruction. The study also aligns with Vygotsky's ZPD, aiming to tailor assignments using ChatGPT to close the skills gap that exists between pupils' present and potential. By exploring teachers' perceptions, the goal of the study is to increase understanding of the possible effectiveness of AI-based instruments for individualized language instruction and to provide guidance for incorporating these tools into language teaching methodologies.

Method

Research Design

This action research project seeks to examine teacher attitudes on the utilization of ChatGPT for personalized learning in a particular Iranian secondary ESL classroom setting, as well as the potential of ChatGPT intervention in facilitating individualized grammar tasks. The study utilized a mixed-method research design.

Participants

The study involved the participation of four Iranian English language teachers, with two teachers from each of the selected secondary schools, during the intervention and interviews. Furthermore, a total of 48 Iranian students who were language learners took part in the ongoing inquiry. The purpose of including many informants was to enhance the reliability of the study and enhance the quality of the data. The intervention group for each teacher's English sessions was designated as Group Number 1, whereas the control group was designated as Group Number 2. Teacher A's Group 1 consisted of twelve students, whereas Group 2 comprised eleven students. There were thirteen students in Group 1 and twelve students in Group 2, as instructed by Teacher B. The selection of schools was based on their alignment with the research aims and their willingness to participate, resulting in a convenience sample that encompasses a wide range of socioeconomic backgrounds. The diverse sample offers a complex inference. Furthermore, a total of 37 language instructors took part in a pilot study survey conducted through Facebook groups, providing valuable insights into the initial perspectives on AI-driven tools.

Instrumentation and Materials

In the initial phase of the investigation, a questionnaire was employed to gather data pertaining to the overall familiarity of AI-driven digital resources for personalized learning among teachers, as well as their potential utilization of those resources. A combination of closed and open-ended items was included in the questionnaire. The utilization of open-ended questions facilitated the provision of comprehensive responses, so offering significant insights into the perspectives and viewpoints of the teachers. The formulation of the primary questionnaire was informed by an online pilot questionnaire. During the intervention stage, the use of ChatGPT, an artificial intelligence language model, was employed as an AI-driven digital tool to evaluate students' grammar knowledge and produce tailored learning activities. Qualitative interviews were

conducted in the last stage to evaluate the perspectives of each teacher regarding the effectiveness of the treatment and its possible utility as a classroom tool.

Questionnaire

A pilot study was conducted to gain a comprehensive understanding of the function of artificial intelligence (AI) in English teaching, with the aim of developing the questionnaire. Likert scale questions, combined with open-ended responses, covered topics like general familiarity with digital tools powered by AI, their use, and familiarity with Artificial Intelligence in language education.

The questionnaire aimed to gauge teachers' awareness and understanding of AI's potential in personalized language learning, addressing aspects such as digital tool usage patterns, competency levels, challenges, overall perceptions, and willingness to implement such tools. The findings provided a foundation for tailoring the intervention program.

The pilot survey focused on the integration of artificial intelligence (AI) in the field of language instruction as a whole. The teachers in the pilot study express the prospective utilization of artificial intelligence for individualized instruction. Additionally, they highlighted a deficiency in understanding regarding its application. The ultimate survey was created to give greater attention to artificial intelligence in the context of individualized language acquisition. The objective was to assess the teachers' degree of expertise and examine their perspectives on the integration of AI for customized language learning. The researcher created the items in this questionnaire. The internal consistency and reliability of the survey employed in this study were investigated by running Cronbach's alpha. Evidently, alpha was above .7 which indicates high internal consistency reliability.

Therefore, it is concluded that all the items of this questionnaire of the study are relatively functioning well, and the questionnaire is of acceptable items and internal consistency reliability. The construct validity of the survey employed in this study was examined by running a Principal Component Analysis (PCA). The result of the Principal Component Analysis (PCA) includes the Kaiser-Meyer-Olkin (KMO) measure, which assesses the sufficiency of the sample for the analysis. In this case, the KMO value is 0.84, which is considered satisfactory according to Field (2005). Field (2005) states that KMO values below .50 are a sign that the sample is not large enough.

Intervention Tools

There were two components involved in the intervention stage, namely, teacher training and usage. The component of teacher training comprised two sessions. The teachers were initially furnished with an informative document that was disseminated through Google Docs. The offered document had a detailed explanation of the intervention technique and outlined the necessary steps for attaining successful implementation. The objective was to ensure that teachers had a thorough understanding of the intervention's concepts. Subsequently, teachers were provided with guidance during the training procedure, which encompassed the evaluation of ChatGPT prior to the intervention.

The participants were instructed on the process of inputting sample texts and employing precise commands to get desired results. Additionally, they received guidance on the appropriate placement of the command and the text. Teachers watched the automatic analysis and summary results created by ChatGPT for the example texts. In addition, they were notified of potential malfunctions, such as failures in generating material, and given strategies and potential remedies to resolve these problems.

The intervention step was designed to serve two primary objectives. Initially, it afforded teachers the chance to witness the implementation of AI-driven personalized learning in a genuine classroom environment. Additionally, a cooperative environment was created where teachers may share their experiences, provide useful insights, and suggest future enhancements to maximize the integration of ChatGPT in the educational context. Additionally, the intervention phase offered a controlled experimental approach to evaluate the efficacy of ChatGPT in facilitating personalized learning within a particular setting of an English as a Second Language (ESL) classroom.

Interviews

The research employed a semi-structured interview format. To obtain a thorough comprehension of the participants' experiences and views regarding the utilization of ChatGPT for individualized learning in language education, the interviews were conducted to capture qualitative data and contextual information. Kvale (2007) states the purpose of qualitative research is to document "qualitative knowledge as expressed through everyday language" (p. 11). The interview questions were predetermined and categorized into three distinct groups: (a) educational background, professional experience, and overall viewpoint; (b) the presentation of intervention outcomes with the aim of obtaining the perspective of the participants; (c) the instructors' inclination to utilize additional AI-driven digital tools within the educational setting.

Data Collection Procedure

Digital distribution of the pilot questionnaire was carried out to 80 high school English language instructors and 7 Iranian secondary schools in Yazd city. Teachers were contacted via email to solicit their participation, and the final survey was only sent to those who expressed their interest by replying to the emails. A subset of four teachers was selected from the pool of participants to take part in the research. The participants' participation was considered relevant due to their prior experience with the AI tool under consideration, enabling them to offer their viewpoints and insights on the elements that impact their inclination to adopt this technology in educational settings.

Following the questionnaire, school visits were conducted to engage with teachers who exhibited a keenness for utilizing AI-driven digital tools for personalized instruction. During these trips, teachers were provided with guidance and instruction on the effective utilization of ChatGPT for the creation of personalized learning activities. The teachers were given a document outlining the trial period, which was thereafter addressed in detail.

The document contained a hyperlink to a consent form that provides a comprehensive explanation of the utilization of the teachers' data. Subsequently, the instructors were directed to commence a treatment phase by presenting a pretest writing assignment of their choosing to both Group 1 and Group 2. Throughout this time frame, the participants' initial knowledge of grammar was evaluated by collecting the pretest, which is Text 1, and analyzing it using ChatGPT. Subsequently, personalized assignments were generated using ChatGPT and the pretest.

Throughout the four-week treatment period, the participants were provided with customized grammar assignments prepared using ChatGPT. The customized assignments were given out during the class session only to Group 1, while Group 2, known as the Control Group, sustained their regular instructional activities. DigiExam is a digital examination platform that facilitates the administration of secure and efficient examinations by educational institutions.

The implementation of this measure guarantees a secure testing environment by implementing device lockdowns that restrict students' access to external programs or websites throughout the examination (Kvale, 2007). In addition, the teachers were requested to document their feedback regarding their encounters with the ChatGPT-generated activities. After the intervention period, both groups were given the posttest, Text 2, to evaluate the degree of improvement in grammar. The participants were instructed to compose a sentence that closely resembled the pretest, showcasing their

knowledge of grammar. The analysis involved the collection of both Text 1 and Text 2 from both the control group and the intervention group.

After the training phase, the educators were instructed to divide the study participants into two groups: an intervention group that acquired personalized ChatGPT learning assignments and a control group that accomplished identical writing tasks but received typical language education.

Subsequently, the teachers were directed to administer a pretest to the students, which comprised a concise written passage that had been previously filled out by the students. Subsequently, the participants were instructed to engage with ChatGPT by utilizing a written assignment provided by a student, along with a set of prompts. The purpose of this interaction was to enable ChatGPT to evaluate the capabilities of each student and generate personalized learning assignments. By directing ChatGPT to recognize individual levels of development and tailor the assignment to the student's respective Zone of Proximal Development (ZPD), it was anticipated that the assignments would offer an individualized level of difficulty that motivates pupils to improve their understanding of grammar.

In order to evaluate the progress of students' individual grammar knowledge, both groups were required to complete an additional written activity immediately following the intervention. This task was intended to be sent to ChatGPT for analysis. To evaluate the effect of the tailored learning task using ChatGPT on grammatical improvement, we can analyze the pre- and post-performance of both the control and intervention groups. Using a baseline comparison helps to thoroughly evaluate the impacts of the intervention by determining if the observed benefits in the intervention groups are directly caused by the intervention itself or if they are influenced by other variables. The intervention is based on the assumption that ChatGPT can provide tailored learning tasks that possess the capacity to affect students' grammar deficiencies and yield a substantial enhancement in their knowledge of grammar.

Following the conclusion of the intervention session, semi-structured interviews were undertaken with the teachers who took part in the study. The purpose of these interviews was to assess their opinions on using ChatGPT as a tool for customized education aimed at enhancing grammatical knowledge. In an in-person interview situation, the researcher and teachers engaged in direct, in-person interaction. The duration of each interview ranged from 25 to 35 minutes.

Data Analysis Procedure

The data analysis in this study adopted a mixed-method approach, combining quantitative and qualitative analyses to comprehensively assess the impact and perceptions of ChatGPT for personalized language learning.

Quantitative and Qualitative Data Analysis

The Quantitative stage consisted of the following steps: 1. ChatGPT and Grammarly were used to identify and count grammar errors in the pretest and posttest. 2. Error rates per word were calculated for both texts to quantify improvement in grammar skills. 3. Analysis of Linear Mixed Models (LMMs) was conducted. In fact, personalized learning's impact on error rates was examined using LMM. 4. The 'lmer' function in R's lme4 package was used employing Satterthwaite's method for p-value estimation. 5. Error Rate was considered as the dependent variable, pre-and post-intervention time was considered as the within-subjects factor, and Groups 1 and 2, the intervention group, was considered the between-subjects factor. 6.Random intercepts by participants were included to capture individual variability.

The Qualitative stage consisted of the following steps: 1. Thematic Analysis of Interviews was conducted, and semi-structured interviews were transcribed verbatim for analysis. 2. Thematic analysis was applied to identify patterns and themes in the data. 3. An iterative process involving multiple readings, coding, grouping, and theme refinement was applied. 4. Data Triangulation was conducted, and qualitative findings were triangulated with quantitative results for a comprehensive understanding. The themes identified in teacher interviews were compared with quantitative data to validate and enhance research credibility. The mixed-method approach provided a nuanced and comprehensive evaluation, combining statistical insights from quantitative analysis with rich, contextual understanding from qualitative analysis. Also, data triangulation enhanced the reliability and trustworthiness of the study findings, offering a robust assessment of ChatGPT's effectiveness in personalized language learning.

Results

Questionnaire

The pre-intervention questionnaire provided valuable insights into the perceptions of the four participating teachers about the application of artificial intelligence (AI) and digital tools to customized learning. This baseline data serves as a reference for comparison with post-intervention perceptions gathered through interviews. Table 1

illustrates the result of standard deviations and averages of the statements for the participants' experiences and points of view.

Table 1.

Standard deviations and averages of the statements for the participants' experiences and points of view

Statement	M	SD
I routinely use digital technologies in language teaching.	3.6	1.6738
I have a strong belief in my capacity to personalize language training.	1.6	1.1945
My capacity to personalize learning is significantly impeded by time constraints.	1.6	1.5217
The challenge of accurately recognising individual learning demands significantly impedes	3.6	1.5217
I lack exposure to the concept of artificial intelligence in education.	2.8	1.5217
I currently hold a favorable view of AI in the field of education.	1	1.5217
AI tools have been employed in the context of language instruction to facilitate personalized learning.	3.6	1.6738
I have full assurance in utilizing AI to personalize the learning experience.	3.2	1.4933
I am apprehensive about excessive dependence on technology.	2	1.4933
I have apprehensions regarding the restricted capacity to manage	2	1.4933
I am apprehensive about the absence of interpersonal engagement.	2.4	1.4933
My apprehensions pertain to matters of privacy and security.	1.6	1.6738
I am intrigued by the utilization of AI-driven technologies for personalizing tasks.	1	1.4933
I am prepared to integrate AI-driven tools into my classroom learning environment.	3.6	1.5217
The tool's availability significantly influences my inclination to utilize it.	3.6	0.5816
The tool necessitates a high level of technical proficiency.	3	1.4933
The level of compatibility with current technology is robust.	3.6	0.5816
There is compelling evidence of the effectiveness.	3.6	0.5816
I am interested in acquiring proficiency in utilising AI-driven tools for the purpose of language acquisition.	3.6	0.5816

Intervention

Table 2 demonstrates comprehensive results based on 102 observations submitted by 48 students. The grand mean is represented by the Intercept in the sum contrast coding scheme. It studied intervention groups and temporal effects on error rate. The beta coefficient (β) represents the estimated effect size. Estimate variability is indicated by the standard error (SE). Z-Score measures observation standard deviation from the mean. The effect's P-value shows statistical significance. It contains a range that indicates the probability that the true population value will fall within the 95% Confidence Interval (CI). Basic Impact Evaluation looked at the control and intervention groups at the pre-intervention time. The findings demonstrate that the difference was statistically

significant. Both the intervention and control groups showed improvements. Continuous training and repeated testing likely contributed to the improvement. Improved Outcome in the Intervention Group suggests that customizing assignments with ChatGPT can successfully reduce error rates.

A notable overall drop in error rates was observed between the pre-and posttest, (Time Effect z (46) =7.472, p<.001)). The intervention group's overall error rates were noticeably lower than those of the control group. (Intervention Group Effect (z (46) =1.924, p=.006)). Interaction between Time and Intervention Group revealed as participants advanced from the pretest to the posttest, the intervention significantly decreased error rates greater than that of the control group for the intervention group (Interaction Effect, (z (46) =-4.572, p<.001)).

Table 2.

Examining the error rate change by intervention group from pre- to posttest using a linear mixed model

Term	B	*SE*	*Z*	*P*	95% CI
Intercept	0.072	0.008	10.263	<.001	[0.050 to 0.087]
Time	0.005	0.002	7.472	<.001	[0.004 to 0.006]
InterventionGroup	0.017	0.008	1.924	.006	[0.004 to 0.032]
Time X Intervention Group	-0.003	0.002	-4.572	<.001	[-0.004 to -0.001]

In conclusion, a four-week intervention using ChatGPT for personalized learning assignments aimed to improve students' grammar skills. Analysis using a linear mixed model (LMM) was done to look at how time and the intervention group affected the error rate. In fact, the four-week intervention using ChatGPT's personalized assignments led to a notable decrease in error rates. The intervention group demonstrated a more significant decline in mistake rates relative to the control group, suggesting the effectiveness of ChatGPT in addressing specific grammar weaknesses and enhancing overall grammar skills.

Interview

This section shows English teacher interview outcomes. The purpose of the study was to learn more about how teachers felt about the advantages and difficulties of

implementing ChatGPT in language instruction, as well as what makes them more or less likely to use AI-based digital tools for individualized instruction.

Table 3.

Organization of the themes of the interview phase

Teacher	**The Advantages of Tailored Language Learning with ChatGPT**	**Interpretation**
A	Customized Assignments	ChatGPT generates assignments tailored to students' proficiency levels, enhancing learning effectiveness.
A	Error Identification	ChatGPT accurately identifies grammatical errors, enabling students to pinpoint and rectify mistakes.
B	User-Friendly Interface	ChatGPT is praised for its ease of use, with features like a button to regenerate responses for customization.
B	Potential for Customization	Teachers foresee ChatGPT's ability to generate tasks based on individual student interests, offering engaging learning experiences.
C	Flexibility and Motivation	ChatGPT allows for adjusting difficulty levels to challenge students appropriately, fostering flexibility and maintaining motivation in learning.
Teacher	**2. Time Management and Task Distribution**	**Interpretation**
A	Rapid Task Generation	ChatGPT provides a rapid solution when students complete assignments ahead of schedule, instantly generating new tasks to maintain learning momentum.
A	Uninterrupted Lessons	Unlike traditional settings where students may have to wait for teachers to prepare tasks, ChatGPT's quick response allows for more uninterrupted lessons.
B	Feedback Efficiency	While attempting to save time by using students' papers for feedback, Teacher B found ChatGPT's feedback to be good but felt it missed some parts requiring additional input.
C	Instantaneous Feedback	ChatGPT offers instantaneous grammar and vocabulary feedback, making it a time-efficient tool for providing timely guidance to students.
C	Time Savings	ChatGPT saves time compared to finding appropriate tasks and evaluating each student separately. Inserting student work into ChatGPT provides suggestions for improvement efficiently.
Teacher	**3. Workload**	**Interpretation**
A	Assessment Stress	While ChatGPT successfully assessed student levels, Teacher A found it occasionally stressful due to the variation in tasks. Individual explanations for each task were required for this independent student group.

Teacher	The Advantages of Tailored Language Learning with ChatGPT	Interpretation
B	Task and Lesson Plan Automation	Teacher B envisions using ChatGPT beyond intervention to automate task and lesson plan generation, integrating it with their teaching approach for efficient preparation.
C	Time-Saving Benefit	Teacher C appreciates ChatGPT's ability to create assignments upon request, acknowledging its time-saving benefit in lesson preparation.
Teacher	**4. Disadvantages of Customized Language Learning with ChatGPT**	**Interpretation**
A	Command Formulation Challenges	Teacher A found that formulating commands posed a challenge, as slight changes could yield completely different outcomes. The sensitivity of the bot led to varied responses based on command placement.
B	Short Generated Tasks	Teacher B noted that tasks generated by ChatGPT were too short, requiring the search for additional materials. There was a preference for more extensive content, particularly pages of grammatical errors.
C	Balancing Use of ChatGPT	Teacher C found it difficult to balance using ChatGPT with other components for language acquisition. Care was taken not to rely too heavily on it, and some focus on less important grammar errors was noted. Adjustments to the command were suggested.
*	*	*
Teacher	**5. Availability to Adopt AI-powered Digital Tools: Learnings from the ChatGPT Experience**	**Interpretation**
A	Strong Desire to Explore AI	Teacher A demonstrated a strong desire to investigate and use digital tools powered by artificial intelligence in the classroom, seeing potential in customization.
B	Cautious Optimism	Teacher B stated optimism about incorporating AI-powered digital tools into instructional strategies, emphasizing the importance of user-friendliness and evidence-based recommendations.
C	Moderate Willingness to Adopt AI	Teacher C showed a moderate willingness to use tools powered by AI, recognizing their potential benefits but emphasizing the importance of accuracy and teacher supervision.
All	Importance of Training	All teachers highlighted the need for additional training to fully understand the capabilities and limitations of AI-based tools in language teaching.
B	Need for User-Friendly Resources	Teacher B stated the importance of finding user-friendly resources that complement instructional strategies when integrating AI tools.

Teacher	The Advantages of Tailored Language Learning with ChatGPT	Interpretation
B	Value of Evidence-Based Recommendations	Teacher B stressed the importance of recommendations based on solid evidence when integrating AI-based digital tools into language classrooms.
All	Importance of Ongoing Assistance	Teachers highlighted the need for ongoing assistance and professional networks to support educators in utilizing AI-based resources effectively.
C	Necessity of Teacher Supervision	Teacher C emphasized the necessity of teacher supervision when incorporating AI tools into teaching practices.
C	Focus on Trustworthy Language Generation	Teacher C emphasized the importance of tools providing trustworthy and accurate language generation in language teaching.
C	Need for Intervention and Testing	Teacher C highlighted the value of interventions to test theories and measure their impact, providing opportunities for educators to provide feedback on the effectiveness of AI tools in various contexts.

The Advantages of Tailored Language Learning with ChatGPT

These quotes highlight positive experiences, emphasizing ChatGPT's accuracy in diagnosing errors, user-friendly interface, and the potential for customization and adaptability. Teachers appreciated the tool's ability to generate tasks tailored to individual students, fostering a sense of engagement and motivation.

Time Management and Task Distribution

When assessing ChatGPT's use for individualized language learning, the teachers took time efficacy into account. These insights indicate that teachers recognized ChatGPT as a valuable time-saving tool, especially in providing quick and immediate feedback on grammar and vocabulary. The tool's ability to generate instant responses was highlighted as advantageous, offering efficiency in comparison to traditional methods of task preparation and evaluation. However, there were also considerations about potential limitations and the need for additional input in certain cases.

Workload

Instructors also talked about how ChatGPT affected teachers' workload and its role in automating certain aspects of language instruction. These responses highlight the dual nature of ChatGPT's impact on workload. While it was seen as a time-saving tool for lesson preparation, there were instances where the variability in tasks led to individual

explanations, potentially increasing the workload. Teachers also envisioned ChatGPT as a tool that could streamline task and lesson plan generation, providing a valuable balance between automation and personalized teaching approaches.

Disadvantages of Customized Language Learning with ChatGPT

Personalized language learning with ChatGPT presented a number of difficulties for English language teachers. These challenges highlight the nuances teachers faced, including the precision required in formulating commands, the need for more extensive task content, and the importance of maintaining a balance between AI-based tools and other crucial elements in language instruction. Adjustments to commands and considerations for task length were identified as areas for improvement.

Availability to Adopt AI-powered Digital Tools

Following their use of ChatGPT, in this section English language teachers discuss their readiness to employ AI-based digital technologies in the classroom. Teacher A demonstrated a strong desire to investigate and use digital tools powered by artificial intelligence in the classroom. Teacher A became aware of how AI tools could improve her students' language acquisition after encountering ChatGPT's advantages, which include accessibility and customized teaching. Regarding the incorporation of AI-powered digital tools into their instructional strategies, Teacher B expressed cautious optimism. Teacher B noted the advantages of ChatGPT, including better writing from students and faster generation of responses, but she also stressed the need to locate user-friendly resources that complement their instructional strategies. After using ChatGPT, Teacher C was averagely willing to use AI-powered digital tools.

Discussion

The study examined the pros and cons of utilizing AI-powered digital tools in Iranian English instruction and what influences teacher acceptance. This analysis illuminates the possibility of artificial intelligence (AI) in individualized language learning and helps educational systems integrate technology by studying instructor experiences and attitudes.

At first, as indicated in the questionnaire, teachers faced difficulties in accurately identifying the specific needs of each learner, which presented a difficulty in their teaching methods. Nevertheless, upon experimenting with ChatGPT, they acknowledged its efficacy as a proficient adaptive learning system for tailored teaching. During the

subsequent interviews, the teachers conveyed that ChatGPT offered accurate diagnoses that targeted specific areas in need of improvement when they entered the students' texts and requested exercises. The present observation is consistent with prior scholarly investigations that underscore the effectiveness of artificial intelligence (AI) in the identification and analysis of information, as well as its ability to provide tailored assignments and feedback (Bansla & Bansal, 2012; Khan, 2021; Budzianowski & Vulić, 2019).

This finding provides additional evidence that teachers' attitudes toward AI are influenced by their recognition of its efficacy in these domains. Wang et al. (2021) found that teachers' views of AI are shaped by their own encounters with its efficacy in meeting educational needs.

The teachers who took part in the study also highlighted the potential advantages of decreased effort and enhanced time management when utilizing ChatGPT for personalized language instruction. The teachers expressed initial skepticism regarding this issue but thereafter emphasized time limits personalization in their replies to the questionnaire. However, ChatGPT generated tasks quickly during the intervention, providing a prompt and effective answer in contrast to conventional educational settings. ChatGPT has eliminated the need for teachers to create individualized activities for each student by generating tasks quickly, resulting in time savings. This observation is consistent with the findings of Rožman et al. (2023), who highlight the potential of AI technologies to automate administrative duties, leading to a decrease in burden and an improvement in time efficiency.

Furthermore, the first results obtained from the survey indicated that educators exhibited a deficiency in self-assurance and harbored apprehensions regarding the precision and execution of artificial intelligence (AI)-driven digital resources. Nevertheless, by engaging with ChatGPT, educators had a heightened understanding of its capacity and efficacy in tailored instruction, resulting in a favorable transformation in their self-assurance. The change in self-assurance was apparent in their increasing ease and ingenuity in proposing methods to enhance the efficiency of AI technologies, as noted in subsequent interviews. The results of this study are consistent with the focus of Ayanawale et al. (2022) on the notable influence of teachers' self-assurance in proficiently using artificial intelligence. Nevertheless, although the teachers acknowledged the appeal and possibilities of AI, they maintained a certain level of doubt. To successfully integrate AI into their teaching techniques, teachers stressed human monitoring and pedagogical and topic understanding. The values underscored by the

TPACK framework (Kim et al., 2021; Celik et al., 2023) underscore the significance of incorporating technology alongside educational tactics and subject-specific knowledge. By employing this iterative methodology, educators have the ability to pinpoint domains in which artificial intelligence (AI) can augment pedagogy, facilitate student acquisition of knowledge, and tackle distinct educational obstacles.

The benefits of ChatGPT changed their perception and made teachers more likely to use AI-based solutions in their classrooms. This matches Wang et al. (2021), which emphasizes that educators' inclination to embrace artificial intelligence (AI) tools is contingent upon their view of the technology's utility and its influence on student achievements.

Moreover, the significance of the tool had a significant impact on teachers' inclination to adopt AI-based technologies. Teachers stressed the importance of aligning an AI tool with their pedagogical aims and instructional approaches in order for it to be properly integrated. They emphasized the significance of being adaptable, ensuring precise alignment with the curriculum, and understanding goals. Teachers acquired a comprehension of how to incorporate ChatGPT into their particular learning objectives as they gained experience with it. This finding aligns with the studies undertaken by Wang et al., as it underscores the significance of teachers' confidence in their capacity to proficiently utilize AI technologies in the context of education, which in turn impacts the acceptance and implementation of those technologies. Wang et al. (2021) emphasized the significance of providing teachers with the resources, support, and infrastructure to proficiently integrate artificial intelligence (AI) technologies into their instructional practices. The TPACK framework highlights the significance of instructors enhancing their technological proficiency to successfully integrate technological advances (Kim et al., 2021). This aligns with the current research, as teachers emphasized that their willingness to embrace these technologies is influenced by factors such as adequate training and hands-on experimentation with the tools. These factors have a substantial impact on their choice to incorporate these tools into their teaching methodology. As a result, teachers demonstrated an enhanced understanding of technology during the intervention and effectively integrated it into their pedagogical methods and subject expertise.

The objective of the statistical analysis was to evaluate the effectiveness of the utilization of customized educational tasks generated by ChatGPT to target and resolve students' grammar inadequacies, resulting in a decrease in grammar errors. The study incorporated three key variables in its statistical analysis: time, intervention, and the

relationship between intervention and time. The intervention and control groups showed a significant decrease in errors with time. The decrease in errors can be ascribed to various causes, such as the inclusion of students in regular sessions that offered supplementary assistance and practice, the implementation of repeated testing within a limited timeframe, the cognitive capacity of individuals, and the amount of student involvement.

It is important to mention that the overall decline in mistakes was found in both groups but the intervention group exhibited notably more substantial enhancement. The results of this study show a statistically significant difference, showing that the group that received the intervention had a much lower error rate compared to the control group. This discovery offers evidence to support the notion that the customized learning tasks provided by ChatGPT accurately address the individual requirements of the students, leading to an enhancement in their grammatical proficiency. The observed improvement can be attributed to the individualized approach of the intervention, as students were given customized assignments via ChatGPT. These results align with the outcomes of AL-Qadri and Ahmed (2023), who performed a study highlighting ChatGPT's precision in delivering precise answers, with an accuracy rate of 93%. The accurate identification facilitated by this aspect of artificial intelligence is likely to have contributed to improving the learning experience for participants in the intervention group, resulting in a more substantial reduction in error rates compared to the control group. Additionally, these findings are consistent with prior studies that have investigated the efficacy of artificial intelligence (AI)-driven digital technologies in facilitating personalized learning (Minn, 2022; Baker, 2016; Desmarais & Baker, 2012).

Conclusion

The study's findings indicate a favorable influence on Iranian instructors' perspectives regarding the utilization of ChatGPT for individualized education. Furthermore, the willingness of instructors to use AI-driven digital tools for personalized instruction in the English language classroom was significantly influenced by their understanding of the tools and their suitability for the educational environment. This underscored the significance of educators cultivating their Technological Pedagogical Content Knowledge (TPACK) in order to address concerns and effectively harness the potential of ChatGPT in augmenting personalized learning. Moreover, the research presented empirical findings that demonstrate the efficacy of ChatGPT in producing customized assignments and accommodating the individual requirements of students in Iran.

These findings serve as a basis for further investigation and offer valuable insights for the integration of artificial intelligence technologies in personalized learning within various educational environments. In order to progress, it is imperative to examine the determinants that impact educators' inclination to embrace artificial intelligence (AI) and offer extensive training and professional growth prospects for Iranian teachers.

Ultimately, this will enhance their understanding of AI-powered tools and their integration into instructional approaches, enabling educators to effectively utilize the tools, align them with educational goals, and provide optimal support. Ultimately, it is imperative to continue exploring this field of study and carry out a more extensive investigation involving a wide range of student demographics in order to overcome the above constraints and gain a more thorough comprehension of the effects of AI-driven tools such as ChatGPT.

Recognizing the constraints of the study methodology and actively striving for enhancement is crucial. One potential strategy for improving the personalization process inside the intervention is the collection of additional student data. This would enable the refinement of commands employed during the production of assignments.

Furthermore, one significant constraint of the study was the very limited sample size., potentially impeding the extent to which the findings might be applied to a broader population. Performing a comparable investigation using a more extensive sample size has the potential to augment the statistical power and facilitate the derivation of more resilient findings. Moreover, an increased sample size would enhance the feasibility of conducting subgroup analysis, Facilitating the analysis of possible discrepancies in the effectiveness of customized teaching methods based on participant characteristics, such as past knowledge, levels of enthusiasm, and routine of study.

The use of ChatGPT for personalized instruction posed several ramifications and difficulties, notably from the standpoint of teachers. The integration of AI-based tools in educational settings often faced initial opposition stemming from apprehensions regarding the efficacy of the technology and a limited understanding of its practical application. Teachers' perspectives of AI in education underwent a transformation when they had the opportunity to actively engage with ChatGPT.

Furthermore, this study also served as a demonstration of the practicality of using individualized learning assignments based on ChatGPT to fulfill a specific criterion at the schools being investigated. The presented proof of concept establishes a foundation for subsequent research endeavors and enhances comprehension of the wider ramifications

and practicality of personalized learning through the utilization of AI-driven technologies such as ChatGPT.

Author's Contributions

The author has analyzed the collected data and contributed to the development of the paper.

Ethics Statement

There are no conflicts of interest in this paper. Participation in the study was voluntary, and informed consent was provided prior to the commencement of the assignment. The anonymity of the participants was maintained throughout the study.

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