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*Research Article*

# TalkTutorAI: Empowering English Language Proficiency through ChatGPT-Assisted Conversational Practice - A Case Study at Ubon Ratchathani Rajabhat University, Thailand

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**Abstract**: The significance of English as a global language is of growing importance in Thailand, especially in education sectors. However, Thai students often face significant challenges in getting conversational English proficiency. Furthermore, Thailand is classified as a non-English proficient country, showing surprisingly low proficiency levels in English, especially in conversational aspects. Hence, the primary objective of this research is to develop TalkTutorAI, a web application AI chatbot that leverages ChatGPT. TalkTutorAI was designed to positively affect Thai learners by providing a platform to enhance and practice their English language skills efficiently, with the assistance of a powerful AI teacher like ChatGPT. This study employs a design science research approach to address real-world challenges commonly met by Thai learners. The assessment of TalkTutorAI involved 116 student participants from diverse faculties at Ubon Ratchathani Rajabhat University. The evaluation incorporated both testing and survey responses from students, focusing on key factors including user experience, language learning efficiency, content relevance, and overall satisfaction. The results showed a commendable high level of satisfaction with TalkTutorAI, as indicated by an overall experience mean score of 3.82 out of 5, demonstrating a positive reception among participants. Users particularly commended the system for its user-friendly interface and convenience. However, some users suggested improvements, such as enhancing response speed, improving language translation capabilities, and fostering

more captivating and human-like interactions. This study suggests that AI chatbots can effectively facilitate English conversation teaching. Furthermore, the findings create a platform for future academic inquiries in this burgeoning domain.

## 1. Introduction

The significance of English as a global language is undeniable, serving as a crucial tool for internationalization, business, education, and cultural exchange. In the context of Thailand, despite the clear effects of rapid globalization, mastering English remains a challenge, as highlighted by the EF Education First (2023).

Research by Sasum & Weeks (2018) revealed that a significant percentage of Thai students face limited English opportunities and struggle with vocabulary. Teng & Sinwongsuwat (2015) further emphasized the persistent oral proficiency challenges among Thai learners, with factors such as age-related constraints and sociocultural influences contributing to their struggles.

Psychological factors, as noted by Juhana (2012), including fear of making mistakes, shyness, anxiety, and lack of motivation, hinder effective English communication. Moreover, students face hurdles in viewing English as essential, with large class sizes, Thai-medium instruction, and a lack of English-speaking environments compounding the issue.

Recognizing these challenges, we Introduce TalkTutorAI, a web chatbot leveraging ChatGPT API to boost English skills for Thai learners. Our approach integrates proven learning methods like debates, games, presentations, role-playing, and discussions. Inspired by success at Tunas Unggul Junior High School in Indonesia (Uyun, 2023), TalkTutorAI aims to provide an engaging and effective English learning experience.

In addressing the prevalent challenges faced by Thai learners, TalkTutorAI leverages the benefits of ChatGPT. Research by Sakai (2023) proves that incorporating ChatGPT in language learning can significantly enhance learners' performance, provide personalized experiences, offer interactive practice, provide immediate feedback, and improve fluency and communication skills.

How can ChatGPT be effectively utilized to assist in conversational practice for English language learners?

This study has two main objectives: 1) developing TalkTutorAI to enrich English speaking skills, and 2) evaluating user satisfaction. TalkTutorAI serves as a personalized AI teacher, offering tailored guidance, motivation, and practice opportunities for English speaking. Guided by the principles of design science, our approach involves understanding student challenges, crafting effective solutions, and rigorous testing to ensure user-friendly design and tangible improvements in English skills.

## 2. Literature Review

### 2.1 Generative AI

Thu, Bang, & Cao (2023) highlight ChatGPT as an AI language model developed by OpenAI, utilizing the GPT network architecture for processing input data and generating desired results. For an in-depth understanding of the operational principles underlying ChatGPT, readers are encouraged to explore the official OpenAI API Reference. In the realm of generative AI, Tipayavaravan, Si-richokcharoenkun, & Cao (2023) also underscore the efficacy of ChatGPT in furnishing real-time feedback on grammar and vocabulary, expediting language learning. Leveraging ChatGPT as a teaching tool presents multifaceted benefits, including facilitating instant corrections in written assignments for grammar enhancement and serving as a virtual conversational partner to hone students' speaking and listening skills in English.

### 2.2 English Learning Strategies

Uyun (2023) underscores the importance of teaching strategies for enhancing learning outcomes. The research at Tunas Unggul Junior High School in Bandung utilizes a qualitative descriptive method, emphasizing real contextual phenomena and human behavior analysis following Yin (2002) approach.

This study aims to comprehensively analyze various situations, events, groups, and social interactions within the educational context, seeking perspectives from students, teachers, and stakeholders. The research findings indicate prevalent teaching strategies employed by teachers in English language instruction, including debates, presentations, games, discussions, and predominantly role-play. According to student responses, games emerge as the most utilized activity, followed by role-play, conversations, and presentations. While discussions are noted by a smaller percentage, a minority partake in activities such as storytelling and spelling. In summary, the research underscores the crucial role of diverse teaching strategies in cultivating effective English-speaking skills within the school environment.

### 2.3 Design Science Research

According to Hevner *et al*. (2004), design science research (DSR) in information technology (IT) is a well-established and widely accepted approach that provides a structured method for creating and evaluating artifacts designed to address similar problems. This methodology aims to foster the development of innovative IT structures that actively address real-world demands and integrate knowledge to solve business problems. Peffers *et al*. (2007) assert that DSR focuses on enhancing problem-solving by creating functional artifacts, such as algorithms, IT architectures, models, and systems, and evaluating their efficiency in application. Gregor & Hevner (2013) present a framework that categorizes DSR outputs into five types based on utility and theoretical contributions. They highlight the significance of DSR in guiding

IT professionals and researchers throughout the artifact development process, which is applicable across diverse fields like computer science, management information systems, and software engineering. Numerous studies demonstrate that the DSR process involves key activities, including problem identification, objective definition, artifact design and development, demonstration, evaluation, and communication of results. These activities are deemed crucial, enhancing DSR's capability to address complex processes adequately and comprehensively.

## 3. Methodologies

This section outlines the research methodologies, including the conceptual model and prototype development, aiming to convey a concise yet comprehensive understanding of the study's strategic framework.

### 3.1 Conceptual Development of the System

Embarking on a transformative journey, guided by the design science framework of Hevner *et al*. (2004), our model unfolds across three pivotal domains: Stakeholder, TalkTutorAI, and Foundation, as depicted in Figure 1. In this dynamic exploration, we navigate the intricate landscape of English language learning challenges faced by Thai learners, crafting innovative solutions that transcend theoretical boundaries and manifest as tangible artifacts designed for real-world impact.

In the Stakeholder domain, we delve into the challenges faced by Thai learners, aiming to gain insights into the factors influencing their proficiency in English. Our study is motivated by the urgency to address these challenges, with a primary focus on assisting Thai learners in their progression

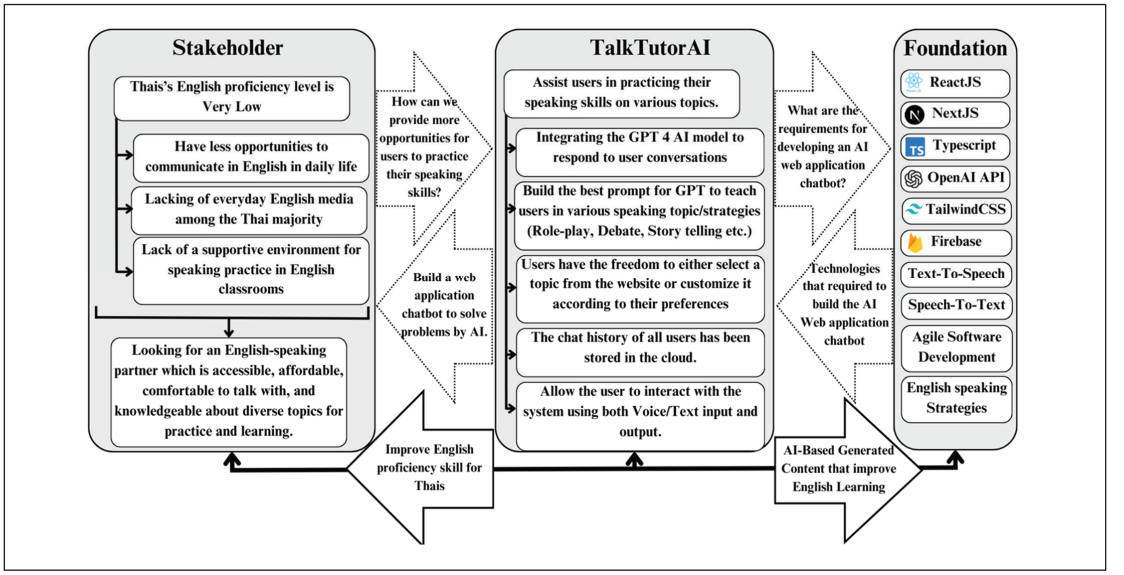


**Figure 1**. Research model of study

toward English proficiency. This identification of challenges serves as the foundational step in the DSR methodology.

Transitioning to the second domain, we introduce TalkTutorAI as the innovative artifact resulting from our DSR methodology. TalkTutorAI is specifically designed to address the identified challenges in the English learning process for Thai learners, embodying the purpose of the design and emphasizing its role as a solution to enhance the English proficiency of Thai learners.

TalkTutorAI, as a functional prototype developed through the DSR methodology, stands as a testament to our commitment to creating tangible and innovative solutions. This artifact is not merely a theoretical concept but a practical application, with features carefully crafted to meet the unique needs of Thai learners.

The upcoming phase involves the evaluation of TalkTutorAI, employing quantitative methods detailed in the next section. This evaluation is a critical component of the DSR framework, providing empirical evidence of the artifact's utility and effectiveness in addressing the identified challenges. Through this evaluation process, we aim to contribute valuable insights to both academia and the practical domain, aligning with the principles of the design science framework.

## 3.2 Overview of the System Development Process

TalkTutorAI was developed following an Agile software development methodology, ensuring an iterative and flexible approach to project management. The process involved distinct stages, including planning, design, implementation, and testing, allowing for continuous improvements throughout the development lifecycle.

### 3.2.1 Tools and Technologies Used

The development of TalkTutorAI harnessed a robust toolkit incorporating various tools and technologies for enhanced efficiency and functionality. Utilizing ReactJS for front-end development and Next.js for full-stack development laid a solid foundation. Streamlined and responsive design was achieved through Tailwind CSS, complemented by custom CSS. TypeScript (ts and tsx) was adopted as the programming language, ensuring type-safe and scalable code. Firebase Firestore served as the database for secure and real-time data storage. To facilitate voice interactions, Text-to-Speech (TTS) and Speech-to-Text (STT) functionalities were seamlessly integrated. Visual Studio Code served as the primary integrated development environment (IDE). The integration of the OpenAI API played a pivotal role in enabling natural language understanding and generation, contributing to TalkTutorAI's comprehensive functionality.

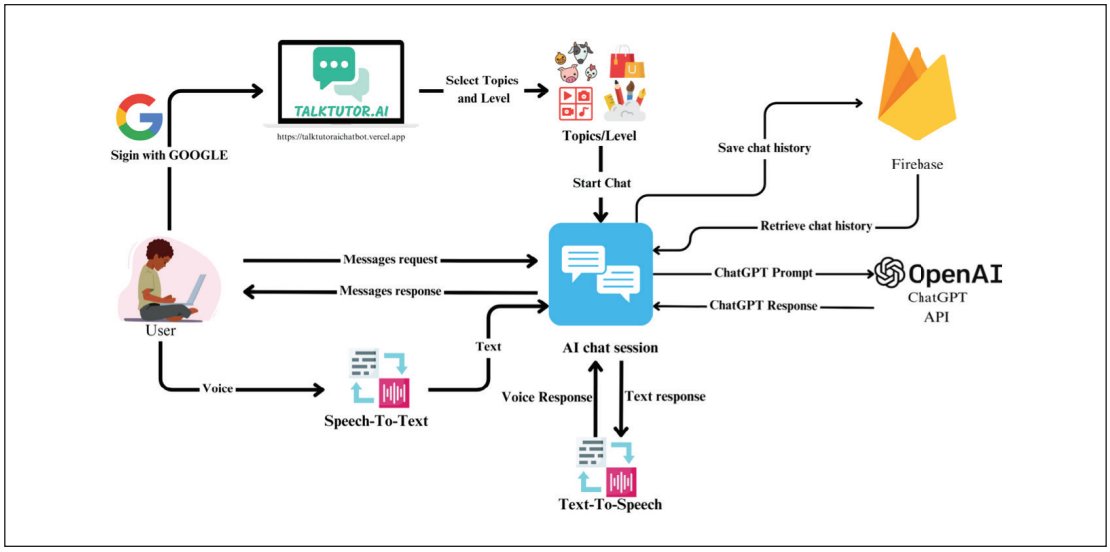


**Figure 2.** Hierarchical architecture and interconnections illustrate the system's flow, depicting a comprehensive overview of user interactions, data flow, and integration with external services

### 3.2.2 Overview of the System Development Process

When creating TalkTutorAI, we made crucial decisions to optimize performance and enhance user satisfaction. A user-centric approach took precedence in development, with a focus on delivering a seamless and intuitive experience from the initial sign-in to active participation in conversations. The integration of Firebase Firestore played a vital role, ensuring real-time data storage and retrieval for instant updates during user interactions. Additionally, strategic implementation of speech-to-text and text-to-speech capabilities offers users the flexibility of voice input and output, thereby enriching the overall conversational experience.

### 3.2.3 User-Centric Features

TalkTutorAI was meticulously crafted with a user-centric approach to enhance the language learning experience, as depicted in Figure 2. The process begins with secure sign-in using Google via NextAuth.js, creating a personalized environment. Prior to practice sessions, users establish customized chat rooms by specifying their English proficiency level (CEFR) and preferred topics. The inclusion of voice interaction, utilizing speech-to-text for input and text-to-speech for responses, introduces a dynamic and engaging element to conversations. Real-time message updates via Firebase facilitate seamless tracking of ongoing conversations.

### 3.3 Data Collection and Participation

This study targeted tertiary students at Ubon Ratchathani Rajabhat University, employing convenience sampling. Employing a quantitative approach, we distributed a tailored online questionnaire via Google Forms after students underwent a 15-minute prototype testing. The questionnaire assessing usability, language acquisition effectiveness, material quality, and overall satisfaction employed a five-point Likert scale. Participants provided 116 datasets for hypothesis testing, offering nuanced insights into their sentiments. The Likert scale, ranging from 1 to 5, allowed for a detailed analysis of satisfaction levels, with 1 denoting low satisfaction and 5 denoting high satisfaction. Demographic data, including gender, academic year, and faculty affiliation, were collected to enrich the dataset. This streamlined and efficient data collection process ensures a robust foundation for the next analysis and interpretation of research findings.

**Table 1.** Descriptive statistics of participants

| Variable | Frequency | Percent |
|---|---|---|
| Gender | | |
| Male | 55 | 47.4 |
| Female | 51 | 44.0 |
| LBGT | 5 | 4.3 |
| Prefer not to say | 5 | 4.3 |
| **Total** | **116** | **100** |
| **Year of students** | | |
| 1 | 78 | 62.2 |
| 2 | 19 | 16.4 |
| 3 | 16 | 13.8 |
| 4 | 3 | 2.6 |
| **Total** | **116** | **100** |
| **Faculties of students** | | |
| Faculty of Computer Science | 54 | 47.6 |
| Faculty of Humanities and Social Sciences | 15 | 12.9 |
| Faculty of Industrial Technology | 13 | 11.2 |
| Faculty of Business Administration and Management | 12 | 10.3 |
| Faculty of Public Health | 8 | 6.9 |
| Faculty of Agriculture | 7 | 6.0 |
| Faculty of Education | 7 | 6.0 |
| **Total** | **116** | **100** |

In summary, Table 1 provides a comprehensive snapshot of the study's participant demographics and academic affiliations. Gender distribution shows a balanced representation, with 47.4% male, 44.0% female, 4.3% LBGT, and an equal percentage preferring not to disclose. Academic years are predominantly composed of first-year students (62.2%), followed by second (16.4%), third (13.8%), and fourth year (2.6%) students. The participants hail from various faculties, with the Faculty of Computer Science leading at 47.6%, followed by Humanities and Social Sciences (12.9%), Industrial Technology (11.2%), Business Administration (10.3%), Public Health (6.9%), Agriculture (6.0%), and Education (6.0%). This comprehensive overview sets the stage for a nuanced exploration of participant characteristics in later analyses.

## 4. Results

### 4.1 Working Prototype as Artifact

The initial version of our TalkTutorAI chatbot can be accessed by the public through the following link: https://talktutorai.vercel.app. Figure 3 illustrates an example of accessing our chatbot via a web browser on a smartphone, using Google Chrome.

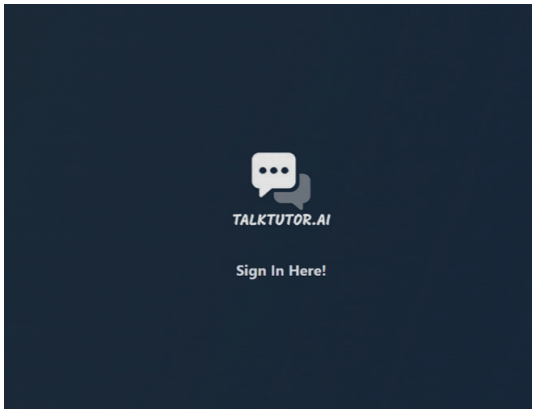


**Figure 3.** The sign-in and starting page

Users start the sign-in process on the web application by clicking the "Sign in Here" button, granting access to the chatting page. The page is divided into two sections: on the right, the message section serves as the central hub for user communication. For unpracticed users or those yet to create a conversation room, the system prompts them to select their preferred level and topics before engaging in any conversation within this section (refer to Figure 4 and Figure 5). On the left side is the Sidebar.

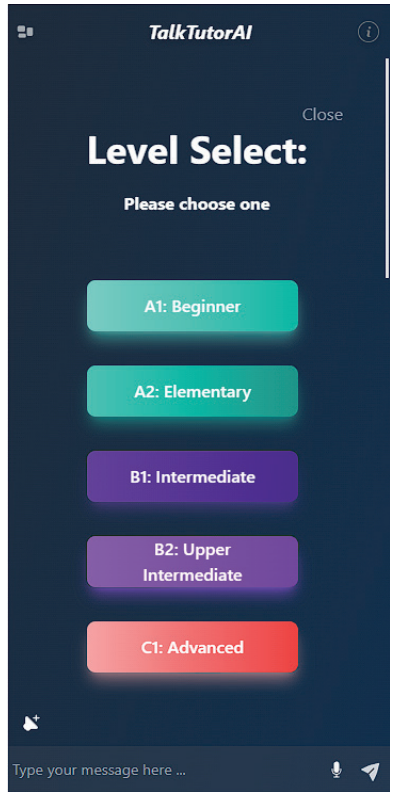


**Figure 4**. The right-side section that allowing users to choose English CEFR levels

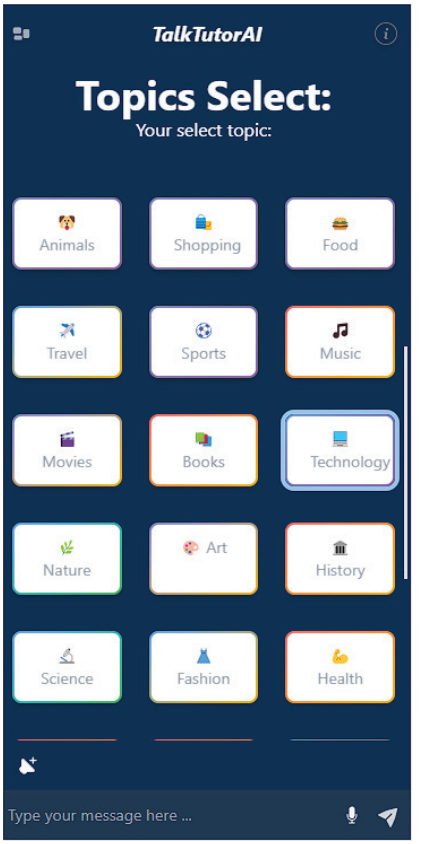


**Figure 5**. The topic selection section

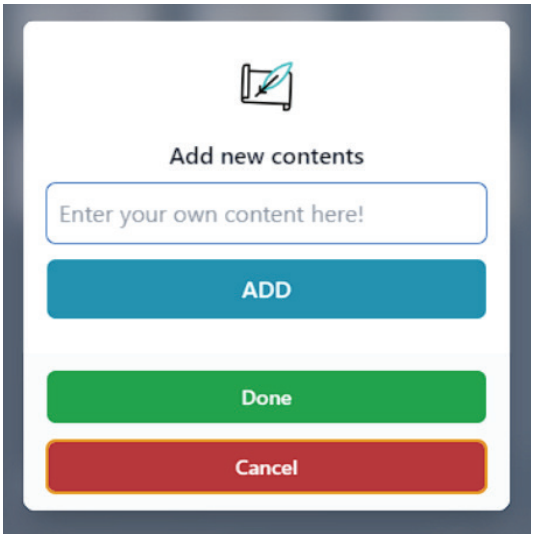


**Figure 6**. The topic selection section

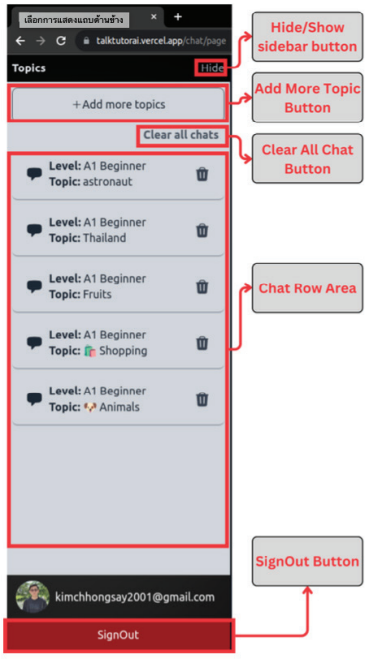


**Figure 7**. The sidebar section on the left side

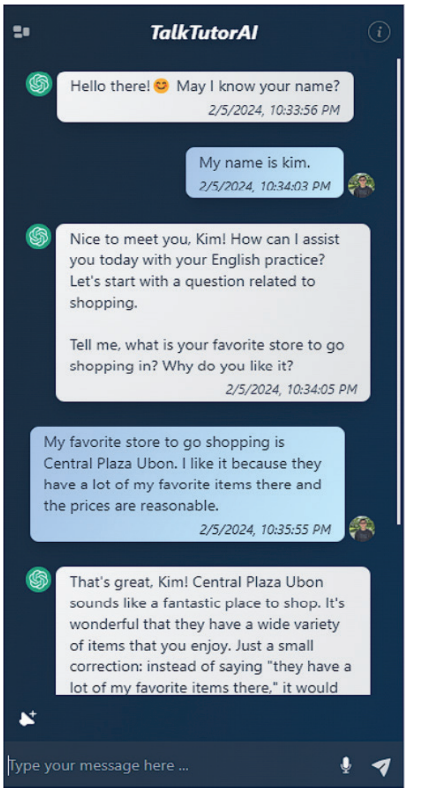


**Figure 8**. The conversation rooms

In case a user cannot find the specific topic that they wish to practice or discuss, there is an option to click the "Other?" button, allowing them to add custom topics, as depicted in Figure 6.

Upon selecting the desired level and topic and clicking "Done" the conversation rooms for each topic will be displayed on the left side of the sidebar in Figure 7 which offers a range of intuitive options for navigation and interaction. It also acts as a hub for various functions, including essential buttons designed to streamline the user journey.

Users can choose any conversation room they wish to practice. Upon clicking, the right side displays a greeting message, allowing users to initiate conversations on their preferred topics, as shown in Figure 8.

In conversations, users can engage in simple dialogue or use commands for specific actions. For example, entering the "/Str" command allows practice of various strategies. Table 2 outlines more available commands.

**Table 2.** Available commands

| Command | Function |
|---|---|
| /Done | Complete the conversation for proficiency analysis and error correction based on CEFR standards. |
| /?[word] | To request AI for the definition and an example sentence. For instance, entering /?[excited] will yield information on the word "excited." |
| /Str | List the conversation strategy that you can use. |
| /ChStr | To adjust the conversation strategy. |
| /SetStr-[YourCustomStrategies] | Custom the conversation strategy due to you need. |
| /Quiz | To generate a mini quiz related to the topic. |
| /Help | To request a list of available commands that you can use during the conversation. |

**Table 3**. Descriptive statistics of participants

| Satisfaction Factors | Mean | Std. Dev |
|---|---|---|
| | **User Experience** | **3.79** |
| 1 | User-friendly chatbot | 3.84 |
| 2 | Timely responses | 3.78 |
| 3 | Intuitive interface | 3.76 |

**Table 3.** Descriptive statistics of participants (cont.)

| Satisfaction Factors | Mean | Std. Dev |
|---|---|---|
| 4 | Response speed | 3.78 |
| | **Language learning effectiveness** | **3.79** |
| 1 | Precise English feedback | 3.78 |
| 2 | Vocabulary enhancement assistance | 3.86 |
| 3 | Engaging English conversations | 3.72 |
| 4 | Proficient grammar correction | 3.68 |
| 5 | Valuable for learning English conversation | 3.89 |
| | **Content and Relevance** | **3.80** |
| 1 | Chatbot suggests relevant conversation topics | 3.68 |
| 2 | Culturally sensitive responses | 3.82 |
| 3 | Diverse conversation scenarios | 3.79 |
| 4 | Equipped with needed resources | 3.86 |
| 5 | Chatbot works on various devices | 3.77 |
| 6 | Chatbot is accessible from anywhere | 3.86 |
| 7 | On-demand access | 3.87 |
| | **Overall Satisfaction** | **3.82** |
| 1 | Satisfied with chatbot experience | 3.76 |
| 2 | Highly recommend chatbot for English learning | 3.81 |
| 3 | Intend to continue using chatbot | 3.90 |

## 4.2 Evaluation of an Artifact

The assessment of the system has four parts, including overall experience with the system, graphical representation of the system, correctness, and performance, as well as any suggestions for improvement. The data analysis results are displayed in Table 3.

In Table 3, participants' positive perception of the TalkTutorAI chatbot system is evident. Mean scores for user experience, language learning effectiveness, content and relevance, performance, and overall experience ranged from 3.79 to 3.82, affirming a generally positive participant experience. Notably, content relevance and overall experience received the highest scores.

### 4.2.1 User Experience

The user-friendly interface earned a mean score of 3.84, indicating positive user experiences. However, user feedback found areas for improvement, particularly in prompt responses, response speed (both mean scores

**Table 4.** Users' comments

| No | Comments |
|---|---|
| 1 | Improve response accuracy |
| 2 | Enhance language translation capabilities |
| 3 | Provide language learning assessments or quizzes |
| 4 | Optimize the mobile interface for better usability |
| 5 | Ensure faster response times from the chatbot |
| 6 | Add more diverse and informative responses |
| 7 | Implement a self-assessment feature for language proficiency |
| 8 | Offer a help or tutorial feature for better user understanding |
| 9 | Create an option for users to provide feedback or report issues directly within the chatbot |
| 10 | Enhance the chatbot's ability to understand and respond to complex or specific queries |

of 3.78), and the intuitive interface (mean score of 3.76).

#### 4.2.2 Language Learning Effectiveness

Varied responses were seen in language learning effectiveness, with vocabulary enhancement assistance receiving the highest mean score (3.86) and proficient grammar correction the lowest (3.68). These findings highlight specific strengths and areas for improvement in the language learning aspect.

#### 4.2.3 Content and Relevance

For content and relevance, diverse conversation scenarios and equipped resources received high scores (3.79 and 3.86, respectively), while relevant conversation topics and culturally sensitive responses scored slightly lower (3.68 and 3.82, respectively). This section provides insights into the strengths and potential improvements in content delivery.

#### 4.2.4 Overall Satisfaction

The overall satisfaction mean score was 3.76, with users expressing a willingness to recommend the chatbot for English learning (mean score of 3.81) and a strong intent to continue using it (mean score of 3.90). These scores indicate a positive reception of the system and a high likelihood of continued user engagement.

Positive feedback was received based on the participants' views of the TalkTutorAI chatbot, praising its user experience, language learning effectiveness, content relevance, and overall satisfaction. While the user-friendly interface received acclaim, feedback suggested improvements in response speed, timeliness, and intuitiveness. In language learning,

vocabulary enhancement was identified as a strength, while engaging conversations could be improved. Content and relevance, especially in culturally sensitive responses, received positive feedback. Overall, TalkTutorAI had a positive reception, with identified areas for improvement in user interaction and content delivery.

## 5. Discussions and Conclusions

Our investigation into TalkTutorAI, a ChatGPT-based web application designed for English language learning, represents a significant advancement in language training, particularly within the ChatGPT context. Addressing a notable gap in existing literature, which lacks comprehensive reviews of ChatGPT's role in language education, our study systematically evaluates TalkTutorAI's effectiveness in addressing English language learning challenges among Thai students.

Aligned with Schmidt-Fajlik (2023) endorsement of ChatGPT for English Language Learners and consistent with Young & Shishido (2023) findings on ChatGPT-generated dialogues' suitability for CEFR A2 proficiency levels, our research underscores the relevance and importance of understanding ChatGPT's applicability in language training. By addressing critical issues and providing practical solutions, our study significantly contributes to effective language education, positioning ChatGPT as a transformative tool.

The findings highlight TalkTutorAI's potential in improving English proficiency, with ongoing refinement based on user insights, thereby contributing to innovative language education strategies emphasizing adaptive and engaging learning platforms. In essence, our research provides a comprehensive understanding of TalkTutorAI's role in addressing language learning challenges and sheds light on the potential of ChatGPT as a facilitator for English conversation teaching.

This study not only adds valuable insights to discussions about language education but also sets the stage for future research in this field. The positive user feedback and the areas identified for improvement underscore the dynamic nature of our research, opening avenues for ongoing refinement and innovation in language education strategies.

## 6. Future Works

Addressing current limitations, the web application lacks a tracking system, hindering user progress monitoring. Future improvements include implementing a robust user tracking system for enhanced performance monitoring and integrating data analysis techniques for insights into strengths and weaknesses. Responding to user feedback, future work involves enhancing response accuracy, language translation capabilities, and providing learning assessments. Optimizing the mobile interface, ensuring faster response times, and adding diverse, informative responses will contribute to improved usability. Implementing a self-assessment feature, a help or tutorial option, and a direct feedback mechanism

within the chatbot would enhance user engagement. Advancing the chatbot's understanding of complex queries and language translation capabilities aligns with educational technology trends, ensuring a more personalized learning experience.

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