International Journal of Learning, Teaching and Educational Research
Vol. 24, No. 12, pp. 872-901, December 2025
https://doi.org/10.26803/ijlter.24.12.37
Received Sep 25, 2025; Revised Nov 3, 2025; Accepted Nov 10, 2025

Development and Validation of a Digital ESP Learning App, Based on Self-Regulated Learning Approach to Support Nursing Students' Speaking Skills

Desi Rochmawati*
Doctoral Program of Pedagogical Sciences, Sebelas Maret University
Health Polytechnic of Ministry of Health in Yogyakarta
Indonesia

Joko Nurkamto, Muhammad Nizam and Dewi Rochsantiningsih
Doctoral Program of Pedagogical Sciences, Sebelas Maret University
Surakarta, Indonesia

Abstract. There remains a lack of digital learning tools that focus on speaking skills within the context of English for Specific Purposes (ESP) in Nursing. Most available English learning applications are designed for general English, which creates an urgent need for the development of a specialized digital learning tool that supports nursing students in improving their speaking proficiency. Therefore, this study aims to design and validate an innovative digital learning application, **E-SPAI**, to enhance nursing students' speaking skills through the integration of a self-regulated learning approach and expert participation during the validation process. The study employed the Four-D instructional design model, consisting of the stages of *define*, *design*, *develop*, and *disseminate*. Data were collected using online questionnaires, semi-structured interviews, and focus group discussions involving ESP educators, nursing students from six Health Polytechnics in Indonesia, and professional practitioners with simple random sampling. Both qualitative and quantitative analyses were conducted based on feedback and scores obtained from the design, development, and expert validation stages. The results show that **E-SPAI** achieved average validation scores of 3.80 from experts, 3.83 from practitioners, and 3.60 from users, with an overall mean of 3.74. These findings confirm the feasibility and suitability of **E-SPAI** as a digital learning application that provides nursing students with interactive features and menus designed to facilitate speaking practice within the ESP Nursing context. **E-SPAI** can therefore serve as an effective alternative medium for enhancing nursing students' speaking competence in international communication.

* Corresponding author: Desi Rochmawati; *brilliantdesy@gmail.com*

Keywords: ESP learning app; self-regulated learning; digital learning tool; international communication; nursing students' speaking skills

1. Introduction

In line with the mission of the Ministry of Health of Indonesia to increase the number of medical professionals working abroad through Government-to-Government (G-to-G) programs, Health Polytechnics across Indonesia are now preparing their nursing students to achieve global competitiveness. As international communication in workplace settings is essential to support their professionalism, English proficiency—particularly in speaking—is a critical component of this preparation. However, in most Health Polytechnics, nursing students receive English for Specific Purposes (ESP) instruction for only two or three semesters, which leads to discontinuity in their English learning. Currently, there are no adequate digital learning tools specifically designed to accommodate ESP in Nursing and to support continuous learning beyond the classroom.

Existing digital learning applications, such as SmallTalk2 or Duolingo, are widely accessible via smartphones but are primarily developed for general English rather than nursing-specific contexts. Nursing students, on the other hand, require communication skills adjusted for global clinical environments. In order to accommodate learning continuity, there should be technology-enriched learning setting to achieve learning goals. This lies in autonomous learning that is related to the concept of self-regulated learning with forethought, performance, control, reflection (Urbina et al., 2021). This means that students should learn independently, set the learning goals, make a plan, control their performances, and continue it with self-evaluation (De Vrind et al., 2024).

Previous studies have also not sufficiently addressed the design and development of digital learning tools in the ESP field, particularly for Nursing. Meanwhile, the affordances of mobile devices have encouraged their extensive use in education, improving the effectiveness and flexibility of learning experiences (Ryan et al., 2024). In language education, for instance, the integration of augmented reality and flash-card-based mobile applications has made learning more interactive and engaging (Rahman et al., 2023). Similarly, mobile learning environments provide learners with broader access to information sources, promote self-directed and autonomous learning, and allow flexibility to study at their own pace (Clorion et al., 2025). Evidence also indicates that mobile-based learning fosters less formal yet more engaging experiences that increase learner participation and self-confidence (Llema & Vilela-Malabanan, 2019).

Observations conducted in several Health Polytechnics (*Politeknik Kesehatan*/ *Poltekkes*) across Indonesia reveal that the predominant learning media used are printed textbooks, which have proven inadequate and inefficient in meeting students' needs. The reliance on textbooks presents several challenges, including limited learning time, low engagement, and poor time management (Perrin & Thomas, 2025; Taye, 2025; Xu et al., 2025). Moreover, these materials are often discarded or unused once the course concludes (Nateghian, 2024). As noted by Huang (2023), the widespread use of mobile devices and internet connectivity has

fundamentally transformed people's learning habits, further highlighting the limitations of traditional print-based materials (Huang, 2023). This situation leads to discontinuity in ESP learning process. To maintain learning continuity in ESP for Nursing, an innovative strategy is required—one that allows students to participate actively in the teaching-learning process anytime and anywhere. Such a strategy should address students' discipline-specific needs and characteristics while fostering independent and sustainable learning practices (Klimova, 2015; Wang et al., 2025). Accordingly, this study proposes the development and validation of a digital ESP learning application grounded in a self-regulated learning approach to enhance nursing students' speaking competence.

Most studies highlight that technology has significant potential to support and improve students' performance in language learning (Antontseva et al., 2025; Fathi et al., 2024; Kharis et al., 2022). Mobile devices are now widely used in education and have been scientifically proven effective in enhancing academic performance and maintaining learning continuity (Llema & Vilela-Malabanan, 2019). The emergence of artificial intelligence (AI) tools such as ChatGPT has also contributed to the growing variety of teaching and learning resources available to educators and learners (Ampo et al., 2025). Considering these developments, the availability of English-learning applications that provide real-time feedback to improve speaking skills is urgently needed. Therefore, this study was conducted to address the following research questions:
a) What are the design and specifications of **E-SPAI**, which was developed based on the self-regulated learning approach to enhance nursing students' speaking skills?
b) What is the feasibility of the E-SPAI application as a digital learning medium to enhance nursing students' speaking skills?
Accordingly, this study aims to develop an innovative digital learning application that focuses on improving nursing students' speaking competence by integrating the concept of self-regulated learning, with the participation of experts, practitioners, and users in validation process.

2. Literature Review

The following sub-sections examine three core areas: 1) self-regulation in language learning, 2) principles for developing a mobile-learning (m-learning) tool to enhance speaking competence, and 3) the application of the self-regulated learning concept in the digital ESP learning app. These strands provide the theoretical foundation for understanding the development of a digital learning application built upon the self-regulated learning approach to improve communicative competence in medical contexts.

2.1 Self-Regulation in Language Learning

In technology-enhanced learning environments, one of the key factors in achieving learning goals is learner autonomy. The concept of autonomous learning is closely linked to that of self-regulated learning (Urbina et al., 2021). Although various self-regulated learning (SRL) models have been proposed by Boekaerts & Niemivirta (2000), Pintrich & De Greet (1990), Schunk & Zimmerman (1994), Winne (1995), Zimmerman (2000), they all share common assumptions and

characteristics related to learning and regulation (Boekaerts et al., 2000). Pintrich's (1999) SRL model combines four phases of self-regulation—forethought, monitoring, control, and reflection—with four areas of regulation: cognition, motivation, behaviour, and context (Pérez-Álvarez et al., 2018; Tanimura et al., 2023). Forethought phase: students set goals, plan their learning, and prepare to complete exercises using the learning media. Performance phase: students focus their attention, participate actively, develop strategies, and monitor their progress. Self-reflection phase: students evaluate their learning outcomes and performance (Brenner, 2022). Self-regulated learning is a psychological approach that plays a critical role in influencing learners' academic success (Sun & Wang, 2020).

Based on various concepts of self-regulated learning, self-regulated learning is closely related to autonomous learning. Self-regulated learning is a learning process in which students or learners are personally active in terms of cognition, motivation, attitude, and emotion in determining learning goals (goal setting/forethought), regulating the learning process (performance), monitoring learning progress (control), and reflecting on the learning outcomes they have achieved (reflection) in order to achieve the desired learning goals. Figure 1 presents the framework of the self-regulated learning model applied in this study.

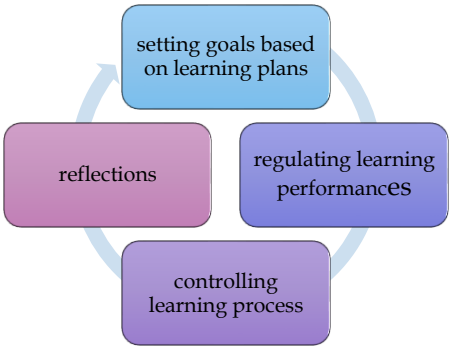

Figure 1: The Framework of Self-Regulated Learning Concept

As illustrated in Figure 1, self-regulated learners are active participants in their learning process, capable of identifying their weaknesses and taking strategic actions to improve (Alotumi, 2021; Puntularb et al., 2021). Within E-SPAI, the SRL phases are embedded in the application's features, menus, and activities targeting subskills such as vocabulary, pronunciation, fluency, and grammar. Learners are guided to complete relevant tasks independently, manage their study time, reflect on their progress to enhance speaking performance and discipline, and thus evaluate their learning activities and outcomes.

2.2 Principles for Developing an M-Learning Tool for Enhancing Speaking Competences

In designing and developing the E-SPAI application, the researchers considered several theoretical and practical aspects: the English syllabus for ESP courses in Health Polytechnics, theories of speaking, the principles of self-regulated learning (SRL), mobile-assisted language learning (MALL) frameworks, and software development principles. Document analysis and theoretical synthesis informed

the design of **E-SPAI** as a digital medium to enhance speaking skills in English for Specific Purposes (ESP) within nursing contexts. According to the Common European Framework of Reference for Languages (CEFR), speaking proficiency comprises several key descriptors, including vocabulary, accuracy, fluency, interaction, and coherence (Council of Europe, 2003).

Speaking competence is typically assessed through indicators such as vocabulary range, content organization, fluency, grammatical accuracy, and pronunciation (Kang, 2022; Marek & Wu, 2011), as well as discourse features like cohesion and sociolinguistic appropriateness, and task-based performance (Brown & Lee, 2015). These principles guided the pedagogical and technical design of E-SPAI, ensuring that its activities align with international standards for speaking assessment and instruction.

2.3 Application of Self-Regulated Learning Concept in the Digital ESP Learning App

Several features of E-SPAI were developed based on the principles of self-regulated learning (SRL). The application integrates Pintrich's (1999) model, encompassing the four SRL phases—forethought, monitoring, control, and reflection—across the four regulatory domains: cognition, motivation, behaviour, and context (Pérez-Álvarez et al., 2018). E-SPAI is designed specifically for Health Polytechnic students to strengthen their speaking competence through structured self-regulation. The app encourages learners to evaluate their current speaking abilities, plan improvement goals, engage in interactive exercises, and self-assess their progress (De Vrind et al., 2024).

To ensure learning continuity, E-SPAI fosters autonomous learning habits and provides flexible, mobile-based access to resources and feedback. The implementation of these SRL principles in E-SPAI is summarized in Figure 2, which illustrates how the model supports the cycle of goal setting, learning execution, and reflection for sustained improvement in ESP speaking skills.

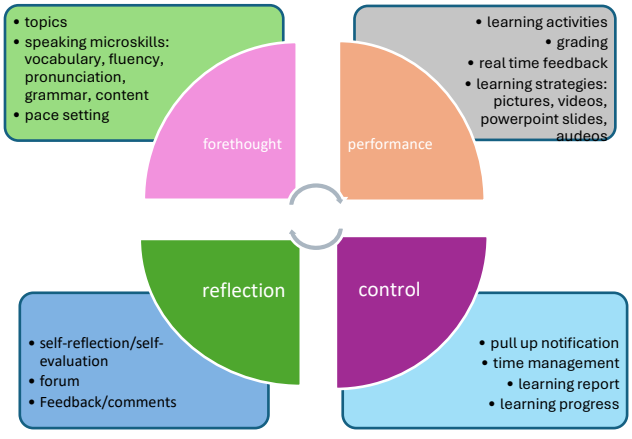

Figure 2: The Syntax of SRL Concept Implementation in E-SPAI

Figure 2 illustrates the implementation of the self-regulated learning (SRL) concept in the development of the E-SPAI application, as reflected in its built-in

features. The forethought phase represents the initial stage of SRL, applied in the form of goal setting and planning activities. The performance phase involves the execution of these plans, during which learners engage with the designed materials and tasks. The control phase runs concurrently with the performance phase, as learners undertake self-control and self-monitoring activities to ensure goal attainment. The self-reflection phase occurs after task completion, when students evaluate and make judgments about their learning activities and outcomes (Inayati & Karifianto, 2022). Table 1. represents the implementation of self-regulated learning concepts in E-SPAI.

Table 1: The Implementation of SRL in E-SPAI

Self-Regulated Learning Phases	**Features**
goal setting/forethought	- topic (unit) and subskill options - learning presentation or reference video features with selected topics. - Learning-speed determination feature.
performance	- Learning activities: exercise, quiz, and assignment features with automatic specific deadlines. - learning track record. - Grading and assessment. - Features displaying pending activities and progress of activities that have been completed in graphical form.
control	-Activity-duration setting -Notifications and reminders
reflection	-Feedback feature via forum -Discussion in forum feature

3. Methodology

This section presents the research methodology, covering the research design and procedures, research sites and participants, as well as data collection and data-analysis techniques.

3.1 Research Design and Procedures

This research adopted a Four-D instructional design by applying the stages of define, design, develop, and disseminate. Four-D serves as a systematic framework for complex for developing educational products or other learning resources (Muwaffaqoh et al., 2021). The stages in the Four-D model are Define, Design, Develop, Disseminate (Branch, 2009; McGriff, 2000; Thiagarajan et al., 1974). The following figure represents Four-D stages Thiagarajan (1974).

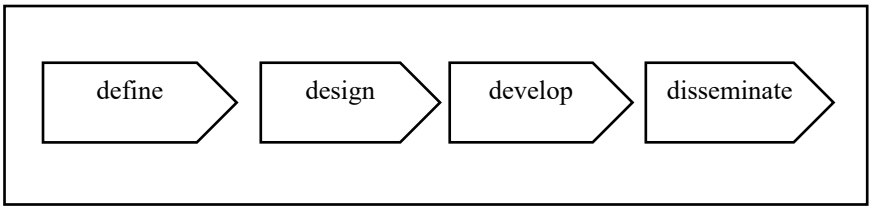

Figure 3: Four-D Development Model (Thiagarajan, 1974)

In the Define stage, the required skills for the ESP course were identified through information collected from ESP educators and nursing students using online questionnaires and interviews. The Design stage included storyboarding and programming of materials and activities within the E-SPAI application. This process involved collaboration between ESP educators and a software developer. During the Develop stage, the research team constructed the functional prototype of the application. The Disseminate stage consisted of software testing conducted with nursing students, ESP educators, and practitioners. The prototype of E-SPAI, as the result of defining, designing, and developing, need to be validated to achieve optimal results in a Focus Group Discussion (FGD).

The validation process involves three experts from two universities and three practitioners from three health polytechnics. The expert validation process involved three experts from two universities in Indonesia. Each expert has their own area of expertise: English language education, learning media development, and technology in teaching and learning. The application was also validated by 85 nursing students from two health polytechnics. The students gave their feedback of E-SPAI based on aspect of the implementation of the self-regulated learning model using E-SPAI media to improve speaking skills in the context of ESP for Nursing. Revisions were subsequently carried out in several iterative cycles based on experts, practitioners, and users feedback, followed by multiple rounds of testing to refine the final version.

3.2. Research Site and Participants

A simple random sampling technique was used in selecting the participants in investigations and software testing, while purposive sampling technique was used in selecting the validators. This research involved six ESP lecturers from six public health polytechnics under the coordination of Ministry of Health of Republic of Indonesia, those were Health Polytechnics of Ministry of Health in Semarang, Malang, Yogyakarta, Surabaya, Surakarta, and East Kalimantan. Participants in this research were ESP educators, nursing students of Health Polytechnics in Indonesia, and practitioners such as ESP educators in Health Polytechnics. Product validation of E-SPAI involved experts from two universities in Indonesia: Yogyakarta State University, and Sebelas Maret University. All procedures adhered to ethical research principles: participants were fully informed of the study's purpose, potential benefits, and minimal risks, and they voluntarily agreed to participate.

3.3 Data Collection and Data Analysis

Data were collected through observations, online questionnaires, and semi-structured interviews to investigate nursing students' skill requirements and to guide the software-testing process. Focus Group Discussions (FGDs) were conducted to validate and evaluate the application, complemented by professional meetings and collaborative discussions with practitioners for further evaluation and refinement (McKenney & Reeves, 2019a). The validation instruments for E-SPAI application were developed based on the principles of 10 pedagogic principles in learning (Anderson & McCormick, 2005), universal instructional design (UID) principles (Elias, 2011), the characteristics of well-

designed software (Egbert & Hanson-Smith, 1999), and speaking-self-regulated learning (Zimmerman, 2000; Pintrich, 2000; Brown, 2015).

The qualitative data obtained was analyzed using the interactive data analysis model by Miles, Huberman, and Saldana (2014). The data analysis process follows the interactive data analysis model, which includes data collection, data condensation, data display, and drawing conclusions (Miles et al., 2014). For qualitative data in the form of interview results, transcripts of all interview results were transcribed and categorized in thematic segments to find similarities and differences (Abidin et al., 2017). The quantitative data were obtained through online questionnaires using Likert scales items that measured participants' level of agreement. The data were analysed statistically descriptive using SPSS Statistics 26. For every item, mean scores and percentage were computed (Fadilah et al., 2023). The resulting mean values were interpreted according to the feasibility criteria shown in Table 2. The percentage of the data then were converted based on the feasibility criteria as presented in Table 3 (Sulistyani et al., 2022).

Tabel 2: Feasibility Criteria (Fadilah et al., 2023)

Criteria	Interval categories
very valid	3.25 > x < 4.00
valid	2.50 > x < 3.25
less valid	1.75 > x < 2.50
not valid	1.00 > x < 1.75

Tabel 3: Feasibility categories in (%) (Sulistyani et al., 2022)

Criteria	Range (in %)
not valid	0 –-25%
less valid	26 - 50%
valid	51 - 75%
very valid	76 - 100%

4. Results and Findings

This section provides the iterative process in developing E-SPAI as a speaking learning application which is the followed by validation of the product. This part elaborates the answers of the research objectives; 1) describe the design and specifications of E-SPAI which was developed based on self-regulated learning, 2) evaluate the feasibility of E-SPAI application as a digital learning media to enhance nursing students' speaking skills.

4.1. Identification of the English Language Skills Requirements

Activities in this stage included conducting a needs analysis, identifying challenges in existing teaching and learning practices, and analysing the assignment system used in ESP classes. Data were collected from ESP lecturers through Google Form surveys. An interview with the Deputy Director of Human Resources Development of the Health Polytechnic emphasized that speaking skills, an integral component of communication competence, are essential to support the health-education transformation mission, which aims to produce adaptive, globally competitive health professionals with strong digital literacy

and interprofessional collaboration competencies (Ditjen Nakes Kemenkes RI, 2022). Similarly, the Heads of Nursing Programs and English lecturers from five other Health Polytechnics highlighted that communication skills must correspond to the practical needs of workplace settings.

In terms of current English-language learning media, most institutions rely on Learning Management Systems (LMS) and textbooks. LMS platforms are primarily designed for administrative and content-delivery purposes, such as managing assignments and distributing learning materials, but they do not provide real-time feedback, which is critical for improving speaking skills (Ha, 2025; Kafile et al., 2025). LMS's have not been able to provide the real-time feedback needed by students when practicing aspects that support the improvement of English-speaking skills.

Real-time feedback facilities in learning activities supporting speaking skills are essential for creating a responsive learning environment that provides real-time corrections leading to sustained improvement in English speaking skills (Tai & Chen, 2024). However, existing LMS tools and digital platforms are not specifically designed to target English-speaking proficiency. Therefore, in the Design and Development stages of E-SPAI, these limitations were addressed by incorporating interactive features such as automatic scoring, a peer-feedback forum, progress-tracking dashboards, and dedicated pronunciation and fluency-practice modules.

4.2. The Design of E-SPAI with SRL Approach for Enhancing ESP Speaking Skills

In this stage, storyboarding process was also conducted to map the structure and flow of the application. The following picture is the application map of E-SPAI.

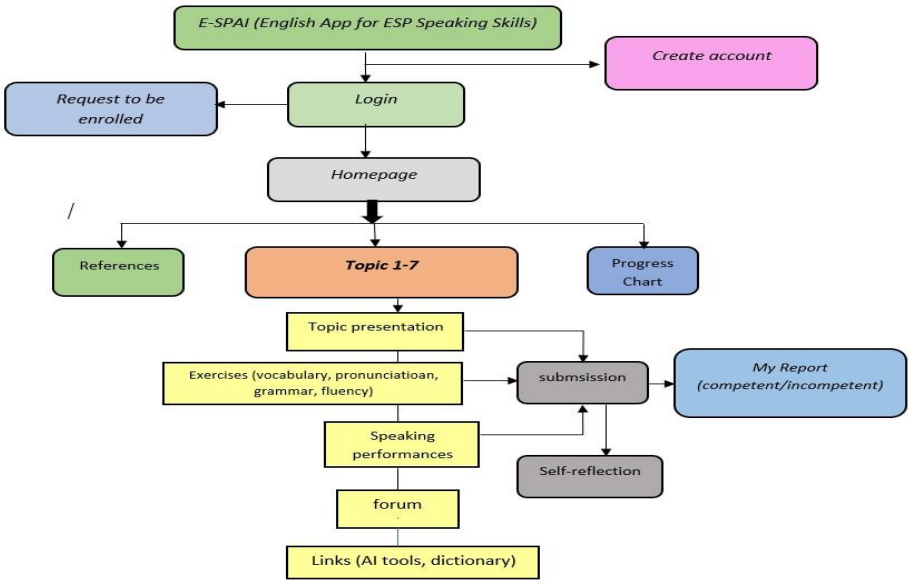

Figure 4: Application Map of E-SPAI

Based on the Applied bachelor's in nursing curriculum, two key learning outcomes were emphasized: 1) the ability to conduct therapeutic communication, 2) the ability to conduct research and develop technology in nursing practice. For ESP course, the learning outcomes were translated into competencies related to capabilities in applying therapeutic communication, actively taking roles in interprofessional collaboration among others and capabilities in enhancing nursing cares quality.

The program learning outcomes were specified into several learning topics which later became the unit titles within E-SPAI. The learning topics listed were discussed in a Focus Group Discussion (FGD). There were 13 participants in the FGD: the Head of the Nursing Department in a Health Polytechnic, the Program Coordinator for the Applied Nursing Degree Program in a Health Polytechnic, a software developer as a collaborator, the academic coordinator for the Applied Nursing Degree Program, students, nursing faculty members, and English language instructors.

The FGD was conducted to review and approve the selected topics and to refine the ESP course outcomes with an emphasis on speaking skills. Each learning topic contains activities which support speaking development including vocabulary exercises, pronunciation and fluency practices, and grammar exercises. The activities are contextually relevant to the communicative needs of nursing students in clinical environments, such as giving instructions to patients, negotiating treatment plans, explaining medical procedures, and communicating effectively with healthcare professionals.

The materials in E-SPAI includes topic selections to accommodate forethought phase. Performance and control phase are translated into learning activities that were developed in the form of multiple choices, speaking practices and fluency practices, jumbled words. All of those are completed with automatic scoring. Speaking performances as the final assessment should be in the form of video recorder to accommodate self-evaluation. The learning topics, learning objectives, and activities are as listed in the table below.

Tabel 4: The Learning Topics and Learning Outcomes

No.	*Topic*	*Learning Objectives*	*Activities*
1.	Unit 1 Patient Admission	Students are able to conduct patient admission, check vital signs, and record the admission observations in good English	a.Listening comprehensions b. vocabulary exercise (matching, quizzes, multiple choices). c. pronunciation practices d. grammar practices (jumbled words, completing sentences with correct grammar) e. fluency practices f. speaking performances (video recording)
2.	Unit 2 The District Nurse	Students are able to describe the nursing roles and help patients with Activities of Daily Living (ADLs) in good English	
3.	Unit 3 Respiratory Problems	Students are able to educate patients about asthma management and give instructions effectively to operate medical instruments in good English	
4.	Unit 4 Caring for Terminally Ill Patients	Students are able to talk about feelings, showing empathy, and using a Palliative Care Pain Assessment in good English	
5.	Unit 5 Helping Patients with Diabetes Management	Students are able to conduct blood sugar test, chart and document personal diabetes care plan in good English	
6.	Unit 6 Job Hunting	Students are able to prepare themselves for interview and respond to interview questions for getting a job in good English.	
7.	Unit 7 How to Prepare Good Presentation	Students are able to for a good presentation and prepare themselves to be confident in a presentation situation.	

4.3. Development of E-SPAI by Using SRL Approach for Enhancing ESP Speaking Skills

To present the product of this research which is called English App for Speaking Skills (E-SPAI), it is essential to review the prototype of E-SPAI, the implementation of self-regulated learning in E-SPAI, and the result of E-SPAI app testing software.

4.3.1. The Prototype of E-SPAI

E-SPAI is a digital English-learning application designed specifically to enhance speaking skills among nursing students in Health Polytechnics through the Self-Regulated Learning (SRL) approach. The application integrates the four SRL phases, goal setting, performance, control, and reflection, to help learners achieve academic success and develop autonomous learning habits. The learning materials in E-SPAI target four sub-skills essential to speaking proficiency: pronunciation, vocabulary, grammar, and fluency. Each unit provides interactive exercises, automatic scoring, and final speaking performance tasks aligned with learning objectives. To integrate the app into classroom instruction, lecturers are granted access to monitor students' final performances and provide feedback directly within the platform.

a. Overview of the E-SPAI Application

E-SPAI was developed using a no-code software development method. No-code is a software development approach that allows application development without extensive programming knowledge. The no-code approach is usually applied to develop applications by professionals with limited knowledge of programming languages (Ferguson, n.d.). This method enables educators and developers to collaborate efficiently in designing pedagogically sound applications. The E-SPAI app is distributed in an apk format, which can be downloaded and installed on Android-based smartphones. The E-SPAI application file in apk format is presented in the figure 5. below.

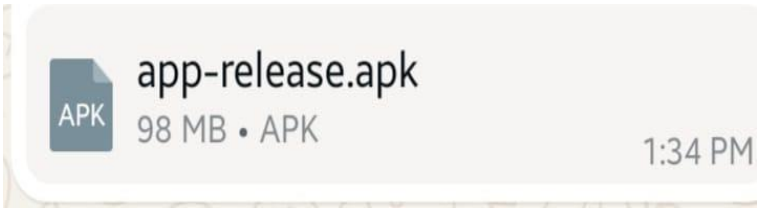

Figure 5: E-SPAI Application File

Once installed, the E-SPAI logo appears on the device's home screen, as illustrated below.

Figure 6: E-SPAI Application Installed on A Smartphone

To log in, users must create accounts. The system distinguishes between lecturer and student roles, each granting access to different features. Upon logging in, students are prompted to set learning goals by selecting topics and activities—a process aligned with the *forethought phase* of SRL. As the first phase of self-regulated learning have mentioned that students set the goals of learning by selecting the topic and learning activities. Users can then explore the various features provided in the E-SPAI application then participate the exercises and apply the strategies like selecting which activities that require to be enhanced.

To monitor progress in completing exercises and learning activities using E-SPAI, the Your Progress feature is provided. With this feature, users can monitor progress for each Unit since this feature present the percentage of students' learning activities which notify them to complete all the activities. Align with

reflection phase, student is able to evaluate their learning process, followed with repetition of the cycle. The following figure represents the Your Progress feature. It displays a progress percentage for each unit, helping students manage their time and sustain motivation

Figure 7: Your Progress, A Feature Showing Students Activity Completion

b. The Learning Unit Presentation in E-SPAI

The content in E-SPAI was designed based on the communicative needs of nursing students preparing for professional practice. E-SPAI supports students to practice in vocabulary exercises, pronunciation exercises, grammar exercises, and fluency exercises in medical practice situations such as hospital and clinical settings, nursing care interactions, and professional self-development. The seven learning units are provided in the application: *Unit 1 Patient Admission, Unit 2 The District Nurse, Unit 3 Respiratory Problems, Unit 4 Caring for Terminally Ill Patients, Unit 5 Helping Patients with Diabetes Management, Unit 6 Job Hunting, Unit 7 How to Prepare Good Presentation* as seen in figure 9.

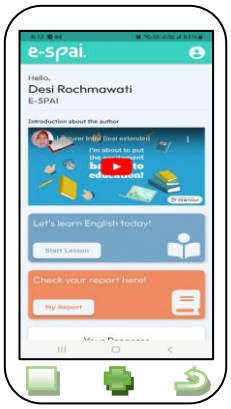

Figure 8: Home Page

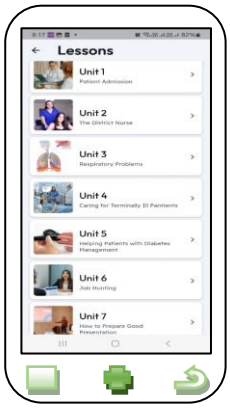

Figure 9: Learning Units

As shown above presents the homepage provides users with easy access to the lecturer's introduction, lesson content, and progress overview. Each unit consists of several features; *Topic Presentation, Exercises, Speech Performances, Forum, and*

Links as seen in figure 10 which shows contents in Unit 1 as the example. Each unit follows a consistent structure to ensure intuitive navigation and familiarity.

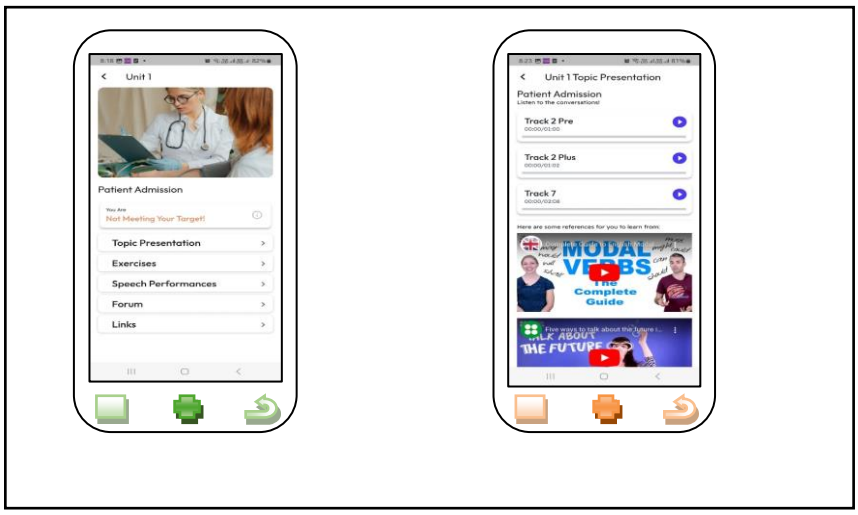

Figure 10: Unit 1

As students' complete activities, they receive automated progress reports showing their performance status. This feature enables students to track their development across all speaking activities and view whether they are categorized as competent or in need of improvement, based on cumulative performance feedback. Figure 11. below shows the details of task completion progress in each unit and the final score. The final feedback shows whether each student is categorized as competent or incompetent.

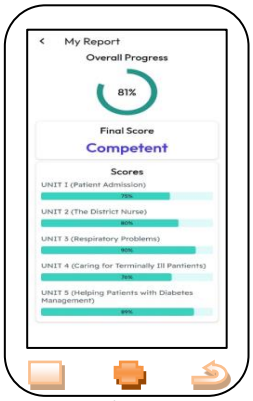

Figure 11: Fitur My Report

c. Presentation of Features in E-SPAI

Each unit in E-SPAI is organized into five consistent menus: Topic Presentation, Exercises, Speaking Performances, Forum, and Links. In Unit 1, for example, selecting the Topic Presentation menu displays a series of audio-based conversations between nurses and patients on specific medical topics. Within the same menu, video resources are provided as grammar references or illustrative materials. The interface for the Topic Presentation feature is shown in Figures 12 and 13.

Figure 12: Menu Page

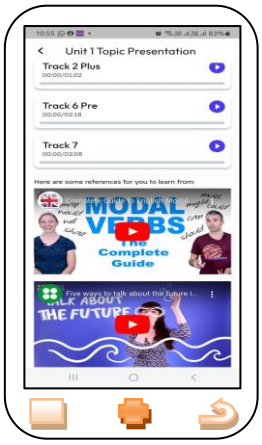

Figure 13: Learning Material

The Exercises menu offers speaking activities that strengthen micro-skills essential to oral proficiency—vocabulary, pronunciation, fluency, and grammar. All the exercises are provided with automatic scoring from the application. Each exercise type is designed to allow repeated practice and provide instant scoring. The menu interface for these features is presented in Figure 14.

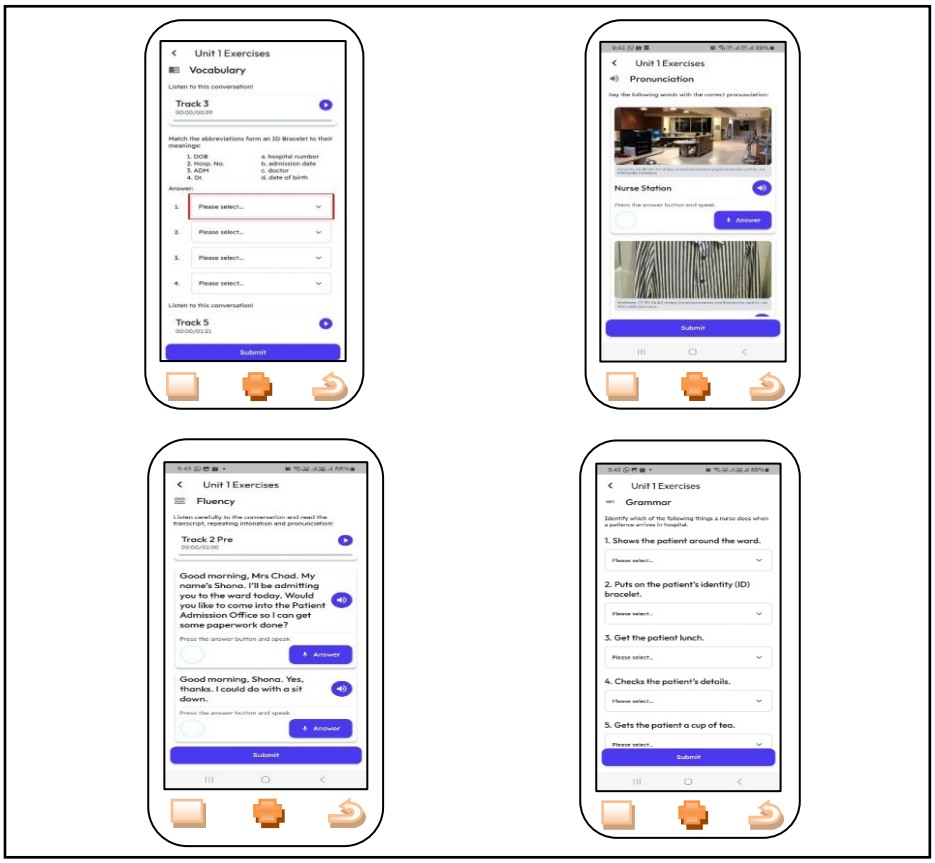

Figure 14: Exercises in E-SPAI

Figure 14. above shows the Speaking Performance menu. The Speaking Performance menu functions as the culmination of each learning unit. When students open this menu, they receive specific instructions for a final speaking task designed to assess their progress. This menu fosters self-regulation by requiring learners select a topic, conduct research, arrange content, write the draft, practice, rehearse, and record their speaking performances.

In this menu, students upload their video performances to an external platform (social media) and then submit the video link within E-SPAI. This is used to post their speaking performance videos. The videos can be viewed and commented on by peers in the Forum menu, promoting collaborative feedback. Lecturers can also evaluate student performances directly in the app using a built-in assessment rubric, helping students reflect on their progress and refine subsequent performances.

An additional feature, the Resource Links menu, provides access to several AI-based tools that assist students in improving their English-speaking skills autonomously, including *Quillbot* (grammar checking), *DeepL* (translation support), *Vocaroo* (voice recording), *SmallTalk2* (speaking practice), and the *Cambridge English Online Dictionary*. These tools reinforce self-monitoring and control the language use, key components of the SRL framework.

Each learning unit ends with a Links section connecting learners to these tools that promote students' self-regulation to complete their Speaking tasks, encouraging them to take ownership of their learning beyond the application. Finally, students can review their overall progress through the My Report feature, which summarizes completed and pending exercises, scores, and performance feedback. This feature helps learners evaluate their progress and identify areas needing improvement. The interface of the My Report feature is displayed in Figure 15.

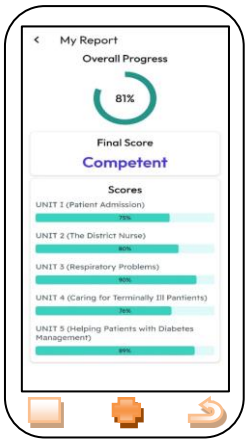

Figure 15: My Report Feature Interface

4.3.2. The Implementation of SRL Concept in E-SPAI

The phases of Self-Regulated Learning (SRL) are systematically embedded within E-SPAI's design and functionality. Each phase, Forethought, Performance, Control, and Reflection, is represented through corresponding features and

learner activities. In this initial phase, E-SPAI provides learners with options to determine which speaking micro-skills to focus on, such as pronunciation, grammar, fluency, or vocabulary. Students independently select specific sub-skills and learning strategies, such as choosing a topic from one of seven available units or practicing vocabulary within sentence contexts. These features cultivate learner autonomy, intrinsic motivation, satisfaction, and active participation in the learning process. By setting their own goals and plans, students experience a sense of ownership that aligns with the self-regulated learning paradigm.

The Performance Phase involves the implementation of planned strategies, active engagement, self-monitoring, and the use of feedback. Learners' practice pronunciation, enhance fluency, and organize ideas using the provided exercises and multimedia materials. The pronunciation-practice feature includes real-time feedback presented as a percentage score—the closer a student's pronunciation is to a native-like model, the higher the feedback percentage achieved. In the Performance Phase of self-regulated digital learning, learners engage in the actual implementation of learning strategies, self-monitoring, and feedback integration.

During this stage, students actively apply the strategies identified during the planning phase, such as improving pronunciation, enhancing fluency, or organizing coherent ideas. All these learning activities are available within E-SPAI. E-SPAI includes a pronunciation-practice feature that provides real-time feedback in the form of percentage-based scores—the more native-like the pronunciation, the higher the score. Visual aids, such as conversation videos, audio materials, pictures, and PowerPoint slides, help attract students' attention, facilitate comprehension of spoken communication, and enhance memory retention

The self-monitoring stage is supported through the Tracking Progress feature, which enables students to monitor their progress in completing planned exercises. While practicing speaking activities, learners assess their pronunciation, intonation, and overall fluency by recording their voices using E-SPAI's recording feature. Their learning progress is visually represented in the My Progress display, which shows completion percentages for each activity. Feedback within E-SPAI comes from multiple sources, including classmates and lecturers. Such feedback is immediately applicable and encourages learners to refine their future performances, ultimately leading to continuous improvement in speaking skills.

In the Controlling Phase, students monitor their performance through real-time feedback. Digital media platforms such as E-SPAI can integrate voice-recognition and AI-based systems to assess pronunciation, fluency, and grammar, providing instant and personalized feedback. Learners can control their practice sessions by adjusting playback speed, repeating exercises, or focusing on challenging sub-skills. E-SPAI's progress-tracking feature allows students to identify areas for improvement and adjust their strategies based on feedback. For example, when encountering difficulties in pronunciation or fluency, learners can slow their speech, focus on smaller segments, or use the repetition function to enhance

accuracy. During speaking-performance recordings, students are given the option to re-record their tasks as many times as needed. This flexibility enables learners to verbalize ideas more effectively, correct stress patterns, improve pronunciation, and achieve more natural fluency (Kang, 2022). In pronunciation or fluency exercises, learners can pause or replay recordings to review specific aspects of their speech, as illustrated in the following figures.

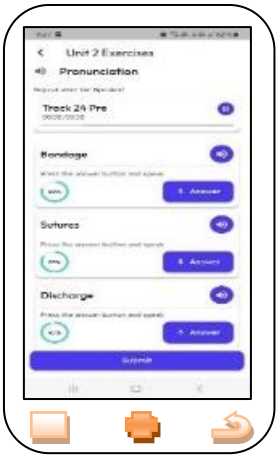

Figure 16: Pronunciation Practices

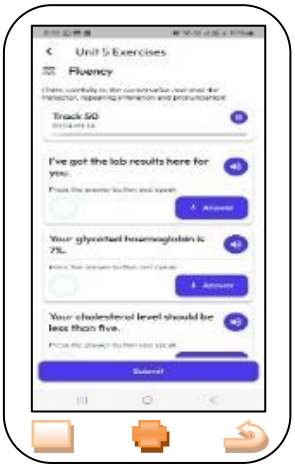

Figure 17: Revising Fluency Practices

The Time Management feature introduces Time Limits, allowing learners to organize their practice sessions efficiently. This function helps students manage study duration, sustain concentration, and maintain discipline throughout the learning process. The time management feature has been implemented in E-SPAI as shown in the following figure.

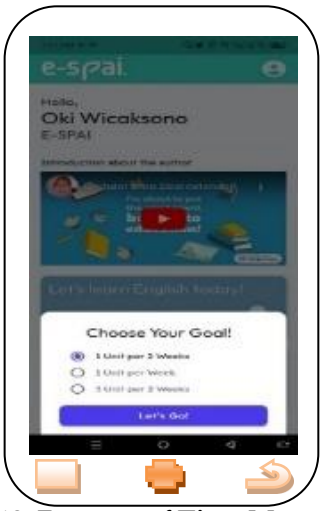

Figure 18: Features of Time Management

In the Reflection Phase, students evaluate their performance after completing speaking activities. E-SPAI automatically provides automatic scoring, feedback on pronunciation, fluency, and vocabulary use. Lecturers also assign scores for each student's performance, which are visible in the app. This phase encourages learners to independently reflect on their proficiency in vocabulary, grammar,

fluency, pronunciation, and content. E-SPAI's self-reflection feature enables users to critically evaluate their performance and identify areas for further improvement. Features to accommodate self-reflection can be seen in the following figure.

Figure 19: Feature of Self-Reflection

Based on their reflections, students set or refine goals for subsequent learning sessions—thus completing the self-regulated learning cycle. For instance, a learner may aim to improve difficult sound patterns or enhance fluency through spontaneous speaking practice. This process empowers students to make informed decisions about whether to adapt or maintain their strategies for future performances.

4.3.3. E-SPAI Application Testing (Software Testing) and Application Improvement

Software testing is a critical process in detecting potential errors before a product is formally released. It involves a series of systematic trials to ensure that all functions perform as intended (Khaliq et al., 2023; Xin et al., 2022). The testing of E-SPAI was conducted in three consecutive phases, each followed by iterative refinements to enhance functionality and usability. During the first testing phase, conducted after the application had been developed using the FlutterFlow platform, several nursing students were invited to test the prototype. This phase aimed to determine whether all features within E-SPAI functioned correctly, including navigation and interaction across menus.

The initial test was carried out by four nursing students who had previously taken English courses. Several technical issues were identified during this stage. Some buttons were found to be nonfunctional, and the My Report feature displayed only five units instead of the expected seven. Additionally, completion notifications for exercises were missing, and a few spelling errors were detected within the interface. Despite these technical issues, other features operated effectively. In the Topic Presentation menu, all audio materials played clearly and without interruption. The Speaking Performance menu successfully connected to external platforms, enabling students to upload their speaking videos directly for lecturer and peer review. Likewise, the Forum feature functioned properly and

could be used to exchange feedback among students. All detected shortcomings were subsequently corrected. The testing process was repeated several times, with each error being immediately repaired and re-evaluated on smartphones until the application's features operated optimally.

The second phase of testing was conducted through a Focus Group Discussion (FGD), which aimed to evaluate and validate the application more comprehensively. The session was attended by experts, dissertation advisors, policymakers, practitioners, collaborators, and students. The group of experts consisted of specialists in English language education, digital learning media development, learning technology, and pedagogy from two universities. In addition, three Health Polytechnic lecturers and one IT collaborator participated in the session. The feedback and suggestions gathered during the FGD became essential references for revising E-SPAI. Several significant improvements resulted from this phase. These included: 1) strengthening the implementation of the self-regulated learning concept within the application's features and content; 2) adding additional SRL-based functions; 3) enriching practice materials to target specific micro-skills in speaking, and 4) providing audio scripts for listening activities.

Other revisions were also made based on feedback from the FGD participants and collaborators to enhance the learning experience and ensure better pedagogical alignment. The third testing phase involved usability trials with thirty nursing students to evaluate the final version of the application. Only minor technical errors were found, primarily concerning a few navigation buttons that did not respond properly. These issues were promptly corrected in the subsequent update. After the final revisions, E-SPAI was confirmed to be fully functional and ready for the dissemination stage.

4.4. Dissemination and Feasibility of E-SPAI

This feasibility test included various participants which involved experts, practitioners, and users that this stage is regarded as dissemination. This English language learning application, which was specifically designed to improve English speaking skills, was tested for feasibility using the E-SPAI learning application validation sheet which covered aspects of content, design, and technical quality (Akker et al., 2013). This process provides a different perspective on a phenomenon and helps researchers avoid misunderstandings when addressing an issue (McKenney & Reeves, 2019).

4.4.1. Experts Appraisal

Experts in English language education evaluated the E-SPAI application by examining its content and activities in relation to the principles of English-speaking skills, vocabulary, fluency, pronunciation, and grammar, and the framework of self-regulated learning. The evaluation indicators corresponded to the four major SRL phases: goal setting (forethought), performance, control, and reflection. The experts utilized a four-point validation scale, and the results showed an average score of 3.76 (94%), which falls under the *highly feasible* category. According to English Language Education experts, E-SPAI is a beneficial learning application that helps students independently develop their

English-speaking skills. Some of the advantages of E-SPAI mentioned by these experts include: 1) E-SPAI provides flexibility for students to improve their ESP speaking skills; 2) the application can be installed on smartphones, allowing it to be accessed anytime and anywhere; 3) students can select the topics they wish to study first based on their individual needs; and 4) the activities within E-SPAI are simple and easy to understand. Some minor revisions suggested by the experts were related to font size adjustments and the addition of clearer instructions for the Forum feature.

The evaluation by experts in digital learning media development regarding the feasibility of the E-SPAI learning application was reviewed from the aspects of pedagogical principles in mobile learning and the principles of universal instructional design. The results of the E-SPAI application feasibility assessment in terms of pedagogy in mobile learning includes; *match to the curriculum, inclusive, learner engagement, innovative, effective learning, formative assessment & summative assessment), coherence-consistency-transparency), easy of use, cost effectiveness.* The second aspect of validation is related to Universal Instructional Design (UID) principles; *equitable use, flexible use, simple, tolerance for error, low physical and technical support.*

The results of the expert appraisal of digital learning media development show that the average score per indicator is 3.85 (96.25%) and which is categorized as highly feasible. According to experts in digital learning media development, the E-SPAI application has several advantages, including: 1) ease of operation, 2) good graphic design, 3) easy-to-read text that is comfortable for the eyes, 4) systematic structures, 5) overall pedagogically significant layout, 6) support for interactive learning, and 7) accommodation for users to learn at their own pace.

The feasibility of the E-SPAI application was also evaluated from the perspective of well-designed software principles, including consistency, effective use of space, legibility, contrast, repetition and alignment, easy navigation and recovery, and high audiovisual quality. The E-SPAI application was assessed using a four-point validation scale. The results of the appraisal conducted by learning technology experts indicated that the average score per indicator was 3.80 (95%), which is also categorized as highly feasible. According to the learning technology experts, the E-SPAI application already has a good interface and is easy to operate. Its functionality is appropriate and aligned with the intended learning purposes.

E-SPAI also presents several notable strengths, including: 1) a feature for assessing speaking skills, 2) a feature that allows students to provide feedback on their classmates' performances through the Forum, and 3) materials that effectively integrate audiovisual media. A minor revision was recommended regarding the improvement of audio quality. Various suggestions and feedback provided by the experts served as valuable input for researchers and the development team to further improve the E-SPAI application. The overall average score of expert appraisals was 3.80, which is considered feasible. In general, the results of the expert appraisals are illustrated in the following chart.

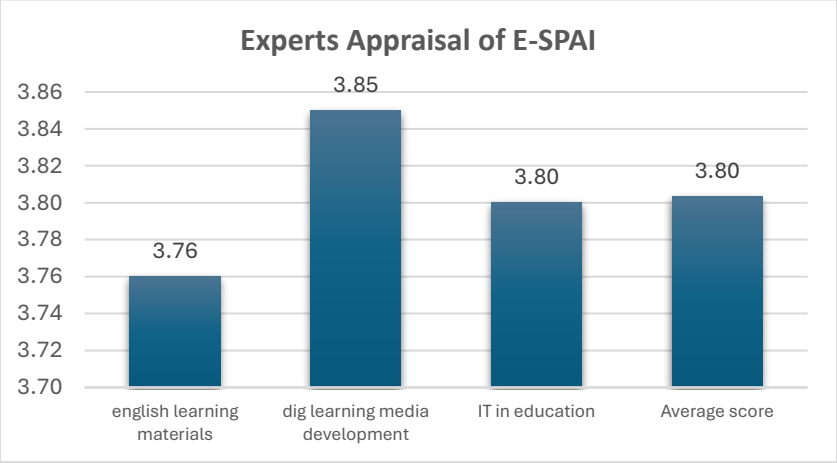

Figure 20: Result of Experts Appraisal

4.4.2. Practitioners Appraisal (Lecturers)

The feasibility of the E-SPAI application was also evaluated by three practitioners consisting of English lecturers who teach ESP for Nursing at Health Polytechnics. These lecturers provided assessments based on the concept of English-speaking self-regulated learning. The results of the feasibility assessment were obtained from the three ESP lecturers, and the average score from the practitioners' evaluation was 3.83 (95.75%), which is categorized as highly feasible. According to the practitioners, the E-SPAI application offers significant flexibility for both instructors and students in determining learning topics according to the teaching plan. The application also effectively facilitates students in improving their speaking skills through practice-based learning. It contains comprehensive ESP materials for nursing within a flexible and user-friendly digital format.

The application integrates essential micro-skills of speaking, including vocabulary, grammar, pronunciation, and fluency. With the help of this application, students can learn independently, identify their weaknesses in specific skill areas, and develop personalized learning strategies to improve their performance. Furthermore, the practitioners emphasized that the E-SPAI application is particularly beneficial for nursing students because its development aligns with the curriculum, syllabus, and professional needs of the nursing program. The features provided in E-SPAI can serve as both supplementary and complementary learning tools within ESP courses for nursing. The results of the practitioners' appraisals are illustrated in the following chart, showing an average score of 3.83, which is categorized as feasible.

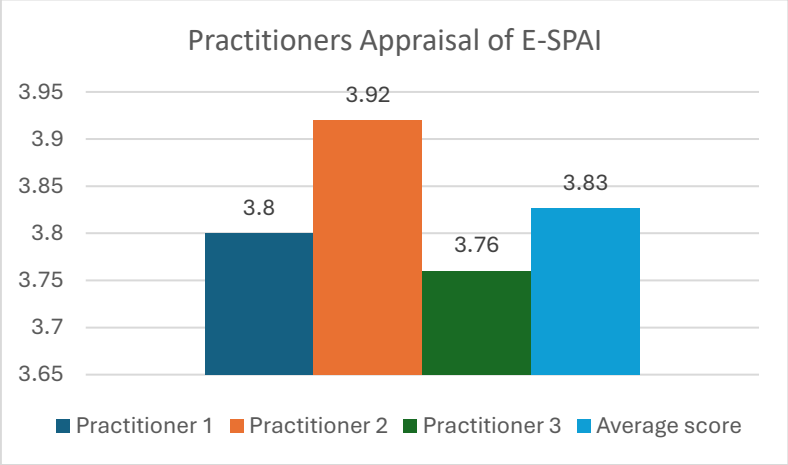

Figure 21: Result of Practitioner Appraisals

4.4.3. Users Appraisal

The evaluation of the E-SPAI learning application's suitability was also conducted by students from Health Polytechnics who served as users of the application. The students assessed E-SPAI based on two aspects: self-regulated learning in speaking and the characteristics of well-designed software. Overall, the students agreed that the E-SPAI application is a comprehensive tool for improving English-speaking skills. It provides integrated practice for pronunciation, fluency, grammar, and vocabulary, accompanied by various exercises, feedback mechanisms, and scoring features that allow learners to measure their progress. The application also presents sample conversations that enrich students' understanding of professional communication in nursing contexts. The average rating given by students for the E-SPAI application was 3.56 (89%), which is categorized as highly satisfactory.

Further evaluations were conducted to assess E-SPAI based on the characteristics of well-designed software, ensuring its practicality as a digital learning medium. According to the students, E-SPAI has complete and well-integrated features. One of its main strengths is the My Report menu, which allows students to view their learning progress throughout the course. In this menu, users can also determine whether they have achieved the "competent" category. Students mentioned that the features are well-organized, the materials are easy to understand, and the audio-visual quality—such as the clarity of images and videos—is high and effectively supports learning. The average score from the students' evaluations based on software design principles was 3.60 (90%), which is also categorized as highly satisfactory. The results of the user appraisals are presented in the following chart.

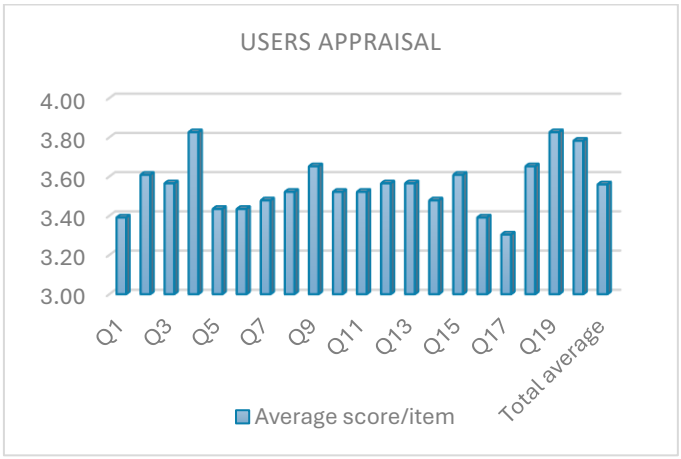

Figure 22: Result of User Appraisals

As a summary, the overall average score obtained from the validation process was 3.74, indicating that E-SPAI is feasible as a digital learning application to enhance nursing students' speaking skills. The overall feasibility results are illustrated in the following graph. The average validation score from the experts was 3.80, while the practitioners' validation score averaged 3.83. These findings confirm that E-SPAI can serve as a supportive digital learning medium in ESP courses. The integration of technology has been proven beneficial in improving nursing students' practical language skills (Kang, 2022; Li et al., 2024). The combined average validation score from all validators and users was 3.58, confirming that E-SPAI meets the criteria for a feasible and digital learning tool.

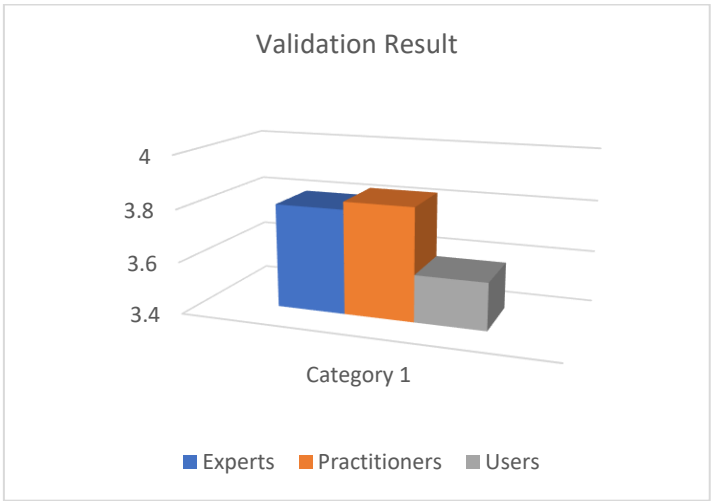

Figure 23: Validation Result

5. Discussion

The E-SPAI application, developed as a digital learning medium to improve English-speaking skills for nursing students in vocational colleges such as Health Polytechnics, was designed using a self-regulated learning approach. The application was tested for feasibility through a series of assessments and validations by ESP experts and lecturers or practitioners. The experts provided evaluations in the areas of English learning materials, digital learning media, and

learning technology, while ESP lecturers and practitioners in nursing evaluated the E-SPAI application based on the concept of self-regulated learning within ESP courses at Health Polytechnics. Based on the preliminary research, E-SPAI was developed according to the communicative requirements of nursing students in global clinical workplace settings, focusing particularly on speaking skills.

This distinguishes it from other digital learning tools that primarily focus on enhancing reading and writing skills (Llema & Vilela-Malabanan, 2019), grammar knowledge (Inayati & Karifianto, 2022), or vocabulary mastery (Chowdhury et al., 2024; Sejong Girls' Highschool, Korea et al., 2022). Other studies have also emphasized the enhancement of different aspects of English learning using the self-regulated learning approach but through other digital platforms such as augmented reality (Rahman et al., 2023) or learning management systems like Blackboard and Edmodo (Almoeather, 2020).

The evaluation results from experts indicated that the E-SPAI application is suitable for use as a medium to support English learning in Health Polytechnics. As discussed in the previous subsections, several factors confirm that E-SPAI meets the criteria for a high-quality educational application: it provides flexibility for practicing speaking skills, includes activities that support subskills in English speaking, offers materials that are easy to understand and appropriately leveled, features an attractive and well-structured graphic design, organizes materials systematically, and delivers automatic feedback in audio-visual formats. The accessibility of the application and the inclusion of visual and auditory materials make learning more engaging and effective in improving students' skills, knowledge, self-satisfaction, and confidence (Li et al., 2024). Furthermore, learning applications that can be installed on smartphones have been found to increase student engagement and encourage greater learning autonomy (Herbert et al., 2021).

Evaluation results from practicing lecturers and students were consistent with those from the expert validation. Both groups agreed that the E-SPAI application is a suitable digital learning medium for improving English-speaking skills. E-SPAI offers flexibility in accessing English learning materials and supports the development of speaking skills through a self-regulated learning approach, which encourages students to take responsibility for their learning goals, conduct self-monitoring and self-assessment, and actively participate in their learning process (Lee, 1998). The integration of technology in English learning has also been proven to enhance student motivation and effectively improve speaking proficiency (Fathi et al., 2024; Hwang et al., 2024; Tai & Chen, 2024).

Overall, the results of the feasibility tests involving experts, lecturers, and users confirmed that E-SPAI is an appropriate and effective tool for supporting students in developing English-speaking skills. The application contains comprehensive ESP materials for nursing, presented in a flexible and interactive digital format. It covers all essential subskills of speaking—vocabulary, grammar, pronunciation, and fluency—and allows students to learn independently while identifying their weaknesses and designing personalized strategies for improvement. E-SPAI is

also regarded as beneficial for nursing students because it was developed in alignment with the curriculum, syllabus, and specific needs of nursing programs. The features integrated into E-SPAI can therefore be utilized as both supplementary and complementary learning tools within ESP courses for nursing. Besides, E-SPAI includes features that accommodate learning continuity for nursing students

6. Conclusion and Recommendation

E-SPAI (English App for Speaking Skills) was developed specifically for nursing students using the Self-Regulated Learning (SRL) approach in language learning. The SRL phases are clearly reflected in the features of E-SPAI, making it a supplementary English-speaking learning tool tailored to nursing students. The English-speaking materials integrated into the application were developed within the context of English for Specific Purposes (ESP) in nursing. Theoretically, this study introduces an up-to-date method of teaching and learning English by integrating technology with the current educational setting. It contributes to the growing field of digital learning media development aimed at improving English language proficiency.

Practically, this study enriches the variety of English learning media available for vocational health college students, particularly those studying ESP for Nursing. E-SPAI also provides an engaging and interactive learning experience through various media, including videos, images, reports, and procedural materials. It can be used as an alternative medium for learning spoken English, particularly in independent assignments aligned with the learning methods outlined in the course syllabus.

The development of E-SPAI followed the Four-D instructional design model, which includes the stages of define, design, develop, and disseminate. Throughout the development process, experts, practitioners, users, and stakeholders were involved at various stages. Experts provided validation, comments, and suggestions based on their areas of expertise, while practitioners and users offered input related to the communication needs of nursing students in professional settings. Iterative trials involving thirty nursing students were conducted to refine the application through a process of continuous testing and revision until the final version of E-SPAI was achieved. The final version was found to be feasible and effective as a digital learning application for enhancing nursing students' speaking skills.

As a learning application designed to improve speaking proficiency, E-SPAI includes various features for practicing pronunciation, fluency, vocabulary, and grammar, supported by automatic scoring and progress-tracking functions. However, some features are not yet fully developed, particularly those supporting online collaborative learning, which are not currently available in the application. Furthermore, since E-SPAI was created using a no-code development platform, it faces technical limitations, such as the inability to accommodate real-time speaking activities like online video conferences. Therefore, future research should focus on selecting more advanced development platforms that allow for a

broader range of interactive speaking features and online collaboration capabilities.

7. Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

8. Acknowledgment

The authors gratefully acknowledge and extend appreciations to the collaborators, colleagues, students, and all participants across three health polytechnics in Indonesia for their valuable contributions to this research.

9. References

Abidin, Z., Mathrani, A., Hunter, R., & Parsons, D. (2017). Challenges of Integrating Mobile Technology into Mathematics Instruction in Secondary Schools: An Indonesian Context. *Computers in the Schools*, *34*(3), 207–222. https://doi.org/10.1080/07380569.2017.1344056

Akker, J. V. D., Bannan, B., Kelly, A. E., Nieveen, N., & Plomp, T. (2013). *Educational Design Research, An Introduction*.

Almoeather, R. (2020). Effectiveness of Blackboard and Edmodo in Self-Regulated Learning and Educational Satisfaction. *Turkish Online Journal of Distance Education*, 126–140. https://doi.org/10.17718/tojde.728140

Alotumi, M. (2021). EFL college junior and senior students' self-regulated motivation for improving English speaking: A survey study. *Heliyon*, *7*(4), e06664. https://doi.org/10.1016/j.heliyon.2021.e06664

Ampo, W. M. G., Ayuban, A. R., Avellaneda, S. L. A., & Go, D. T. (2025). Exploring Teachers' Lived Experiences in Integrating ChatGPT in Classroom Practices. *International Journal of Education and Emerging Practices*, *1*(1), 17–28. https://doi.org/10.63236/injeep.1.1.2

Antontseva, D., Kudysheva, A., Fominykh, N., Rakhimgaliyeva, Z., & Seidualiyeva, Z. (2025). Developing Foreign Language Communicative Competence in Future Natural Science Teachers with Online Speech Simulators: The Kazakhstan Experience. *International Journal of Learning, Teaching and Educational Research*, *24*(6), 273–301. https://doi.org/10.26803/ijlter.24.6.13

Boekaerts, M., Zeidner, M., & Pintrich, P. R. (2000). *Handbook of Selg-Regulation*. Academic Press.

Branch, R. M. (2009). *Instructional Design: The ADDIE Approach*. Springer US. https://doi.org/10.1007/978-0-387-09506-6

Brenner, C. A. (2022). Self-regulated learning, self-determination theory and teacher candidates' development of competency-based teaching practices. *Smart Learning Environments*, *9*(1), 3. https://doi.org/10.1186/s40561-021-00184-5

Brown, H. D., & Lee, H. (2015). *Teaching by principles: An interactive approach to language pedagogy* (Fourth edition). Pearson Education.

Chowdhury, M., Dixon, L., Kuo, L.-J., Donaldson, J. P., Eslami, Z., Viruru, R., & Luo, W. (2024). Digital game-based language learning for vocabulary development. *Computers and Education Open*, *6*, 100160. https://doi.org/10.1016/j.caeo.2024.100160

Clorion, F. D. D., Fuentes, J. O., Suicano, D. J. B., Estigoy, E. B., Serdenia, J. R. C., Alejandrino, P., Albani, S. E., Idris, D. L., Paclibar, D. T., Torres-Toukoumidis, A., & Alieto, E. O. (2025). Smartphones and Syntax: A Quantitative Study on Harnessing the Role of Mobile-Assisted Language Learning in the Digital

Classroom and Applications for Language Learning. *Procedia Computer Science*, *257*, 7–14. https://doi.org/10.1016/j.procs.2025.03.004

Council of Europe. (2003). *Common European Framework of Reference for Languages: Learning, Teaching, Assessment*.

De Vrind, E., Janssen, F. J. J., & Van Driel, J. H. (2024). *Improving Self-Regulated learning of Speaking Skills in Foreign Languages*. 601–624. https://doi.org/10.1111/modl.12953

Ditjen Nakes Kemenkes RI, K. K. (2022). *Transformasi Politeknik Kesehatan Kementerian Kesehatan*.

Fadilah, I., Rusdi, R., & Ristanto, R. H. (2023). Development of hormone system teaching material for distance learning to improve students digital literacy. *Jurnal Pijar Mipa*, *18*(3), 290–304. https://doi.org/10.29303/jpm.v18i3.4587

Fathi, J., Rahimi, M., & Derakhshan, A. (2024). Improving EFL learners' speaking skills and willingness to communicate via artificial intelligence-mediated interactions. *System*, *121*, 103254. https://doi.org/10.1016/j.system.2024.103254

Ha, L. M. (2025). Technology-Supported English Language Learning for Non-English Majors at Under- Resourced Vietnamese Universities. *Internationa Journal of Learning, Teaching, and Educational Research*, *24*(9), 694–712.

Herbert, V. M., Perry, R. J., LeBlanc, C. A., Haase, K. N., Corey, R. R., Giudice, N. A., & Howell, C. (2021). Developing a Smartphone App With Augmented Reality to Support Virtual Learning of Nursing Students on Heart Failure. *Clinical Simulation in Nursing*, *54*, 77–85. https://doi.org/10.1016/j.ecns.2021.02.003

Huang, X. (2023). Design and Application of English Assisted Learning System Based on Mobile Learning Platform. *Procedia Computer Science*, *228*, 231–240. https://doi.org/10.1016/j.procs.2023.11.027

Hwang, G.-J., Rahimi, M., & Fathi, J. (2024). Enhancing EFL learners' speaking skills, foreign language enjoyment, and language-specific grit utilising the affordances of a MALL app: A microgenetic perspective. *Computers & Education*, *214*, 105015. https://doi.org/10.1016/j.compedu.2024.105015

Inayati, N., & Karifianto, D. M. (2022). Supports to Self-Regulated Learning in the Online Grammar Course. *The Journal of AsiaTEFL*, *19*(3), 1033–1043. https://doi.org/10.18823/asiatefl.2022.19.3.18.1033

Kafile, M., Ninana, A., & Makhetha-Kosi, P. (2025). The Digital Divide and E-Learning Participation: A Mixed-Methods Study of Extended Curriculum Programme Students in South Africa. *International Journal of Learning, Teaching and Educational Research*, *24*(9), 769–784.

Kang, N. (2022). Promoting EFL Learners' Self-regulated Learning using a Self-recorded Video-Speaking Task in an Online ESP Course. *The Journal of AsiaTEFL*, *19*(4), 1141–1162. https://doi.org/10.18823/asiatefl.2022.19.4.1.1141

Khaliq, Z., Khan, D. A., & Farooq, S. U. (2023). Using deep learning for selenium web UI functional tests: A case-study with e-commerce applications. *Engineering Applications of Artificial Intelligence*, *117*, 105446. https://doi.org/10.1016/j.engappai.2022.105446

Kharis, M., Schön, S., Hidayat, E., Ardiansyah, R., & Ebner, M. (2022). Development of a Chatbot App for Interactive German Grammar Learning. *International Journal of Emerging Technologies in Learning (IJET)*, *17*(14), 52–63. https://doi.org/10.3991/ijet.v17i14.31323

Klimova, B. (2015). Developing ESP Study Materials for Students at a Non-philological Faculty. *Procedia - Social and Behavioral Sciences*, *197*, 104–107. https://doi.org/10.1016/j.sbspro.2015.07.063

Li, A., Zain, N. M., Yusuf, A., Deng, H., & He, Q. (2024). Development and effectiveness of online teaching on practical skills among nursing students: A systematic review and meta-analysis. *Nurse Education in Practice*, *78*, 103988. https://doi.org/10.1016/j.nepr.2024.103988

Llema, C. F., & Vilela-Malabanan, C. M. (2019). Design and Development of MLERWS: A User-Centered Mobile Application for English Reading and Writing Skills. *Procedia Computer Science*, *161*, 1002–1010. https://doi.org/10.1016/j.procs.2019.11.210

Marek, M., & Wu, W. V. (2011). *Using Facebook dan Skype as Social Media in EFL Conversation Class*.

McGriff, S. J. (2000). *Instructional System Design (ISD): Using The ADDIE Model*.

McKenney, S. E., & Reeves, T. C. (2019). *Conducting educational design research* (Second edition). Routledge/Taylor & Francis Group.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (Third edition). SAGE Publications, Inc.

Muwaffaqoh, D., Kirana, T., & Rachmadiarti, F. (2021). The Development of E-Book based on Project Based Learning on the Plant Anatomy Structure Material. *International Journal of Recent Education Research*, *2*(4).

Nateghian, N. (2024). English language needs of Iranian students of civil engineering: Are the courses aligned with workplace needs? *English for Specific Purposes*, *76*, 122–135. https://doi.org/10.1016/j.esp.2024.08.002

Pérez-Álvarez, R., Maldonado-Mahauad, J., & Pérez-Sanagustín, M. (2018). *Design of a tool to support self-regulated learning strategies in MOOCs*.

Perrin, R., & Thomas, A. (2025). Evaluating L2 textbook input for grammar learning: From research findings to operationalized evaluation criteria. *Research Methods in Applied Linguistics*, *4*(3), 100213. https://doi.org/10.1016/j.rmal.2025.100213

Puntularb, P., Yippikun, C., & Pinchunsri, P. (2021). The Characteristics and Self-Regulation of Undergraduate Students in Online English Learning: A Case Study of A Private University in Thailand. *International Journal of Higher Education*, *10*(7), 34. https://doi.org/10.5430/ijhe.v10n7p34

Rahman, M. A., Faisal, R. R., & Tho, C. (2023). The Effectiveness of Augmented Reality Using Flash Card in Education to Learn Simple English Words as a Secondary Language. *Procedia Computer Science*, *227*, 753–761. https://doi.org/10.1016/j.procs.2023.10.580

Ryan, C., Vanderburg, M., Chugh, R., Johnston, K., Clapperton, R., Bond, K., Flanders, M., & James, C. (2024). Mobile applications in nursing science education: A scoping review with snowballing method. *Nurse Education Today*, *138*, 106215. https://doi.org/10.1016/j.nedt.2024.106215

Sejong Girls' Highschool, Korea, Yang, G., & Bae, J. (2022). The Effect of Mobile Application Types on Learner's Vocabulary Ability and Affective Domain. *The Journal of AsiaTEFL*, *19*(4), 1219–1233. https://doi.org/10.18823/asiatefl.2022.19.4.5.1219

Sulistyani, A. M., Prasetyo, Z. K., Hanum, F., & Prasetyono, R. N. (2022). Development and Validation of e-Books during the Post-Pandemic to Improve Attitude towards Environmental Care in Case of Indonesia. *International Journal of Advanced Computer Science and Applications*, *13*(4). https://doi.org/10.14569/IJACSA.2022.0130479

Sun, T., & Wang, C. (2020). College students' writing self-efficacy and writing self-regulated learning strategies in learning English as a foreign language. *System*, *90*, 102221. https://doi.org/10.1016/j.system.2020.102221

Tai, T.-Y., & Chen, H. H.-J. (2024). Improving elementary EFL speaking skills with generative AI chatbots: Exploring individual and paired interactions. *Computers & Education*, *220*, 105112. https://doi.org/10.1016/j.compedu.2024.105112

Tanimura, C., Okuda, R., Tokushima, Y., Matsumoto, Y., Katou, S., Miyoshi, M., Oshima, A., Yoshimura, J., Fukada, M., Sasaki, K., Matsuura, H., & Ueki, M. (2023). Examining the reliability and validity of a self-regulated learning strategy scale for undergraduate nursing students and effective factors of self-regulated

learning strategies. *Nurse Education Today*, *128*, 105872. https://doi.org/10.1016/j.nedt.2023.105872

Taye, T. (2025). The benefits and challenges of integrating literary texts in English language textbooks in ethiopian grade 12 English language classrooms. *Social Sciences & Humanities Open*, *11*, 101545. https://doi.org/10.1016/j.ssaho.2025.101545

Thiagarajan, S., Semmel, D., & Semmel, M. (1974). *Instructional Development for Training Teachers of Exceptional Children*. ERIC.

Urbina, S., Villatoro, S., & Salinas, J. (2021). Self-Regulated Learning and Technology-Enhanced Learning Environments in Higher Education: A Scoping Review. *Sustainability*, *13*(13), 7281. https://doi.org/10.3390/su13137281

Wang, H., Aziz, A. A., & Kutty, F. M. (2025). Needs Analysis for the Design and Development of an AI-integrated Learning Module in English Speaking Classes: A Study on Chinese University Students. *International Journal of Learning, Teaching and Educational Research*, *24*(9), 545–569.

Xin, X., Tu, Y., Stojanovic, V., Wang, H., Shi, K., He, S., & Pan, T. (2022). Online reinforcement learning multiplayer non-zero sum games of continuous-time Markov jump linear systems. *Applied Mathematics and Computation*, *412*, 126537. https://doi.org/10.1016/j.amc.2021.126537

Xu, X., Coxhead, A., Parkinson, J., & Gu, P. (2025). Investigating the dynamics of English for Medical Purposes (EMP) textbook design and use in China. *System*, *131*, 103688. https://doi.org/10.1016/j.system.2025.103688