

Intelligent Educational Recommendation Platform with AI Chatbots

Thanarat Kingchang¹, Pinanta Chatwattana² & Panita Wannapiroon¹

¹ Information and Communication Technology for Education, Faculty of Technical Education, King Mongkut's University of Technology North Bangkok, Bangkok, Thailand.

² Electronics Engineering Technology, College of Industrial Technology, King Mongkut's University of Technology North Bangkok, Bangkok, Thailand.

Correspondence: Thanarat Kingchang, Information and Communication Technology for Education, Faculty of Technical Education, King Mongkut's University of Technology North Bangkok, Bangkok, Thailand.

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Abstract

The objectives of this research were as follows. 1) Analyze the intelligent educational recommendation platform with AI Chatbots. 2) Design the architecture of the intelligent educational recommendation platform with AI Chatbots. 3) Develop the architecture of the intelligent educational recommendation platform with AI Chatbots. 4) Study the appropriateness of developing the intelligent educational recommendation platform with AI Chatbots. The sample used in the research was seven experts in information system development from various institutions in higher education. The architecture of the intelligent educational recommendation platform with AI Chatbots there is two main components: 1) Stakeholders consisting of system administrators and external users, and 2) The working process of the intelligent educational recommendation platform with AI Chatbots consists of four parts including natural language processing, dialog management, database and application programming interface (API), and response generation. Assessment of the appropriateness of the architecture of the intelligent educational recommendation platform with AI Chatbots found that 1) the architecture of the intelligent educational recommendation platform with AI Chatbots, overall at a high appropriated, 2) the architecture of the intelligent educational recommendation platform with AI Chatbots, an individual element at a high appropriated, and 3) the architecture of the intelligent educational recommendation platform with AI Chatbots, Integrated elements at a high appropriated. As described earlier, the architecture of the intelligent educational recommendation platform with AI Chatbots can be a guideline for developing with AI Chatbots in the future.

Keywords: artificial intelligent, AI Chatbots, mobile application, educational guidance, aptitude

1. Introduction

1.1 Introduce the Problem

Currently, information technology has played an increasingly important role in human life, not only in everyday life but also at work. These need to be informed to plan their lifestyle, such as checking weather and travel information. In the work issue, information technology be used to facilitate as a tool to support decision-making; it should be accurate and rapid. Personnel at various levels should have knowledge, understanding, and skills in using information technology. Modern technology is vital in supporting education management, providing information services for further education, educational guidance, etc.

The rapid growth of technology and the evolution of information presented through the media have resulted in an alternative to applying information technology to educational management. This is due to the convenience and speed that can connect easily. It can also be used through mobile devices that can be accessed anytime and anywhere (Chatwattana, 2020). These advantages can be used in response to the present education policy, which focuses on lifelong learning and can seek self-knowledge from all learning materials by integrating communication technology tools and social media.

Artificial Intelligence (AI) is the technology to create machines with the same characteristics of intelligence and thinking as a human being, like human actions, rational thinking, and rational actions (Kaplan, 2016; Khemani, 2013). The science at the heart of AI technology's ability to achieve intelligence and human-like learning is machine learning (ML). It consists of four parts (Chatwattana, 2020) as follows.

- 1) Robotics or robot arm system is a model of the human body that is controlled by a computer.
- 2) Natural language processing system is the development of computer systems to synthesize sounds that exist in nature to convey meaning to humans.
- 3) Speech recognition system is to develop computer systems to understand human language and recognize human speech continuously.
- 4) Expert system is to develop computer systems to have knowledge and reasoning to analyze problems by using knowledge or experience to solve one problem to solve other problems logically.

Chatbot is software that interacts literally or verbally with users through language, designed to mimic typical human interaction. Software developed to automate and fast respond to text or voice conversations. Besides, it can be used in various applications such as Line, Facebook, and Instagram (Rukhiran & Netinant, 2022; Ferry, 2018).

AI Chatbots are software agents that interact with the user for a conversation using natural language. AI Chatbots will be built using artificial algorithms that will analyze the user's query and understand the user's message to make a robot that will help to guide the automated Q&A service is more convenient, thanks to the use of Chatbot (Gaikwad et al., 2018; Gupta et al., 2020). It has applied several sophisticated artificial intelligence technologies to analyze the questions effectively and find answers that accurately meet the questioner's needs (Phuengrod et al., 2021).

Mobile Application is the development of applications specifically for mobile devices or smartphones to meet the needs of consumers. It also encourages smartphone users to make it easy to use. Therefore, the significant development of smartphone applications, such as online chat programs, and online shopping systems. Besides, online food ordering systems for business use (Yilmaz, 2016; Chatwattana et al., 2023).

Guidance for further education refers to providing students with accurate information about further education at each institution. By choosing the appropriate level of the learner that can study in which institution they can study. How are properties defined? The Course of Study, assessment, Tuition expenses, qualifications upon completion. In addition, future career opportunities to explore one's aptitudes, abilities, and interests. Besides, prepare for the institution to study further.

Aptitude refers to the ability that a person has experienced and accumulated until special skills are demonstrated in one field or another (Luan & Angkhana, 1998). This will affect your ability to learn and succeed in the future. They are usually divided into general aptitude, sometimes called scholastic aptitude, and specific aptitude.

From the above concept, as a result, the researcher had the idea to develop the intelligent educational recommendation platform with AI Chatbots, a type of computer program designed to play a role in automatically replying to text conversations through a platform freely. It was able to communicate with users 24 hours a day. This feature of automated interactions reduces response delays and allows text to be selected in responses. It is used to process to understand human language and sentence form. Besides, the meaning that humans want to convey better reduces the burden on advisers to answer the same questions repeatedly by using applicant profiles, qualifications, and aptitude tests to analyze and recommend admission to match the aptitudes and careers that students want to be in the future.

2. Method

The intelligent educational recommendation platform with AI Chatbots has four research objectives.

- 1) Analyze the elements of the intelligent educational recommendation platform with AI Chatbots.
- 2) Design the architecture of the intelligent educational recommendation platform with AI Chatbots.
- 3) Develop the architecture of the intelligent educational recommendation platform with AI Chatbots.
- 4) Study the appropriateness of developing the architecture of the intelligent educational recommendation platform with AI Chatbots.

The assessment results of the appropriateness of developing the architecture of the intelligent educational recommendation platform with AI Chatbots were highly appropriate.

3. Research Methodology

This research is the design and development of the architecture of the intelligent educational recommendation platform with AI Chatbots. The research methodology is divided into four stages corresponding to the research objectives.

Stage 1: Analyze and synthesize documents and research relevant to the architecture of the intelligent educational

recommendation platform with AI Chatbots. The researcher has analyzed and synthesized documents and research consisted of.

1) Artificial intelligence technology, mobile applications, Chatbot, educational guidance, and aptitudes to use as a guideline for defining a conceptual framework for the developed platform architecture.

2) Factors affecting the choice of subjects of the Railway Technical School, which is the first rail vocational specialty school in Thailand that provides education at the Higher Vocational Certificate (Vocational Diploma) level, some of the school's disciplines accept graduates in the same field of the vocational certificate (Vocational Diploma) in the same field, such as mechanical and electrical, locomotive and wheel technician. Recruit students who finished the Vocational Diploma in the field of the following. 1) Department of Automobile, 2) Department of Mechanic, 3) Department of Power Electricity, 4) Department of Electronics, etc. Therefore, applicants must plan their application for each field. Whereas, upon graduation, both fields will have different career paths. Such mechanical, he could work as an assistant train driver and become a train driver further. In contrast, locomotive and wheel technician, he was able to work as a railway maintenance technician in a factory.

Stage 2: Design the architecture of the intelligent educational recommendation platform with AI Chatbots. The researcher also designed the platform architecture developed by the Use case diagram, context diagram, and swimlane diagram.

Stage 3: Develop the architecture of the intelligent educational recommendation platform with AI Chatbots. In this section, we applied the concept of the System Development Life Cycle (SDLC) (Robert, 2013). In the process of designing and developing the platform architecture. It consists of five procedures as follows: 1) Requirement Analysis, 2) Design, 3) Implementation, 4) Testing, and 5) Evaluation, respectively.

Stage 4: Study the appropriateness of developing the architecture of the intelligent educational recommendation platform with AI Chatbots. Conduct the study of the appropriateness of developing the architecture of the intelligent educational recommendation platform with AI Chatbots, by seven experts in information system development from various institutions in higher education with purposive sampling. The research instruments are as follows:

- 1) The architecture of the intelligent educational recommendation platform with AI Chatbots.
- 2) The assessment form for the appropriateness of developing the architecture of the intelligent educational recommendation platform with AI Chatbots.

The questionnaire is characterized by five levels at which the evaluation and interpretation criteria (Kanasutra, 1995) are performed as follows.

Table 1. Average score range and interpretation meaning.

Score range	Meaning
4.50 – 5.00	Very high satisfaction
3.50 – 4.49	High satisfaction
2.50 – 3.49	Moderate satisfaction
1.50 – 2.49	Low satisfaction
1.00 – 1.49	Very low satisfaction

4. Results

The results of the design and development of the architecture of the intelligent educational recommendation platform with AI Chatbots. Researchers have concluded following the above four objectives, and the results can be summarized as follows.

4.1 Results of the Study of Theoretical, Articles, and Relevant Research.

Conceptual framework of the intelligent educational recommendation platform with AI Chatbots, the results are analyzed and synthesized as shown in Figure 1.

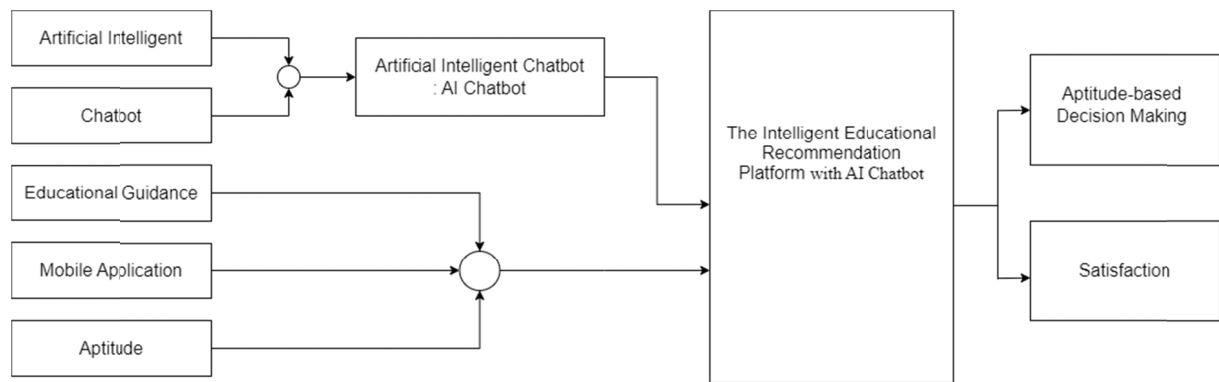


Figure 1. Conceptual framework of the intelligent educational recommendation platform with AI Chatbots

Determination of factors affecting the choice of vocational rail field of Railway Technical School. Based on the survey results from the questionnaire given to students studying rail system at the Vocational Diploma level. The 1st year in Mechanical and Electrical Locomotive and Wheel are preferences, interests, and future careers.

Table 2. Survey results of factors affecting the choice of subject areas of Railway Technical School

Assessment issues	Mean	S.D.	Interpretation
1. Preferences and interests	4.21	0.80	High
2. Future career	4.46	0.78	High
Overall	4.34	0.80	High

Table 2 found that the survey results of factors affecting the decision to study in Railway Technical School overall were at a high level (Mean = 4.34, S.D. = 0.80), which may conclude that such factors can be questioning and answering to the aptitude.

4.2 Results of the Design of the Architecture of the Intelligent Educational Recommendation Platform with AI Chatbots

1) Design of use case diagram of the architecture of the intelligent educational recommendation platform with AI Chatbots as shown in Figure 2.

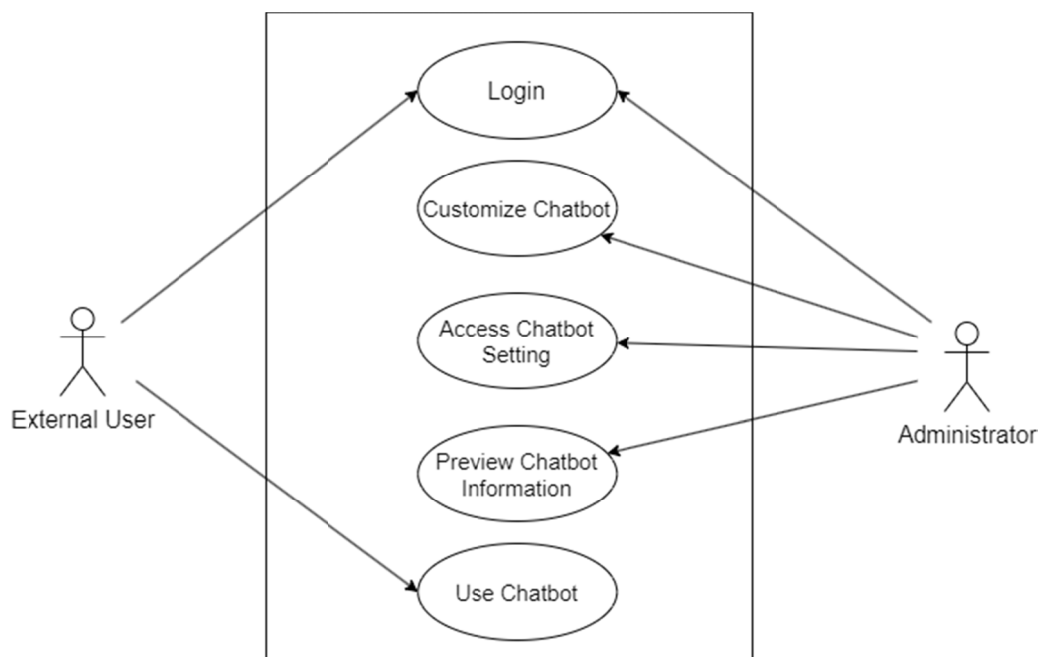


Figure 2. Use case diagram

Figure 2 shows a use case diagram of the architecture of the intelligent educational recommendation platform with AI Chatbots. The researcher analyzed and synthesized the needs of users. It consists of two groups: 1) Administrators can log in, manage data, manage access, manage information for further education, and browse data analysis reports, 2) external users, i.e. students who are interested in further study, can log in and questions and answers information about further education and other related information, etc.

2) Context diagram design of the architecture of the intelligent educational recommendation platform with AI Chatbots as shown in Figure 3.

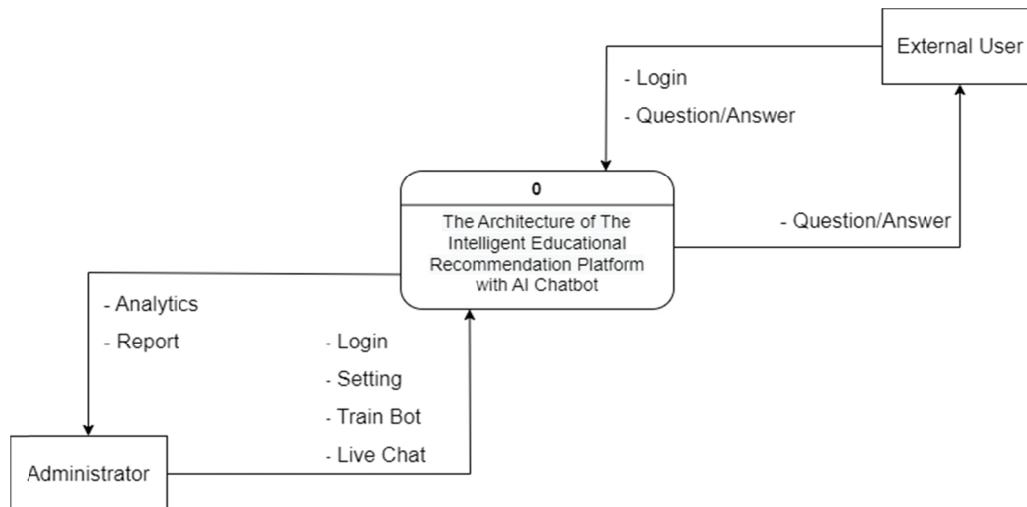


Figure 3. Context diagram

Figure 3 shows the context diagram of the architecture of the intelligent educational recommendation platform with AI Chatbots. It shows the relationship of work within the system, including the people involved. The system design consists of two parts: 1) Administrators can log in to set up the platform, add intelligence to the bot, and view reports on its usage, and 2) External users, where external users can log in and the questions and answers about further study and related information.

3) Design of swimlane diagram of the architecture of the intelligent educational recommendation platform with AI Chatbots as shown in Figure 4.

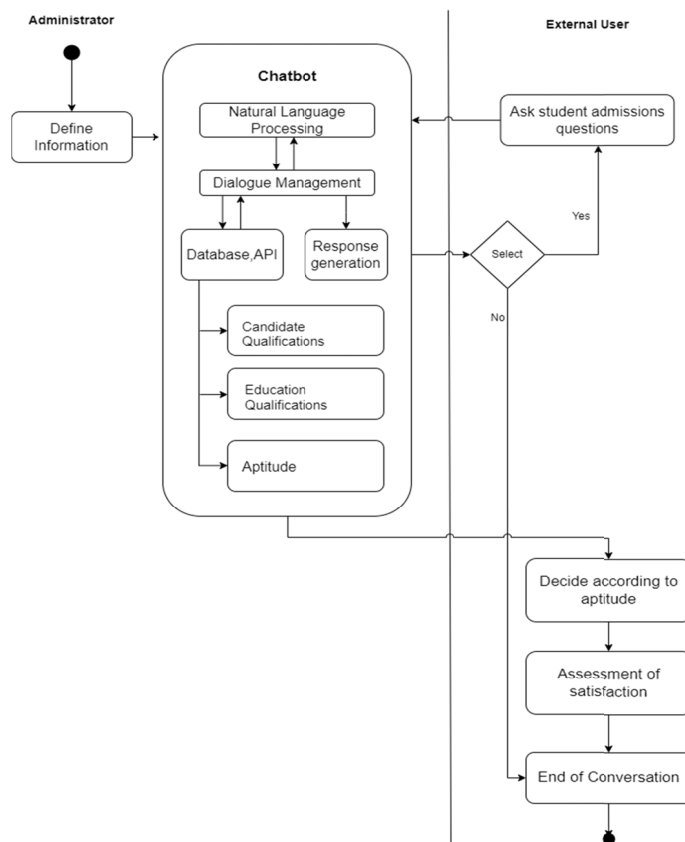


Figure 4. Swimlane diagram

Figure 4 shows a diagram showing the working process within the architecture of the intelligent educational recommendation platform with AI Chatbots. The work is divided into two groups of users: (1) Administrators able to set up Chatbot via Chatbot engine to enable the bot to answer questions and process answers as defined. (2) External users, once the school Line is added, the bot will process the questions and respond continuously until the final answer is obtained. The system will recommend the user apply to the field where they meet the school’s requirements and according to the user’s aptitude.

4.3 Results of the Development of the Architecture of the Intelligent Educational Recommendation Platform with AI Chatbots

The concept of designing and developing the architecture of the intelligent educational recommendation platform with AI Chatbots, an information system that works through a mobile application, allows users to quickly access information for further education guidance through smartphones and tablets, as shown in Figure 5.

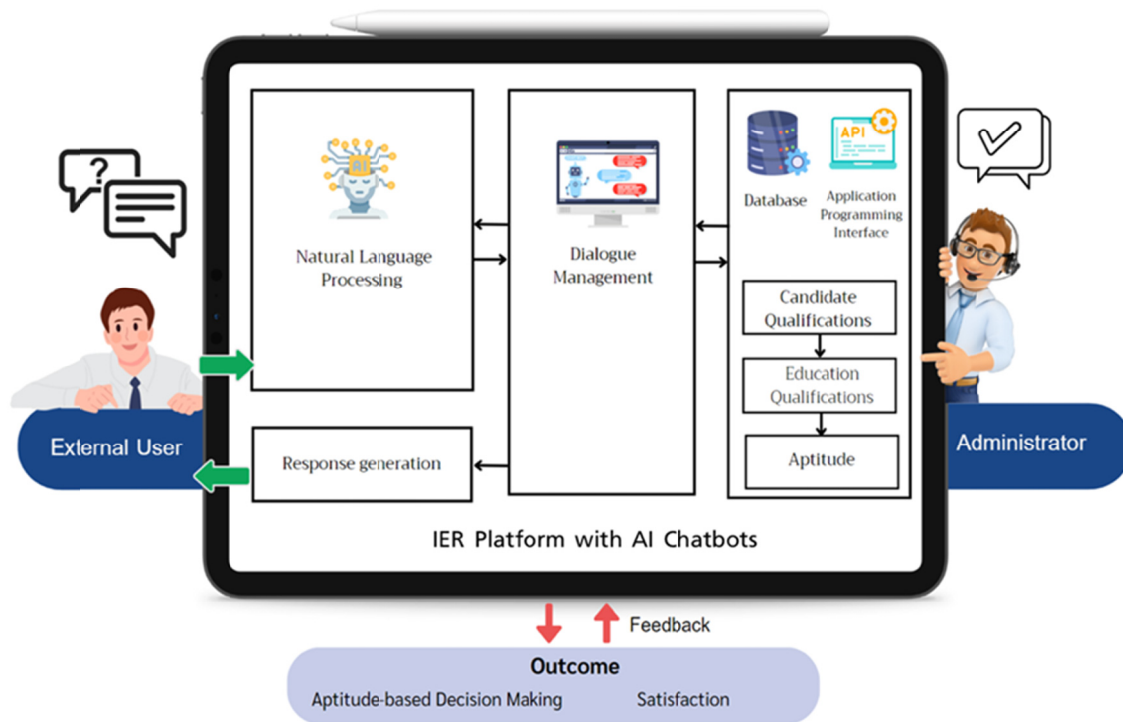


Figure 5. The architecture of the intelligent educational recommendation platform with AI Chatbots

Figure 5 represents the architecture of the intelligent educational recommendation platform with AI Chatbots, which is a platform that works through a mobile application with two main components as follows.

1) Stakeholders are the person related to the intelligent educational recommendation platform which developed. It consists of two groups of system users. (1) Administrator who can view the dashboard, data analysis reports, manage the question and answer information, and manage data within the developed platform, and (2) External users are students interested in studying at the Railway Technical School and need admission information.

2) The working process of the intelligent educational recommendation platform with AI Chatbots consists of four parts.

- Natural language processing is a machine learning technology that enables computers to interpret, manipulate, and understand human language, automatically process information, analyze intent or confidence in messages, and respond to human communication in real time.
- Dialogue management is responsible for contacting other systems, such as retrieving information from our knowledge base or searching for a set of answers prepared according to the user's needs and displaying results. Furthermore, retrieve other information.
- Database and application programming interface (API) is a knowledge base platform. Users can run it by contacting the conversation manager, interacting and asking for additional information in case the information is insufficient, and providing advice and assistance in the decision-making process, as a human-like behavior, as the user could connect with experts in the field. In addition, questions and answers, from one question to another until it found the answer.
- Response generation is the part that synthesizes the answers and responds to users naturally and directly to the point. It also assists with machine learning, allowing Chatbot to retrieve various data from the database accurately.

3) Output is the product of the work process of the intelligent educational recommendation platform with AI Chatbots, namely: Aptitude-based decision-making by requiring users to take an aptitude test; the questions are analyzed based on student's preferences, interests, and future careers.

4) Feedback consists of expert opinions, which will be used to improve/correct the system for better performance.

4.4 Assessment Results of the Appropriateness of the Architecture of the Intelligent Educational Recommendation Platform with AI Chatbots

1) Assessment results of the appropriateness of the architecture of the intelligent educational recommendation platform with AI Chatbots (integrated elements) as shown in Table 3.

Table 3. Assessment results of the appropriateness of the architecture of the intelligent educational recommendation platform with AI Chatbots (integrated elements)

Assessment issues	Mean	S.D.	Interpretation
1. The architecture has complete elements and covers the requirements.	4.50	0.55	Very high
2. The sequencing of architectural elements is precise and successive.	4.67	0.52	Very high
3. The elements in each part are correlated with each other.	4.33	0.82	Very high
4. The architecture has a suitable composition and is apprehensive.	4.50	0.84	Very high
5. The architecture is appropriate for the intelligent educational recommendation platform with AI Chatbots.	4.67	0.52	Very high
Overall	4.53	0.63	Very high

Table 3 shows the architecture of the intelligent educational recommendation platform with AI Chatbots. In terms of the integrated elements which developed, the appropriateness is at a very high level (Mean = 4.53, S.D. = 0.63). The architecture of the intelligent educational recommendation platform with AI Chatbots can be used as a guideline for developing the intelligent educational recommendation platform with AI Chatbots.

2) Assessment of the appropriateness of the architecture of the intelligent educational recommendation platform with AI Chatbots (individual element) as shown in Table 4.

Table 4. Assessment of the appropriateness of the architecture of the intelligent educational recommendation platform with AI Chatbots (individual element)

Assessment issues	Mean	S.D.	Interpretation	
1. Stakeholders	1.1 System administrator	4.50	0.84	Very high
	1.2 External user	4.67	0.54	Very high
Overall		4.58	0.67	Very high
2. The working process of the platform	2.1 Natural language processing	4.67	0.52	Very high
	2.2 Expert system	4.17	0.41	High
	2.3 Database, API	4.33	0.52	High
	2.4 Response generation	4.33	0.52	High
Overall		4.38	0.49	High
3. Output	3.1 Aptitude-based decision-making	4.67	0.52	Very high
Overall		4.67	0.52	Very high
4. Feedback	4.1 Expert opinions	4.67	0.52	Very high
Overall		4.67	0.52	Very high
Overall assessment results (individual element)		4.57	0.55	Very high

Table 4 found that the architecture of the intelligent educational recommendation platform with AI Chatbots (individual element), experts have commented that the developed platform architecture is appropriate at the very high level in all elements, namely: Stakeholders (Mean = 4.58, S.D. = 0.67), working process of the platform (Mean = 4.38, S.D. = 0.49), the output (Mean = 4.67, S.D. = 0.52) and the feedback (Mean = 4.67, S.D. = 0.52). In addition, summarizing the overall assessment of the developed platform architecture (individual element) is appropriate at the very high level (Mean = 4.57, S.D. = 0.55), which can conclude that the architecture of the intelligent educational recommendation platform with AI Chatbots for decision-making according to the aptitude.

3) Assessment of the appropriateness of the architecture of the intelligent educational recommendation platform with AI Chatbots (implementation) as shown in Table 5.

Table 5. Assessment of the appropriateness of the architecture of the intelligent educational recommendation platform with AI Chatbots (implementation)

Assessment issues	Mean	S.D.	Interpretation
1. Use of the developed platform architecture can meet aptitude-based admission decision-making.	4.17	0.75	High
2. The developed platform architecture can be used as a guideline for developing the intelligent educational recommendation platform with AI Chatbots.	4.33	0.52	High
Overall	4.25	0.62	High

Table 5 found the architecture of the intelligent educational recommendation platform with AI Chatbots, is appropriate at the high level (Mean = 4.25, S.D. = 0.62). The experts accepted the idea of developing the architecture of the intelligent educational recommendation platform with AI Chatbots. The idea can be used to further create the intelligent educational recommendation platform with AI Chatbots for practical use.

5. Conclusion and Discussion

The architecture of the intelligent educational recommendation platform with AI Chatbots is a tool to promote information awareness through mobile applications to make aptitude-based decisions for studying in railway engineering schools. There are two main components: 1) Stakeholders: which represent individuals related to the intelligent educational recommendation platform developed, consisting of two groups of system users such as administrator and external users, and 2) The working process of the intelligent educational recommendation platform with AI Chatbots, consisting of four parts including, natural language processing, dialogue management database and application programming interface (API), and response, respectively.

The research results found the following. 1) Overall, the architecture of the intelligent educational recommendation platform with AI Chatbots is highly appropriate. 2) The architecture of the intelligent educational recommendation platform with AI Chatbots, an individual element, is highly appropriate. 3) Implementing the architecture of the intelligent educational recommendation platform with AI Chatbots is highly appropriate. As stated earlier, the architecture of the intelligent educational recommendation platform with AI Chatbots developed can be used as a guideline for developing the intelligent educational recommendation platform with AI Chatbots in the future. This aligns with Karapakdee & Piriyaasurawong (2022) research that says Chatbots are automated chat programs powered by artificial intelligence (AI) that allows users to work with responses in natural language, creating relationships between students and teachers to be able to communicate in the same direction. It is in line with Chatwattana et al. (2023) research that mobile applications are one of the most popular information technology tools to meet users' needs. It also supports learning and uses via mobile devices through applications installed on mobile devices that rely on internet technology to connect data to manage content and exchange information between users. As a result, both public and private organizations are increasingly focusing on providing information through portable communication tools.

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Authors contributions

Mr. Thanarat Kingchang develops the main idea of this research, wrote and compose the manuscript, developing the AI chatbot platform and studied the results. Assoc. Prof. Dr. Pinanta Chatwattana, and Assoc. Prof. Dr. Panita Wannapiroon develops the methodology and review the manuscript. The three authors have approved the final version of this manuscript for publication.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Obtained.

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Data sharing statement

No additional data are available.

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