

Journal of Dinda

Data Science, Information Technology, and Data Analytics

Vol. 5 No. 2 (2025) 197 - 207

E-ISSN: 2809-8064

AI-Based Hotel Front Office Training Application Game Concept for Hospitality Students

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Abstract

The advancement of Artificial Intelligence (AI) technology presents numerous opportunities in vocational education, particularly in the hospitality sector. Front office is a department studied by Hospitality Students, however many educational institutions face challenges in providing authentic front office training, whether due to limited access to actual hotel environments, budget constraints, or a lack of opportunities to interact directly with guests. This study proposes a conceptual design of utilizing AI as an interactive virtual guest in an educational game learning application for front office training. The concept also integrates speech recognition as the form of communication with the AI virtual guest to create a realistic and interactive learning experience. The model is designed to support independent and repetitive practice through various guest scenarios such as reservations, check-in/check-out services, and providing information. A qualitative descriptive method was employed through literature review and needs analysis. The findings recommend the use of AI-based simulation as a complement to live training and as a foundation for future development of hospitality education applications. Preliminary validation using the User Experience Questionnaire (UEQ) indicates that the concept received an "Excellent" score where Attractiveness (2.00), Perspicuity (1.89), Efficiency (1.90), Dependability (1.67), Stimulation (1.95) are above the benchmark, while Novelty scored the lowest with 1.48 in the category of Almost Excellent. These results suggest that the application concept could serve as an alternative solution for vocational learning by offering a simulated experience that closely resembles real-world front office operations.

Keywords: Artificial Intelligence, educational game, front office, simulation, vocational education.

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1. Introduction

The focus of vocational education is on the practical skills necessary to be prepared for the workforce. Technical expertise, leadership, and most importantly, people skills are essential for service engagements in the hospitality industry [1]. Because it interacts directly with guests, the front office division is essential and demands proficiency in reservation systems, SOPs, and communication techniques [2], [3]. However, due to a lack of access to real hotel environments, budgetary limitations, and little exposure to actual visitor interactions, many universities find it difficult to offer authentic front office training [4], [5].

A safe and repeatable way to practice real-life service scenarios without the repercussions of the actual world is through simulations [6]. This is further enhanced by educational games, which offer students who are digital natives today dynamic, multimedia-rich experiences [7],

[8]. These games can provide conversational feedback, mimic responsive virtual guests, and facilitate self-directed learning in authentic settings when paired with artificial intelligence (AI) [9], [10], [11]. Furthermore, real-time voice interaction made possible by AI-powered speech recognition and natural language processing gives pupils the opportunity to practice speaking and get adaptive answers, enhancing the training's realism and immersion [12], [13].

The majority of training simulations currently used in hospitality education, especially for front desk positions, are static and rule-based, which makes them unsuitable for simulating the dynamic and unpredictable nature of client interactions [14]. On the other hand, by utilizing natural language processing and real-time answers, AI-powered game-based simulations provide a more engaging and flexible learning environment [15], [16]. However, there is still a huge study and practice gap, particularly in front office training, as seen by the

Received: 25-06-2025 | Accepted: 04-08-2025 | Published: 13-08-2025

extremely limited use of such AI-driven conversational simulations.

This article introduces a conceptual framework that combines an educational game with Artificial Intelligence (AI) for training in front office operations. Within this concept, AI serves mainly as a conversational agent, functioning as a virtual guest that can mimic various personalities, emotional responses, and service inquiries. Utilizing natural language processing (NLP), speech recognition, and established behavioral protocols, the AI not only comprehends students' inputs but also delivers fitting and adaptable responses instantly. Learners participate in simulation activities, such as check-in procedures, complaint resolution, and guest services, using a game-based interface.

The objective of this model is to improve educational results by offering a practical, engaging, and flexible training environment that connects academic knowledge with real-world hospitality skills. Additionally, since the model encourages students to communicate in English, it also promotes language learning and the enhancement of communication abilities. To explore the feasibility and educational potential of this approach, the study is guided by the following research questions:

1. How is the conceptual design of the AI-based front office training application game developed?
2. How do users perceive the application based on initial feedback using the User Experience Questionnaire (UEQ)?

2. Research Methods

This research uses a descriptive qualitative methodology to create the idea for a training game for hotel front office operations that utilizes artificial intelligence. For the initial validation of this design concept, the researcher utilizes the User Experience Questionnaire (UEQ) and analyzes the results both descriptively and quantitatively to reflect user feedback on the created prototype.

The information sources for this study include both primary and secondary data. Primary data was gathered from hospitality students and lecturers who filled out the UEQ questionnaire, while secondary data was derived from literature concerning front office training, educational technology, and user experience. Data collection methods involved reviewing literature, observing the prototype in a limited manner, and distributing the User Experience Questionnaire as a means to initially validate the proposed application design concept.

2.1 Design Thinking Method

The process of analysis conducted utilizes the Design Thinking Method, a cooperative approach to solving problems that seeks to generate a wide range of ideas as a foundation for creating innovative solutions. This approach goes beyond just visual elements or emotional responses of users and takes into account user experience in its entirety. Illustrated in figure 1, Design Thinking follows a structured and thorough process that consists of five key phases: empathize, define, ideate, prototype, and test. Through these phases, this method can develop solutions that are pertinent and focused on the needs of the user [17].

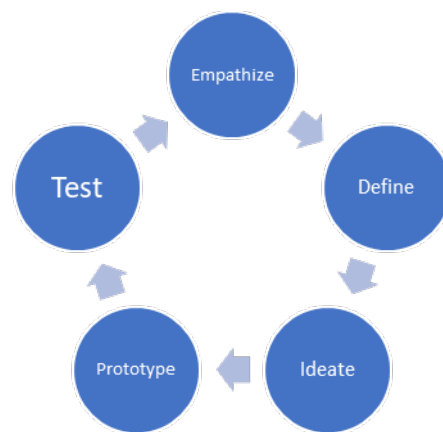


Figure 1. Design Thinking Method

Empathize

At this stage, the researchers aim to grasp the requirements, obstacles, and aspirations of hospitality students as they learn front office skills. They utilize a technique that includes monitoring students' educational activities in both theoretical discussions and hands-on practice. Moreover, they conduct interviews with both students and lecturers involved in the course. The researchers also performed a review of existing literature on typical training approaches for Front Office roles. The findings indicate that students often exhibit rigidity, particularly in practical settings, as they primarily focus on memorizing scripted dialogues from their textbooks. In addition, students struggle to apply their knowledge effectively and receive immediate feedback on their performance since they are all at a similar skill level. Instructors face challenges as well, given the large number of students assigned to each teacher.

Define

At this stage, researchers are able to define the issues recognized in the earlier phase. The conclusion drawn indicates that hospitality students require engaging and

easily reachable training resources for front office operations, enabling repeated practice, since the existing educational approaches are viewed as lacking interactivity.

Ideate

During the ideate phase, researchers start transitioning from defining problems to considering possible solutions. This stage is centered on generating imaginative ideas that will eventually serve as the groundwork for developing a prototype. There is a strong focus on pinpointing the necessary characteristics for creating a website, as well as fostering the development of inventive concepts that will aid in crafting a more specific and tangible design. Proposed solutions resulting from this inquiry include a Front Office simulation app that replicates scenarios where students manage processes like reservations, check-ins, and check-outs, along with delivering information services. Moreover, features providing instant assessments and feedback are also incorporated.

Prototype

A prototype serves as the first version of a product, mainly aimed at catching mistakes early and investigating opportunities for further enhancements. During this stage, the preliminary design will be assessed by potential users to gather helpful feedback and suggestions, enabling ongoing improvements to the design. The application's initial layout will include the Main Page, options in the Exercise Menu options such as reservation, check-in/check-out, and information services, a progress bar and score, as well as an avatar and guest simulation.

Test

Since this application is still a conceptual design, this stage will involve validating the initial concept. To do this, a quantitative method will be applied in the form of a questionnaire distributed using the User Experience Questionnaire to lecturers/practitioners in Front Office and students, by presenting the concept presentation and requesting feedback from these lecturers and students.

Table 1. User Experience Questionnaire

Scale	Explanation
Attractiveness	Overall impression of the product. Do users like or dislike it?
Perspicuity	Is it easy to get familiar with the product and to learn how to use it?
Efficiency	Can users solve their tasks without unnecessary effort? Does it react fast?
Dependability	Does the user feel in control of the interaction? Is it secure and predictable?
Stimulation	Is it exciting and motivating to use the product? Is it fun to use?
Novelty	Is the design of the product creative? Does it catch the interest of users?

The UEQ itself consists of 26 questions, which are presented in table 2, with attributes that represent a gradient between opposing attributes. Each item is a semantic differential (opposite adjectives), answered on a 7-point Likert scale, where: -3 = Completely agree with the left adjective; 0 = Neutral; +3 = Completely agree with the right adjective.

2.2 User Experience Questionnaire

The User Experience Questionnaire, or UEQ, serves as a useful, dependable, and credible tool for assessing user experiences. This tool can be utilized alongside additional evaluation techniques for subjective quality evaluation [18]. As illustrated in table 1, the scales of the questionnaire cover a comprehensive impression of user experience. Both classical usability aspects (efficiency, perspicuity, dependability) and user experience aspects (originality, stimulation) are measured.

Table 2. UEQ Questions

No	Item	Scale (-3 to +3)	UEQ Dimension
1	annoying → enjoyable	-3 to +3	Attractiveness
2	not understandable → understandable	-3 to +3	Perspiciuity
3	creative → dull	-3 to +3	Novelty
4	easy to learn → difficult to learn	-3 to +3	Perspiciuity
5	valuable → inferior	-3 to +3	Attractiveness
6	boring → exciting	-3 to +3	Stimulation
7	not interesting → interesting	-3 to +3	Stimulation
8	unpredictable → predictable	-3 to +3	Dependability
9	fast → slow	-3 to +3	Efficiency
10	inventive → conventional	-3 to +3	Novelty
11	obstructive → supportive	-3 to +3	Dependability
12	good → bad	-3 to +3	Attractiveness
13	complicated → easy	-3 to +3	Perspiciuity
14	unlikable → pleasing	-3 to +3	Attractiveness
15	usual → leading edge	-3 to +3	Novelty
16	unpleasant → pleasant	-3 to +3	Attractiveness
17	secure → not secure	-3 to +3	Dependability
18	motivating → demotivating	-3 to +3	Stimulation
19	meets expectations → does not meet expectations	-3 to +3	Dependability
20	inefficient → efficient	-3 to +3	Efficiency
21	confusing → clear	-3 to +3	Perspiciuity
22	impractical → practical	-3 to +3	Efficiency
23	organized → cluttered	-3 to +3	Efficiency
24	attractive → unattractive	-3 to +3	Attractiveness
25	friendly → unfriendly	-3 to +3	Stimulation
26	conservative → innovative	-3 to +3	Novelty

According to the official documentation from the UEQ site, a sample of 20 people is sufficient to obtain stable and analyzable results. However, for the standard practice of UX evaluation, 30 respondents are established for this research to be adequate for descriptive analysis. This questionnaire is distributed using Google Forms.

2.3 Instructional Media Evaluation

The conceptual framework of the educational game for the front office, which utilizes AI, will undergo assessment by professionals. There will be three validation experts, each specializing in essential areas: one will focus on front office teaching, another will concentrate on instructional design/media, and the third will be a professional from the front office sector. They will assess different aspects and feedback systems through a formal validation tool that uses a Likert scale. The findings will be compiled to evaluate the practicality of the content and media [19]. This approach guarantees that the media is educationally sound, effective in teaching, and relevant to the current practices in the hospitality front office sector.

3. Results and Discussion

3.1 Overview of the Application Model

Based on the results of the literature review and analysis of vocational education needs, an initial design of an AI-based front office training application and educational games has been developed. The purpose of this model is to provide an immersive, interactive learning experience that closely resembles real hotel conditions, without the need to use actual hotel facilities, as seen in figure 2.

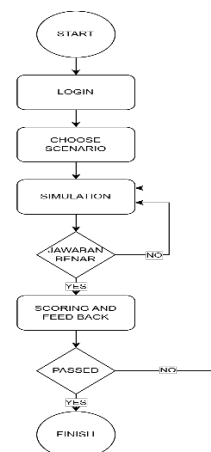


Figure 2. Activity Diagram

This application is designed so that users (students) can practice front office situations such as greeting guests, the check-in process, answering questions, handling complaints, and check-out, with AI-controlled virtual guests.

The storyboard for this simulation concept could be seen in the wireframe represented in figure 3.

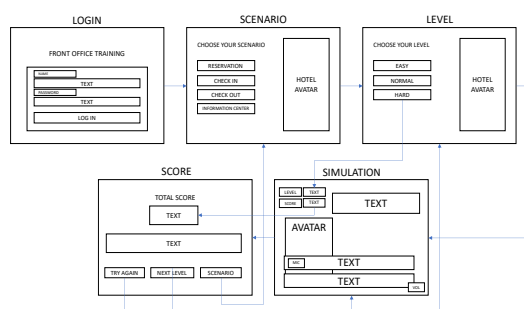


Figure 3. Storyboard

Login

In this menu (figure 4), students will log in using their respective usernames and passwords. The username and password are adjusted according to those registered at their respective schools.

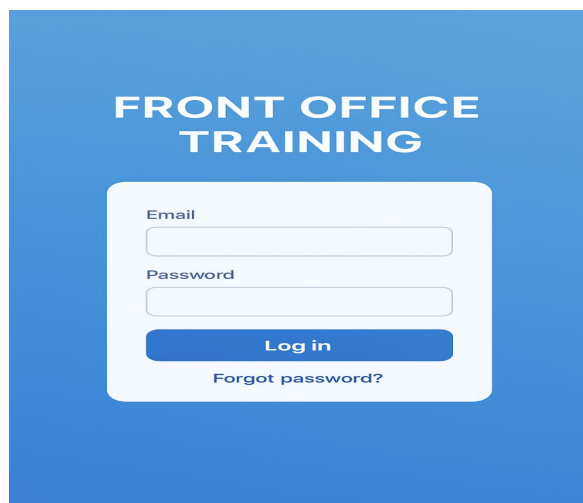


Figure 4. Login Menu

Choose Scenario

Shown in figure 5, students can choose their desired simulation scenario. The options include Reservation, Check-in and Check-out, and Information Center. In addition, there is a selection of difficulty levels where at the first level (easy) there will still be conversation guidance, at the second level (medium) the user will engage in improvised conversation without assistance, and at the third level (hard) where the AI will respond with complaints.

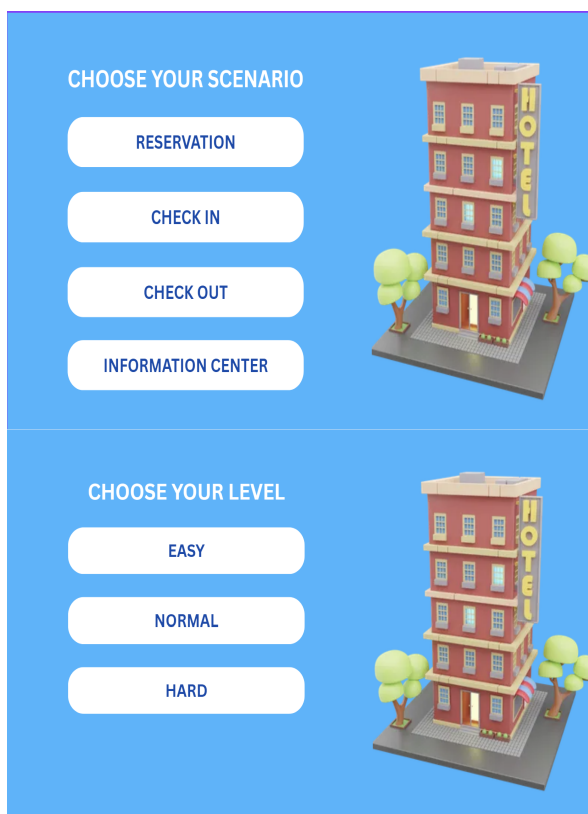


Figure 5. Scenario and Level Select Menu

Simulation

The simulation begins and students interact with an AI avatar that has been tailored to the chosen scenario and level. The AI will respond by providing assessments and suggestions for better answers. Students will interact with speech recognition via mic. This not only provides student to boost their confidence in speaking English, but also as a tool to further enhance their pronunciation and grammar by suggestions given. Examples of the conversation commenced could be seen in figure 6.

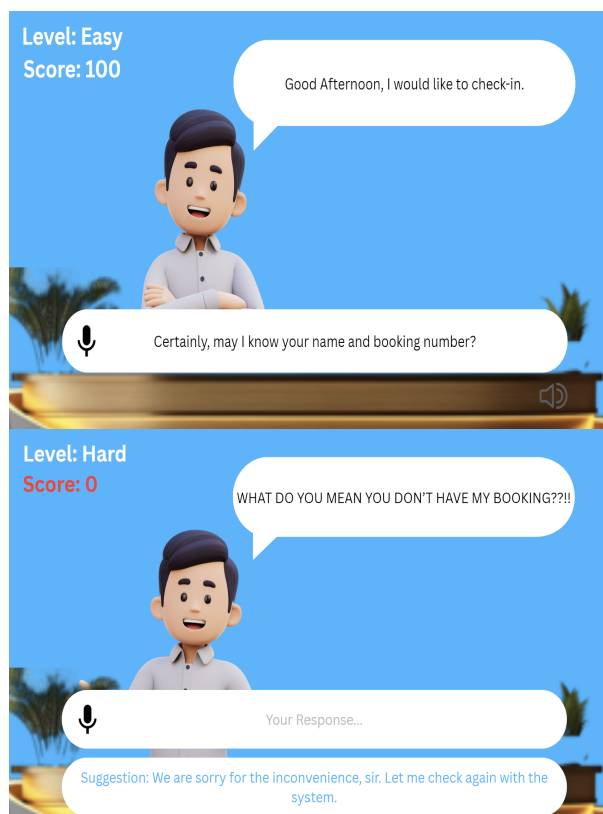


Figure 6. Simulation

Scoring and Feedback

This display will provide the final score and options to repeat, level up, or choose another scenario. The AI will also provide feedback for the simulation commenced. The display could be seen in figure 7.

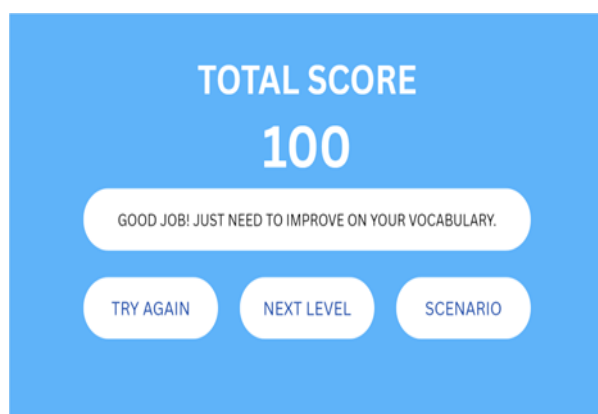


Figure 7. Scoring and Feedback

3.2 Main Components

Simulation Interaction Module

This section serves as the core component of the interface, where learners engage directly with virtual

guest in different situations. Students can interact using their voice through speech recognition technology. Dialogues are developed organically with the help of Natural Language Processing (NLP), enabling the AI to provide relevant responses.

AI-Based Guest Characters

The virtual guest are not typical chatbots; they operate through AI that has been trained to react to various student types and scenarios. The AI can imitate the conduct of actual guests: it may be courteous, upset, displeased, rushed, or even amiable. Each virtual guest possesses a unique background, personality, and specific requests. This setup prompts students to engage in critical thinking, develop empathy, and adapt to authentic service situations. Moreover, this AI-driven virtual guest introduces numerous possible outcomes depending on the discussions that take place.

Situation Scenario

The application presents a range of scenarios, including managing reservations, handling check-in and check-out processes, and delivering information. Each scenario is designed to enhance communication abilities, problem-solving skills, and quality service. Instructors can tailor these scenarios to align with the skill levels of the students.

Assessment System and Feedback

Each student interaction will be assessed by the system, focusing on criteria such as the appropriateness of responses, ethical service practices, the speed and accuracy of solutions, and the capacity for empathy when addressing guest issues. Once the simulation is finished, learners will receive prompt feedback, including scores and personalized suggestions for improvement.

3.3 UEQ Analysis

A total of 30 respondents participated in this study. The gender distribution consists of 20 female and 10 male respondents (figure 8). Participants were chosen through intentional sampling to maintain relevance to the study's context. Every respondent was a final-year student in a hospitality program at Telkom University, possessing previous knowledge of front office principles and basic English skills, as well as lecturers instructing front office from different faculties. To qualify, participants had to have finished at least one hands-on training course connected to front office tasks. This background was considered suitable for assessing the practicality and perceived benefits of the suggested AI-driven game simulation.

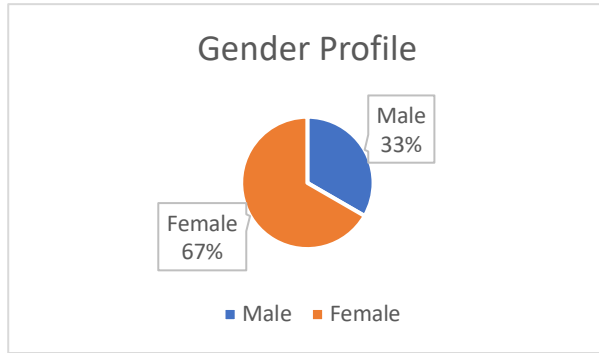


Figure 8. Gender Profile

In terms of age (figure 9), the majority of respondents (50%) were in the 20 - 30 age group, followed by 20% aged under 20, 17% aged 31 - 40 and 13% aged 41 - 50. This demographic information provides useful context in interpreting the user experience feedback collected through the UEQ.

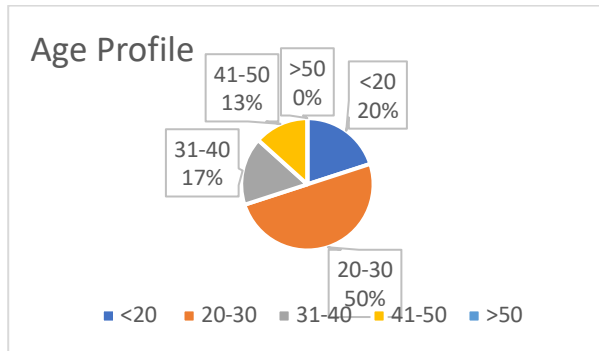


Figure 9. Age Profile

The quantitative data obtained from the questionnaire survey has been input into the UEQ Data Analysis table. The raw data collected can be seen in table 3. The scale facilitates the interpretation process, where positive values represent the level of agreement with the statements, while negative values reflect disagreement.

Table 3. Questionnaire Data

Items										
1	2	3	4	5	6	7	8	...	26	
3	3	0	3	3	0	3	0	...	3	
3	2	2	3	3	2	3	2	...	2	
3	3	3	3	3	3	3	3	...	3	
3	3	3	3	3	3	3	3	...	3	
2	2	3	1	3	1	2	2	...	1	
2	2	2	2	2	2	2	3	...	2	
3	2	2	2	2	2	1	1	...	2	
...	

3	3	3	3	3	1	2	0	...	-3
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The second stage displayed in table 4 includes the calculation of the average (mean) values of six aspects in UEQ, ranging from attractiveness to novelty, based on all respondent data. This step aims to summarize the diverse individual perceptions into an overall picture of user experience regarding the developed application.

Table 4. Second Data Transformation

Scale Means per Person					
Attractiveness	Perspicuity	Efficiency	Dependability	Stimulation	Novelty
2.00	2.25	1.50	0.75	1.50	1.50
2.83	2.50	2.75	2.50	2.75	2.25
3.00	3.00	3.00	3.00	3.00	3.00
3.00	3.00	3.00	3.00	3.00	3.00
1.67	1.50	1.75	2.00	2.00	1.50
1.50	2.25	2.25	2.25	2.00	2.00
2.00	1.75	1.75	1.25	0.75	1.00
...
2.50	2.75	0.50	0.75	2.25	0.00

Then, the items are grouped according to the UEQ dimensions, and the average score for each dimension is calculate, represented in table 5.

Table 5. UEQ Average Value

UX Aspect	UEQ Scale
Attractiveness	2.00
Perspicuity	1.89
Efficiency	1.90
Dependability	1.67
Stimulation	1.95
Novelty	1.48

The average score for each UEQ component is calculated after performing the transformation. An average score between -0.8 and 0.8 indicates that respondents view that aspect neutrally, a score above 0.8 indicates a positive perception, and a score below 0.8 indicates a negative perception. The maximum point for the UEQ is 3 points. From the results of the calculations in table 5, it can be seen that the assessments tend to be positive.

Each scale is then compared against this dataset and categorized into 5 qualitative levels, as seen in table 6:

Table 6. Benchmark Category

UEQ Score Range	Benchmark Category
> 1.5	Excellent (Top 10%)
1.0 – 1.5	Good (Above average)
0.0 – 1.0	Average
-0.5 – 0.0	Below Average
< -0.5	Poor (Bottom 10%)

From the Benchmark given in figure 10 we could also see that overall, the concept is in the excellent category, with only 2 scales that are in the good (above average) category which are dependability and novelty

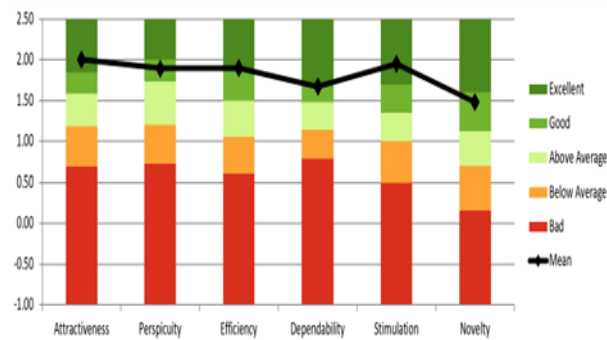


Figure 10. UEQ Benchmark

Attractiveness

Attractiveness received a rating of 2.0 on a scale of 3.0, categorizing it as "Excellent" based on the UEQ standards. This suggests that the participants had a very favorable view of the concept.

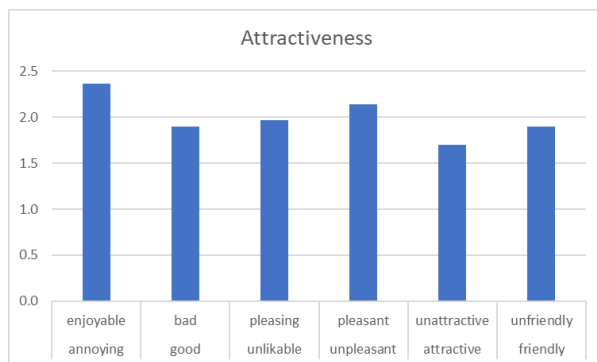


Figure 11. Attractiveness Aspect

The detailed analysis portrayed in figure 11 reveals favorable scores for being enjoyable (2.4), good (1.9), pleasing (2.0), attractive (1.7), and friendly (1.9). These consistently high ratings indicate that users perceive the design as appealing and pleasant, confirming a strong positive reception.

Perspicuity

Perspicuity achieved a score of 1.89, categorizing it within the "Excellent" benchmark group. This indicates that users are expected to find the application concept straightforward and simple to grasp.

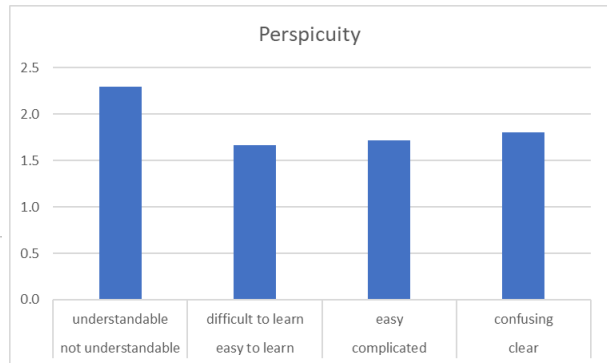


Figure 12. Perspicuity Aspect

The ratings for components shown in figure 12, including easy to learn (1.7), not complicated (1.8), and clear/not confusing (1.8), signify a low cognitive load perceived by users. This illustrates that the application concept offers an intuitive experience for new users, although slight enhancements might enhance clarity even more.

Efficiency

Efficiency received a score of 1.89, which also aligns with the "Excellent" standard category. This rating indicates that participants feel the application would enable them to carry out tasks efficiently and with minimal effort.

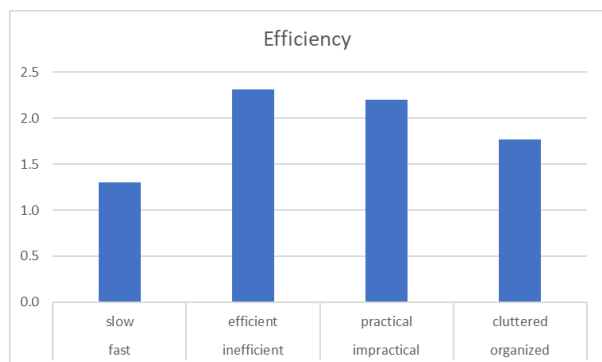


Figure 13. Efficiency Aspect

The sub-scores shown in figure 13 for efficiency (2.3), practicality (2.2), organization (1.8), and speed (1.3) portray an overall favorable view of how the application performs and operates. Nevertheless, the somewhat lower speed rating hints at potential issues regarding

responsiveness or loading times that could be improved in later versions.

Dependability

Dependability received a score of 1.67, categorized as “Excellent” according to UEQ benchmarks, but just a little above “Good”. This dimension assesses whether users feel in control, secure, and able to predict system behavior.

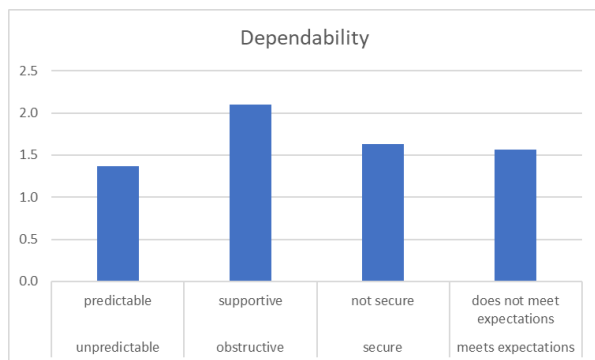


Figure 14. Dependability Aspect

According to figure 14, although the idea is regarded as safe (1.6) and fulfilling expectations (1.6), the predictability rating is lower at 1.4. This might indicate some doubts stemming from the utilization of AI-based interactions. This implies that, even though the system builds a fair amount of confidence, there could still be some concerns regarding its reliability or clarity that need to be addressed through design or communication strategies.

Stimulation

Stimulation scored 1.95, placing it near the threshold of the “Excellent” benchmark category. This indicates that respondents find the concept motivating, engaging, and emotionally rewarding to use.

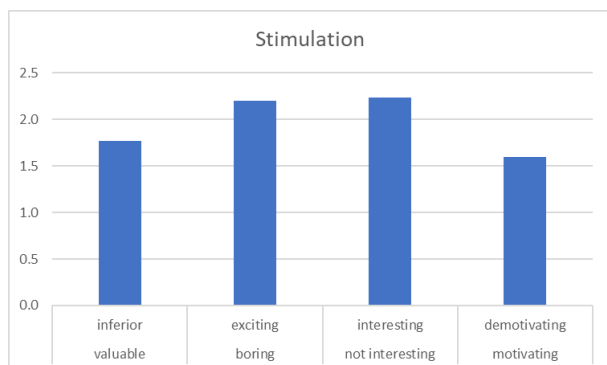


Figure 15. Stimulation Aspect

High scores across stimulation-related items in figure 15 (e.g., exciting, motivating, fun to use indicate that the

design is likely to keep users engaged and entertained for an extended period. Although it falls just short of the 2.0 standard for outstanding quality, the overall findings affirm the app's attractiveness concerning emotional involvement.

Novelty

Novelty scored the lowest among all dimensions, with a mean of 1.48. Although this value remains in the positive range, it falls just below the “Excellent” benchmark threshold (≥ 1.5), suggesting that the idea is seen as somewhat new but does not really stand out as particularly innovative when compared to similar systems assessed with the UEQ.

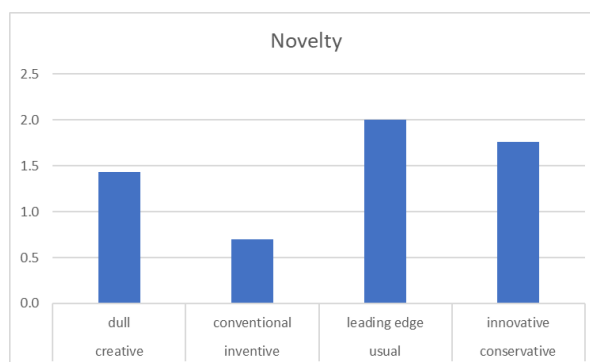


Figure 16. Novelty Aspect

A more detailed analysis in figure 16 reveals that participants regarded the idea as fairly traditional at 1.8, yet still saw it as inventive at 0.7 and creative at 1.4. This indicates a degree of acceptance of novelty; users acknowledge some uniqueness but may view the overall design or execution as based on established norms. Thus, even though the product shows signs of innovation, the existing score may not be high enough to assert strong conceptual novelty without additional design refinements or clearer distinctions.

3.4 Instructional Media Evaluation

The AI-based instructional media developed in this study was validated by three experts from different professional backgrounds: a Front Office Lecturer, an Instructional Design Lecturer, and a Front Office Manager as an industry practitioner. The assessment by the Front Office Lecturer revealed that the content is in line with the essential skills required in hospitality vocational training, achieving an average rating of 3.9. This expert recognized the correctness of service protocols like check-in procedures, managing guest inquiries, and the flow of guest interactions, while also suggesting that including scenarios for handling complaints would add more depth to the material.

The Instructional Design Lecturer gave a higher average score of 4.3, pointing out that the media incorporates effective teaching strategies, such as logical organization of content, interactive elements, and feedback systems. The integration of visuals, text, and audio was deemed beneficial for enhancing the learning experience, although some slight adjustments to improve the contrast between text and background were suggested.

From a professional standpoint, the Front Office Manager provided an average score of 3.6. He found the scenarios and dialogues to be very authentic and compatible with standard practices in hotels. The evaluator mentioned that the interactions between staff and guests were appropriate to the context and conducted in a professional manner. He added, "This media accurately illustrates the actual working conditions at a hotel front desk and can serve as an excellent resource for preparing students for their future careers in the industry."

In summary, all three specialists concurred that this media is very practical as a teaching resource in vocational hospitality training. It effectively addresses educational goals while meeting industry standards, thereby making it an excellent tool for improving students' preparedness for front office positions in real-world environments.

4. Conclusion

The results of this design indicate that combining AI, simulations, and game elements could serve as a practical solution for vocational education institutions with limited access to hands-on facilities. When compared with conventional techniques like peer role-playing or classroom case studies, this model presents a more interactive and adaptable approach that does not rely on the presence of instructors or real-life guests. Simulations powered by AI could improve students' communication abilities and boost their confidence in service-related activities. Nevertheless, as this research is still in the conceptual design phase, it requires additional development.

For future research, since this application model is still in its initial conceptual phase, it is vital for computer science educators, front office experts, and UI/UX designers to collaborate in order to create a workable prototype. It is advisable to begin testing within a vocational campus setting to evaluate effectiveness, collect user feedback, and uncover any practical limitations before wider rollout. This model presents several distinct benefits: it provides students with the chance to participate in flexible, self-directed training outside of regular classroom hours; the AI aspect allows for adjustments to various guest interaction scenarios, including different emotional responses, service

requests, and complaint types; and conducting interactions in English adds significant value to language learning and communication skills. Cooperation among departments focused on hospitality, computer science, and education will ensure that the application is not only technologically sound and visually appealing but also educationally effective. If developed successfully, the application could become a part of the front office curriculum, delivering continuous and immersive training experiences.

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