

The Evaluation of a Persuasive Learning Tool using Think-Aloud Protocol

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Abstract—e-Learning has become a platform for students to gain and expand their knowledge through mobile applications or web-based systems. Even though e-learning systems usually aim to facilitate students' understanding of the subject, some fail to convey the underlying learning outcomes. These circumstances emerge as most e-learning methods or tools fail to attract students to engage in their studies continuously. Therefore, to overcome the problem, the Persuasive Learning Objects and Technologies (PLOT) model comprises persuasive design elements for online learning, is developed. A web-based statistical analysis assistant system called TemanKajianKu (Study Buddy) has been developed based on PLOT elements to assist students in identifying the correct approach to conduct and analyze their experiment. This paper aims to evaluate users' experience and examine the effectiveness of the persuasive design elements of the system. Ten participants were involved in interviews using the Think-Aloud protocol method. The study results showed that most participants conveyed positive opinions by giving good feedback on the system design. Most also stated that the system could help them make decisions by utilizing persuasive elements such as reduction, social signal, tunnelling, tailoring, and self-monitoring. This concludes that the Persuasive Learning Tool is effective in helping develop an e-learning application or web-based system that helps students in decision-making concerning their studies.

Keywords—Learning technology; persuasive technology; persuasive learning; persuasive design

I. INTRODUCTION

Technology can solve many problems by enhancing students' learning capacity using mobile applications and web-based platforms. According to Ahmad [1], computing technologies are intended to assist individuals with daily activities like conducting administrative work or teaching in a classroom and to influence and drive people to change their attitudes or behaviors toward specific issues or things. Numerous applications from various fields must be developed to support students' learning in helping to produce students who are sensitive to using internet platforms as tools to gain knowledge. Problems can arise when students cannot make timely decisions, and their workload grows. With the help of digital learning technology, which can change students' attitudes and improve knowledge content, especially in decision-making aspects like methods, strategies, or selection in research activities, this problem can be resolved. Decision-making and critical thinking are essential in solving a problem, especially in the student's learning process. It has been discovered that technology-assisted learning can influence attitudes, improve research performance, and offer learning experiences for making critical decisions. The need to enhance

the research and student learning level was determined to be met by multimedia components alone, such as audio, video, and interactivity. Student performance must improve to raise learning motivation.

Even though experience is one of the most essential factors in building a technology or application, and if each technology or application is designed to persuade people, the user's decisions are still influenced by experience [2]. Effective persuasive designs are essential when developing an e-learning system [3]. Because e-learning programs are flexible enough to meet needs, this saves students who already understand some concepts in a course from having to review them. On the other side, they might like more complex material, whilst individuals just discovering a field would choose to concentrate on the basics [4]. After that, to better comprehend student decision-making in their study, a system called TemanKajianKu was developed to assist students in understanding statistical analysis. The main aim of this study is to evaluate the persuasive learning tool implemented in the system using a think-aloud protocol for the students. According to studies, failing to think critically might delay or prevent graduate students from finishing their studies and impede the advancement of research [5]. Although universities provide courses designed exclusively for graduate students, including Research Methodology, some students find them too general because each student's studies are unique based on the topic of their studies. Examples of research tasks requiring analytical skills include selecting research methodologies and statistical analysis approaches for user studies and evaluations. Then, the material and methods used in the evaluation study will be further described in the following section of this paper. Next, the result and discussion are presented to explain the evaluation system. The final part of this paper is the conclusion.

II. BACKGROUND WORK

A. Persuasive Technology

Persuasive technology is designed to change user attitudes and behavior without coercion [6]. Persuasive technology can be used and implemented to help students adjust and at the same time be able to accelerate their attitude changes without any coercion [7]. This technology can bring people together through computer interaction [8]. It could trigger positive emotions in users by employing various persuasion principles or methods to gain trust and successfully persuade them to adopt the desired attitude or behavior [9]. Persuasive technology has been used in various fields, such as e-commerce, health, and marketing. Persuasive technology is also applied in education by focusing on changes in learning

behavior towards students on e-learning [10]. According to the table below, Gram-Hansen and Sandra Burri (2012) identified nine persuasive design principles for system development.

Persuasive learning experiences, such as being actively involved in learning, could be established with persuasive design ideas or principles applied in education [11]. A persuasive learning design framework is also explicitly developed to target changes in student attitudes toward learning technology [12]. Table I shows the persuasive elements of system design outlined under the learning design framework [13]. Each of these persuasive elements has its application design function in decision-making to produce a more compelling user experience.

B. Persuasive Technology in Education

As the world strives for new technologies and the IR4.0 era, education must be prepared to provide content through mobile applications. Using persuasive technology in education can significantly benefit students' language learning, stress management, school safety, and other areas. An application called VocabGame was created in Arab nations using persuasive design elements to assist students in understanding word meanings and so expanding their vocabulary. Additionally, it supports educators working to enhance their country's systems for teaching and studying English as a foreign language [14].

Most students in Canada experience stress and anxiety, which is likely related to poor time management. SortOut is an application developed with seven persuasive strategies integrated as six essential elements that assist students in time management and time savings by encouraging organizational behavior [15]. Then, it may be challenging for students and teachers to enhance language learning and raise learners' motivation when English is a second language. From the 17 review frameworks for mobile education applications, the Vocabulary Game EVG prototype has been offered. It uses persuasive design elements to focus on three criteria (mobile, game, and language learning) [16].

1) *Persuasive learning*: According to Gram-Hansen (2015), persuasive learning and design can be related to facilitating the learning process by inspiring learners to engage in the learning experience and encouraging a sustainable behavior change [17]. Furthermore, through learning opportunities provided by online platforms, persuasive learning can develop an emotional bond between users and systems. Using persuasive design features in websites and applications, persuasive learning can also aid in motivating users and students to learn.

2) *Educational technology*: Educational Technology creates a way to broaden the scope of education and learning by disseminating information using online platforms. According to Voronov (2021), educational technology gives advantages to students throughout their studies, such as online learning, and needs to be in a place with a stable network [18]. Pham (2022) stated that technology is a field of study that investigates analyzing, designing, developing, implementing,

and evaluating the instructional environment and learning materials to improve teaching and learning [19].

Although utilizing educational technology can improve student decision-making in learning and teaching skills, this problem can be solved with learning technology that could change students' attitudes and increase their knowledge. Learning technology is a broad category of communication, information, and related technologies used to support the learning process, teaching, and assessment. Tools such as tutorials, simulations, productivity tools, and communication tools such as email were used as materials for students' activities. After that, to ensure that learning technology is widely implemented on websites and applications, persuasive design should be employed to assist higher education and school learner in learning things more quickly and efficiently as well as accurately decision-making in their study.

TABLE I. PERSUASIVE DESIGN PRINCIPLE (GRAM-HANSEN & SANDRA BURRI, 2012)

Principles	Description
Reduction	Reduction is a design method for reducing a process that might otherwise be difficult. For example, Shopee purchase allows users to skip many time-consuming navigations and tiresome form filling to make an immediate purchase.
Tunnelling	Tunneling is a design method in which the user is placed inside a process with a predetermined path. For example, most installation processes necessitate the completion of multiple stages by the user before the installation can be completed.
Tailoring	The degree to which a site or application offers appropriate content to users or user groups is referred to as tailoring. User demographics can be reflected in navigational options, filtering processes, and labeling systems.
Suggestion	Suggestion is a persuasion design method that involves conveying a message at the right time. For example, when Kindle suggests several books that are linked to the one you were going to purchase.
Self-monitoring	Self-monitoring is a design method that enables users to keep track of progress. For example, sites that need a login before allowing the user to track their weight reduction progress.
Surveillance	Surveillance is like self-monitoring, except the monitoring is done by the system or the system's owners, not by the user. Users of a weight-loss website, for example, may be encouraged not just by tracking their success, but also by sharing their experiences and receiving feedback from other users who are dealing with similar problems.
Conditioning	The method of incorporating emotional input into a design is known as conditioning. It is frequently presented in the form of praise and prizes, but more subtly than with Persuasive Social Actors.
Simulation	Simulation is a design method that allows users to experiment and explore in a safe, non-threatening setting. It plainly and immediately demonstrates a link between cause and effect, and it may look like a subtle form of persuasion as the user gains personal experience through the simulation.
Social Signals	Social signals are a form of the design principle that, like conditioning, incorporates emotional feedback into a design but is more direct. For example, delivering positive feedback and social support to users. Chatbots, which can be seen on websites providing advice and comments in a human-like manner, are examples of persuasive social actors.

III. MATERIALS AND METHOD

A semi-structured interview was conducted with participants in a lab, or some were in a room free from distractions. All participants were given information about the objectives of the TemanKajianKu system and instructions to implement the think-aloud protocol throughout the interview session. There are three different tasks, the first one being the scenario task. The scenario task is divided into two different scenarios and participants need to solve all the scenarios given by using functions in the TemanKajianKu system.

There are two objectives throughout this pilot study:

- To evaluate the user experience on persuasive learning object technology (PLOT) in the TemanKajianKu system.
- To evaluate the effectiveness of persuasive design elements in a TemanKajianKu system.

Next, a total of ten questions will be asked on persuasive elements that are applied in the system. Each persuasive element will have two related questions; all participants must answer the questions through conversation. Besides that, three open-ended questions were asked about user experience when using the TemanKajianKu system. All these questions are used to study the effectiveness of persuasive design elements and users' feedback for system improvement.

A think-aloud protocol is a technique that is implemented during the interview session. A think-aloud protocol is a technique that encourages participants to share their opinions with interviewers while engaging with the product [20]. Usually, this technique was applied while doing qualitative empirical data collection. Participants verbally conveyed their opinions about the interaction experience, including their goals, justifications, and impressions of UX difficulties, to identify UX weaknesses [21]. Everything said by the user and the interviewer was documented and audio-recorded during the interview since the aim is to identify the response the user gave precisely.

A. Instructions and Scenarios

The first scenario asks participants to use the system sequentially following the eight steps set. Second, participants are given three types of storylines to solve to get the answers for each situation.

Table II shows all the steps for participants to follow and finish it. These are standard steps for a new user in understanding the functions and use of the system, which is from signing into the system, utilizing it, and logging out from the system. Therefore, Table III below shows three different situations for participants to solve. The situation asks the participants to use chatbots and charts to know the methods used in statistical analysis and sampling analysis.

Scenario one shows Ali, a post-graduate student who wants to use parametric analysis in his studies; participants are asked to help Ali find the appropriate statistical analysis method. Then, scenario two shows Fatimah, an undergraduate student who has just studied the subject of statistics and wants to know

about the quota sample; the participants are asked to help Fatimah find the appropriate method for sampling analysis. The last scene shows that participants are asked to find the most distant statistical analysis techniques in the diagram using chatbot help. All participants can ask questions about the scenarios if they don't understand them well.

TABLE II. LIST OF 8 STEPS FOR USERS TO USE THE SYSTEM

Step 1	Users are asked to register a new account to log into the system.
	↓
Step 2	Users are prompted to create a new project for Sampling Analysis.
	↓
Step 3	Users are asked to use the chatbot on the left side of the screen.
	↓
Step 4	The user is prompted to save the project and return to the home page.
	↓
Step 5	Users are prompted to create a new project for Statistical Analysis.
	↓
Step 6	Users are asked to use the chatbot on the left side of the screen.
	↓
Step 7	The user is prompted to save the project and return to the home page.
	↓
Step 8	Users are asked to test the edit and delete buttons.

TABLE III. LIST OF THREE SCENARIOS USERS NEED TO FINISH

Scenario	Description
Scenario 1	Ali is a postgraduate student who conducts research using analytical statistics. Ali used different 'continuous' data and means methods in his study. The study did not exceed two groups and the parametric analysis technique was the main technique used. <u>Participant Task</u> Users are asked to use the chatbot to guide Ali to get information about parametric analysis.
Scenario 2	Fatimah is an undergraduate student who has just studied statistics. She still does not understand the information about analysis sampling. She wants to know more about the quota sample method. <u>Participant Task</u> Users are asked to use the chatbot to guide Fatimah to get information about quota samples.
Scenario 3	The user is asked to select the most distant statistical analysis technique in the diagram and use the chatbot to get the steps to achieve the selected technique.

B. Questionnaires

This system implements five persuasive elements from the persuasive learning object technology (PLOT): reduction, tunneling, self-monitoring, tailoring, and social signal. Table IV shows that two questions were asked to the participants for each persuasive element used in the system to determine the effectiveness of the elements implemented. Next, three more open-ended questions were asked to get user feedback and experience in upgrading the system more efficiently.

TABLE IV. LIST OF QUESTIONS USED DURING THE INTERVIEW

Scenario	Description
Reduction	Is the TemanKajianKu system easy to use even if it is your first time using it?
	Are there any design elements in the TemanKajianKu system that are not required?
Tunneling	Does the TemanKajianKu system show you the steps to get the statistical method you need?
	Do you think the statistical method search process diagram shows easy-to-understand and accurate steps?
Self-monitoring	Does the TemanKajianKu system indicate your level of progress in obtaining the required statistical methods?
	Do you think statistical method search process diagrams help you figure out where you are right now?
Tailoring	Does the TemanKajianKu system provide the statistical methods you need?
	Do you think the use of chatbots in this system suggests a statistical method that matches your research needs?
Social Signal	Does the TemanKajianKu system use language that is easy to understand and clear?
	Does the chatbot used use positive language, complement, and give you good comments?
Open-ended Question	What do you think of this system?
	Does the system save you time and help you make decisions to find coincidental statistical analysis methods?
	Are there any other feature additions or system problems that can be updated in the system?

C. Thematic Analysis

This section presents the results and findings from the pilot study data analysis. The data collected includes semi-structured interviews and recorded videos of users explaining their experiences with the TemanKajianKu system. We categorized transcriptions and arranged the themes of the findings based on thematic analysis after transcribing the recorded videos and interviews [22].

Clarke & Braun, (2017) defined thematic analysis as a method for analyzing qualitative data that entails searching across a data set to identify, analyze, and report repeated patterns [23]. Data familiarization was first applied by reading and re-reading the selected articles and marking early ideas or perceptions [24]. Then, coding was included in the data collection by using the Nvivo software to identify the themes. The preliminary themes were discussed and improved until the finalized themes were identified.”

D. System Interface Design

The sign-in page for the TemanKajianKu system is seen in Fig. 1. To use the system, a user must first register a new account. Fig. 2 and 3 depict the system's dashboard, which lists two different analysis methods that users may select for their research methods, and a chart page where users can determine the most suitable strategy for the chosen analysis method from the information displayed on the page.

TemanKajianKu system applied a user-friendly design interface by implementing a suitable color theme to ensure users understand each tool or function available.

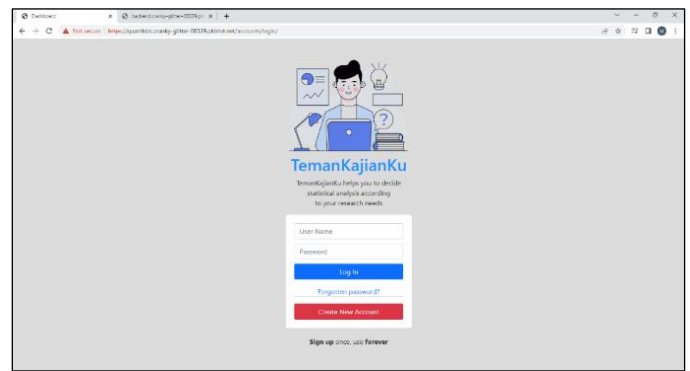


Fig. 1. Sign in page temankajianku system.

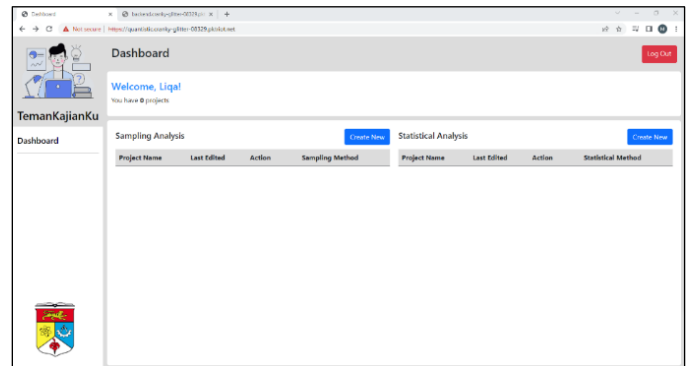


Fig. 2. Dashboard page temankajianku system.

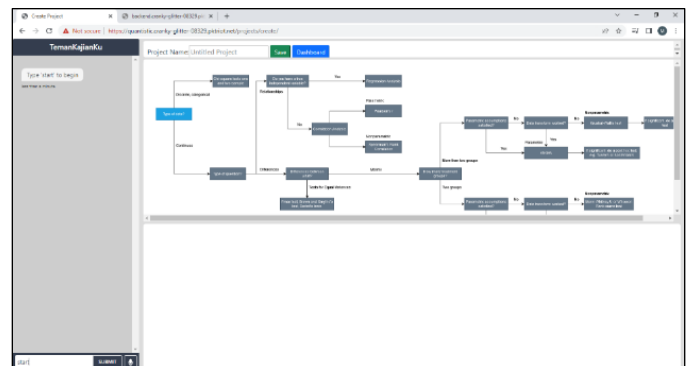


Fig. 3. Flow/chart diagram page temankajianku system.

IV. RESULTS

In this system evaluation, 10 postgraduate students from the National University of Malaysia (UKM) with different backgrounds study were recruited as system users in this research. All system users must follow the system instructions and steps, where three different tasks must be completed by exploring the whole system. They were requested to finish the task within a maximum of 30 min using the laptop given while doing the interview.

Most of the participants were male (60%), postgraduate students (100%), and studied in the engineering field (50%). Most of the participants have learned statistics subjects (90%) and suggested platforms for online learning study. The demographic of users' information is presented in Table V.

TABLE V. DEMOGRAPHIC OF USERS' INFORMATION

Users (n=10)	n (%)
Gender	
Male	6 (60%)
Female	4 (40%)
Age	
18-20	-
20-30	8 (80%)
30-40	2 (20%)
Background study	
Undergraduate	-
Postgraduate	10 (100%)
Course study	
Engineering	5 (50%)
Health Science	1 (10%)
Science and Technology	4 (40%)
Year of Study	
1	3 (30%)
2	3 (30%)
3	1 (10%)
4	3 (30%)
Have you ever learned a statistic	
Yes	9 (90%)
No	1 (10%)
Have you ever used any online learning platform	
Yes	9
Type of platform:	Khan Academy Co space Deep learning My teams Mooc UKM Folio Netacad Coursera Domestika
No	1

A. The Effectiveness of Persuasive Element used, and User Experience based on TemanKajianKu

There are three different results of the persuasive using think-aloud experiment. First, think aloud about the result of the user using the TemanKajianKu system. Second, think-aloud results on persuasive questions that were asked during the pilot study, and third, think-aloud results on persuasive open-ended questions to know users' feedback about the TemanKajianKu system (see Fig. 4).

B. User Experience in Utilizing the TemanKajianKu

Understanding user experience is essential to understand how people think about the system from start to finish. User experience, according to Rex Hartson (2019), is the sum of the effects a user feels before, during, and following engagement with a system or product in ecology [25]. Additionally, user experience influences how interested users are in using the system long- or short-term. Three themes with eight subthemes were identified after data analysis. The themes include user-friendly, improvement of system functions and disadvantages of system tools. Based on the identified themes, the analyzed data is discussed below:

- User-friendly

The majority of users preferred to have complete access when using the system. As a result, users are free to use every

system component without needing permission. Furthermore, the system is simple to use and comprehend, making it simple for users to understand its function, how to utilize it, and obtain the required information. For example, participant 2 said, "Simple, easy to understand, the system has an easy-to-understand flow".

- Improvement of system function

The design of the system interface also contributes to users having a clear view of the system. Due to incorrect color selections, small text fonts, and displayed graph diagrams that need to be enlarged, some system components need to be visible. For example, participant 3 said, "This diagram must be enlarged a little because I cannot even read the one below. This diagram should be larger. Like below, the information cannot come out immediately because it cannot even be read". In addition, users recommend enhancing the system by including a zoom feature and a selection of system color themes.

- Disadvantages of system tools

Every system inevitably has flaws that must be fixed to increase usability. Some users of the system need clarification on the instructions and diagram provided. Based on the statement, the size and tool position of the part in the system is too close to one another and too small. Users said the systems occasionally required system instruction and were challenging to use. "It is difficult to move to the flowchart and drag the slider on the bottom page," says participant 4.

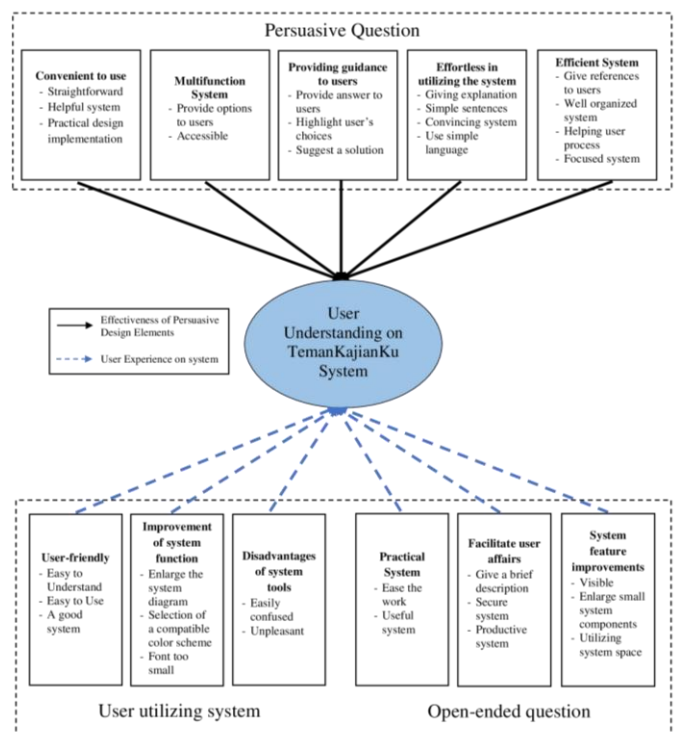


Fig. 4. User experience and the effectiveness of persuasive design implementations.

C. User Experience based on Open-ended Question

After users had completed the persuasive questions, they were invited to answer three open-ended questions to know the user experience when using this system and give their opinions or suggestions about the TemanKajianKu system. As a result, three themes have emerged for each submitted question, which are practical systems, facilitate user affairs, and system feature improvements.

- Practical System

A practical system consists of good functions and features with various exciting elements. Based on user perceptions, this system is beneficial and makes it easier for users to achieve user goals. For example, participant 5 said: *"It is beneficial for statistical methodology, for those involved in this field, beneficial."* Participant 1 and participant 2 made a similar point.

- Facilitate user affairs

A system facilitates user affairs by saving the user time, explaining methods, and assisting the user in making decisions to locate compatible statistical analysis methods. Furthermore, a secure and productive system makes users feel more enthusiastic and safer. For example, participant 4 said, *"Yes. Because there is a definition, and it has an efficient flow chart, so time goes faster."* Other users also agreed that this system could save time and help make decisions about the statistical analysis method for their research.

- System features improvements

System features should be improved to ensure that the system is maintained and managed with better quality. There are several remarks made by users about their interactions with the systems. For instance, it may be necessary to expand small system components to be more visible. Additionally, complex features can be clarified to make them simpler to grasp, and voids in the system can be filled with fresh, more useful features. During the interview session, participant 10, said: *"I think for the flow diagram, it should be bigger than now. As for me, I can't see it clearly. For anyone short-sighted, they need to focus more to see the diagram."* Participant 7, Technology Student, makes similar thoughts.

D. The Effectiveness of Persuasive Design Elements Used

Five persuasive elements from Persuasive Learning Object Technology (PLOT) were implemented in the TemanKajianKu system: reduction, tunneling, self-monitoring, tailoring, and social signal. Each persuasive element has a specific purpose in assisting and simplifying user system utilization. During the pilot study, the user was given a set of ten questionnaires, two of which were related to each persuasive element employed in the system. Users must answer all the questions. The interviews were recorded. 16 subthemes were created, which led to the formation of five themes. Each one of the five themes will represent each persuasive element implemented.

- Convenient to use

The first persuasive design elements approach in the system was a reduction, intending to make it simpler for users to utilize the system in line with their preferences and comfort

levels. The system is beneficial and comprehensive in providing a selection method that makes users feel easier to use and practical with the design found in the system. For example, participant 5 said, *"The system already has guidelines, and the website is also running smoothly. This diagram is also complete, it helps"*.

- Multifunction System

A design method called tunneling means inserting the user inside a process that follows a predetermined path. Users believe the system is straightforward and has an easy-to-follow flow that guides the user by displaying a simple and understandable user interface with instructions, labels, and page titles. Participant 8 gave positive feedback: *"The diagram shows the easy-to-understand steps"*.

- Efficient system

The aim of self-monitoring is a design method that enables users to keep track of progress. According to user comments, the system is simple to understand regarding the features and design that assist users in identifying the system's structure and comprehending the graph display. For example, participant 4 stated, *"Because there is a chatbot, so we don't have to worry about the flow, the flow as a reference."* Participant 2 had the same opinion, which is *"Changing the color helps, the system helps us to focus more on our purpose"*.

- Providing Guidance to Users

A website or application employs tailoring to give users or user groups the information suitable for them. According to the user, the system presents users with a choice between an option and an answer related to or applicable to their research, which can assist users in making more precise and effective decisions faster. *"The system gives suggestions. Because the system gives us a choice."* said participant 6.

- Effortless in Utilizing the System

Social signal is a design principle that combines emotional feedback into a design more directly than conditioning. This system was implemented by using clear and good language, large text, simple sentences, and color picks that correspond to the user's view. This system also helps users feel more secure in their answer options or methods through clear and comprehensive explanations. For example, participant 1 said, *"Okay, the chatbot language is very clear because it's just a short sentence"*, and participant 9 agreed, *"The chatbot boosts my confidence in making decisions. The explanation provided is simple and understandable"*.

V. DISCUSSIONS

Generally, educational technology is a scientific and ethical practice of boosting learning and improving performance by creating, using, and managing appropriate technological processes and resources [26]. This study has developed a system based on persuasive design elements that assist students in research decision-making. The study continued by asking ten users to participate in semi-structured interviews to determine their thoughts on the system. Think-aloud protocol interviews were conducted to understand more about users' viewpoints and their benefits from using the system. This in

continuously helps to attain the study's research objectives which consist of; the effectiveness of implementing persuasive elements and user experience while using the system. This was done by utilizing thematic analysis to examine the data that had been gathered.

In this section, we will discuss two components of the findings from the conducted interviews. First, how effectively the system's persuasive design aspects work, followed by how well users experience utilizing the system. According to the first theme created by the persuasive elements' effectiveness, most users offer the system positive feedback and believe that the system's persuasive design elements can aid them in making research decisions. Because the human brain is not a rational information processor or decision-maker, persuasive information design helps influence user decision-making [27], and reduction aids in developing a more positive attitude about the behavior, [6] which persuades people to choose the best action. Next, the user identified that the system provides simple guidelines for understanding the appropriate statistical methods for research through graphs, explanations, and focusing on the objectives of the user's study. The persuasiveness of information offered by computing technology will increase if it is catered to the requirements, interests, personality, usage context, or other characteristics relevant to the individual [28]. In the process of tailoring, the relevant information is provided to the individual to meet their needs in a context unique to that instant in time [29]. After that, some users stated that the system did a great job motivating them to grasp statistical analysis using straightforward language and short, basic sentences. According to Oinas (2008), a system should use compliments expressed through words, visuals, symbols, or sounds to provide positive feedback to a user [30]. Because positive feedback might affect users' perceptions of social support [31], and by utilizing social influence, social support aims to inspire people [32], where it is employed in persuasive design elements of social signal.

Furthermore, some users have expressed dissatisfaction with the system's usability due to its functional limitations. They thought using system tools like graphs and chatbots was occasionally challenging because the system is often too confusing. Even if Lukas (2022) asserts that a user-friendly design solely focuses on making a task as simple as possible for the user to complete and does not try to change the action the user wants to accomplish, a persuasive design must be kept apart from a user-friendly design [33]. Nevertheless, persuasive design can enhance the user experience by making a website simple and engaging user by understanding psychological triggers and their behavior. Most users then claim the system's functionality and toolkit can be enhanced further. For instance, the text and graph are too small, the theme color choice is inappropriate, and more features are added to the available area. Users' feedback on system upgrades makes us more sensitive to ensuring the system is more functional and user-friendly. As a tool, the system should identify user preferences and offer solutions to problems while guiding the user through a step-by-step procedure (Fogg, 2002) because the user experience is crucial to an information system's success (Li & Samir, 2010). In addition, users described each statistical or sampling analysis result briefly, demonstrating the system's

stability in managing users' information. Fogg (2002) claimed that persuasive software could understand humans because it is more persistent than humans and employs various influencing modalities [6]. Oinas (2009) asserts that a system should appeal to its users and offer information that is accurate, impartial, and fair [28].

To the best of our knowledge, Malaysia universities should also provide additional training to improve academics' online teaching skills to ensure more successful lesson performance [34]. Concerning that, using systematic platforms or applications, such as TemanKajianku, would be a plus point in enhancing online learning. Based on the study, it can be concluded that TemanKajianKu is a system objectively developed as an online learning platform to assist students in selecting the most effective research methods. E-learning enables people to meet their educational needs through various digitally enabled services [35] and a web-based system that makes information or knowledge available to users or learners without regard to time constraints or geographic proximity [36]. In meeting this objective, this system implemented a chatbot as a user and system communication platform. One of the key tools in this system is the chatbot, which helps users find recommended methods that are appropriate for their research. Another key tool in the system is the graphs for statistical analysis or sampling analysis methods, highlighting the steps to be performed in user research. In general, it was discovered that persuasiveness has a significant role in facilitating users and is beneficial in helping users reach their desired goals in this system based on the discussion. The findings were gained through the study of system usage.

VI. CONCLUSION

The results of this study conclude that our participants liked the TemanKajianKu system because it helped them in decision-making for statistical analysis for their research study. This system provides two different analyses, sampling, and statistical analysis, for users to choose the corresponding and appropriate method. As predicted, PLOT helps motivate, increase confidence, and engage users to achieve users' goal. Therefore, some participants said the system could be improved with more effective functions or features. Future developments of the TemanKajianKu system will emphasise the efficiency of user-system communication through the current chatbots. The present chatbot will be upgraded further to identify the objective and goals of the user research in greater depth, hoping that the system's proposed analysis approach is more suitable to the user. Additionally, it is feasible to enhance the persuasive design elements to make the system more organized, productive, inventive, and efficient. All the recommendations will be considered for the improvement of the TemanKajianKu system.

ACKNOWLEDGMENT

We would like to thank all participants involved in this study. The work was supported by a university research grant GGPM-2022-065.

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