Education on Utilization of Online Queuing Application Based on Khanza Health Information System for Patients and Families

Siti Masdah[*], **Nita Putriasti Mayarestya, Nuruniyah, Ayu Diana Meilantika, Ayu Rizky**

Administration Study Program, Institute Technology and Health Muhammadiyah West Kalimantan, Kubu Raya, Indonesia

*Corresponding Author: sitimasdah@itekesmukalbar.ac.id

ARTICLE INFO	ABSTRACT
	Background: RS Bhayangkara Pontianak faces challenges in managing patient queues due to the high volume of visits and low utilization of online queue applications based on the Khanza Health Management Information System (SIMKES). **Contribution:** This community service activity aims to improve patients' and families' understanding and ability to use online queue applications independently. **Method:** Through a participatory educational approach, the educational intervention lasted one day and involved 45 participants who had never used the application. Education was provided through short counselling sessions, leaflet distribution, video tutorial screening, and direct simulation of application use. **Results:** 51.1% of participants were delighted with the educational material, 48.9% with the delivery method, and 60% felt helped by the simulation. Confidence in using the application increased significantly, especially among younger participants. However, older users showed limited progress due to low digital literacy. These results indicate that a participatory educational approach effectively encourages the adoption of digital health tools. **Conclusion:** The need for ongoing training for patients and staff, the provision of easily accessible self-study materials, and the integration of digital literacy education into routine hospital operations.

1. Introduction

The rapid development of digital health services has transformed how hospitals manage patient flows and service delivery. One of the key innovations is the implementation of Hospital Information Systems (HIS) that include online queuing features. These systems are designed to reduce patient waiting times, improve service efficiency, and optimize the allocation of hospital resources. According to a 2023 report by WHO, more than 60% of hospitals in Southeast Asia are moving toward digital integration, including queue management systems. However, adoption among patients particularly in lower digital literacy communities remains limited.

Queue management has evolved significantly with the advent of technology, particularly in sectors such as healthcare, banking, and retail. Traditional methods of managing queues, such as issuing paper tickets, have been replaced by more sophisticated, technology-driven solutions that enhance efficiency and customer satisfaction. Systems that use a Systems Management System (SMS) to manage queues allow customers to receive their queue numbers and updates on their mobile phones. This reduces the need for physical tickets and helps manage queues more efficiently [1], [2].

The use of an online queuing system in healthcare provides significant benefits. First, it can effectively reduce patient waiting time, thereby increasing satisfaction with the service received [3]–[5]. Secondly, patients can remotely monitor their queue status in real-time, which allows them to better manage their arrival time and reduce the inconvenience of physical queuing [6], [7]. Thirdly, the system also improves operational efficiency as it reduces the administrative burden on staff, allowing them to focus more on medical services [8]. Lastly, the online queuing system expands service accessibility, especially for patients who live in remote areas or have limited mobility, making healthcare more inclusive and accessible [9]–[12].

Bhayangkara Pontianak Hospital is one of the important health facilities in Pontianak city that serves various health needs of the community. With the increasing number of patients, especially in outpatient clinics, the hospital is facing challenges in patient queue management. Long queues and long waiting times are often the main complaints of patients, which can affect satisfaction and quality of health services.

Bhayangkara Pontianak Hospital has implemented the Khanza Health Information System (HIS Khanza) as part of the hospital's service digitization efforts [13]. Despite this, many patients continue to use manual registration methods. Preliminary data from hospital administration indicates that less than 30% of outpatient visits in 2024 utilized the online queuing system, with common reasons being unfamiliarity with the app, lack of smartphone access, and low confidence in using digital tools. These challenges are exacerbated among elderly patients and those from rural areas. Without targeted educational efforts, the full potential of the system remains untapped, resulting in continued inefficiencies, overcrowding, and patient dissatisfaction.

Therefore, addressing this gap requires a structured and inclusive educational approach to empower patients and families with the skills and confidence to use the system independently. Educational interventions have proven effective in increasing digital health literacy and improving technology adoption, especially when designed with participatory and practical elements.

One of the prominent features of this system is the online queuing application that allows patients and their families to register and monitor the queue digitally, without having to come directly to the hospital. However, the utilization of this application is still not optimal, especially among patients and families who do not fully understand how to use this technology

Outpatient services are one of the main services that often face challenges in managing patient queues. The implementation of an online queuing system can help improve service efficiency by reducing patient waiting time and minimizing crowds in hospital areas [14]. Queuing problems in outpatient clinics occur due to long waiting times, visitor density, and data irregularities. Patients often experience long waiting times to get services at the outpatient clinic. This is caused by an unoptimized registration and queuing system. Crowded queues cause inconvenience for patients, especially in terms of waiting time and comfort. Manual registration processes often lead to poorly organized data, increasing the risk of errors and inaccuracies in patient information.

Many patients and families are not familiar with digital technology, including online queuing systems. This causes most patients to continue using the more time-consuming manual queuing method. The lack of education campaigns and education regarding the use of online queues has led to a low level of adoption of the technology. Policymakers need to understand the barriers so that problems can be overcome [15]. The targets of this activity are patients and or families who regularly visit the Outpatient Clinic at Bhayangkara Pontianak Hospital as well as administrative staff and health workers who play a role in managing patient queues. Some of the obstacles and challenges in implementation are technological barriers and digital literacy among patients, especially for those who are elderly or not familiar with digital devices as well as patient response and adaptation to changes in the queuing system from manual to digital.

Bhayangkara Hospital has started to implement a technology-based queuing system in all clinics, but its use is still limited and uneven in all outpatient clinics. Limited training for staff on the use of the online queuing system has been conducted, but there are still shortcomings in the understanding and application of the system. The need for development with education for medical and administrative staff requires additional training on how to operate and utilize the online queuing system effectively. Education campaign for patients needs to be provided with clear information on how to use the online queue system to improve compliance and minimize confusion [16].

The implementation strategy is carried out by conducting an education campaign and training to patients and families can operate the online queuing system. Developing educational materials in the form of system usage guides, video tutorials, and informative posters that are easy to understand and finally involving health workers and administrative staff in promoting the use of online queues to patients.

The urgency of this study lies in the striking disparity between the potential of online queue technology based on SIMKES Khanza that has been implemented at RS Bhayangkara Pontianak and the low level of patient adoption. Although this system is designed to reduce waiting times, prevent congestion, and increase service efficiency, only 30% of outpatients actively use it. This condition reflects that implementing digital technology cannot immediately overcome health service problems if a practical educational approach does not accompany it.

One of the fundamental problems is the high dependence of patients on manual registration methods, which causes long queues and piles in the waiting room, potentially reducing comfort and quality of service. In addition, there is a digital literacy gap between young and elderly age groups and between patients from urban and rural areas. This gap increases the risk of unequal access to digital-based services and can hinder the goal of inclusive health service transformation.

On the other hand, the lack of systematic and sustainable strategic education, both for patients and health workers, is also an inhibiting factor in optimizing the use of the online queue system. Lack of technical understanding, minimal socialization, and low user confidence in digital technology must be addressed immediately. If not, this problem will continue and directly impact low hospital operational efficiency, high administrative workload, and decreased patient satisfaction.

Therefore, structured, participatory, and easily accessible educational interventions are needed to bridge this gap. This research is very urgent as a form of contribution to strengthening the transformation of digital health services, with the importance of empowering patients and families to utilize the digital queuing system independently and confidently. This increase in understanding and skills impacts the technical aspects of using the application and encourages the realization of more efficient, comfortable, and equitable health services.

The purpose of community service is an education campaign to patients by educating patients on how to use the online queue system to improve service experience and efficiency. Another objective is evaluation and monitoring by monitoring and evaluating the implementation of the online queuing system to ensure success and identify areas that require improvement. Improve the understanding and skills of patients and families in using the online queuing system at the Outpatient Clinic of Bhayangkara Pontianak Hospital. Finally, the reduction in patient waiting time can be reduced by using online queues, to increase patient satisfaction with hospital services.

With this background, this service activity aims to provide education on the utilization of the HIS Khanza-based online queuing application to patients and families, as a form of contribution to strengthening the digital transformation of inclusive and patient-oriented health services. This community service project was designed to educate patients and their families on how to use the SIMKES Khanza online queuing application, to improve service efficiency, reduce wait times, and support inclusive digital transformation in healthcare.

2. Method

This community service activity employed a participatory educational intervention aimed at increasing patients' and families' capacity to use the online queuing system integrated within the SIMKES Khanza platform at Bhayangkara Pontianak Hospital. The design emphasized direct engagement and hands-on learning through structured education and simulation. The intervention targeted individuals unfamiliar with the digital registration process, especially those who typically used the manual queuing method.

The activity was conducted at the Outpatient Clinic of Bhayangkara Pontianak Hospital on a full day in February 2025, starting from 06.30 a.m. until 05.00 p.m. The location was selected to ensure accessibility for patients and families who were already present for outpatient visits. Timing was chosen during peak registration hours to reach as many new patients as possible. Coordination was established beforehand with the hospital's Information Technology Department and Research & Development Unit to facilitate smooth implementation and technical support.

A total of 45 participants were involved in this activity. The inclusion criteria were patients or accompanying family members who had never previously used the online queuing application and agreed to participate voluntarily. Most participants were first-time or irregular visitors who required digital guidance. Participants varied in age and digital literacy level, which provided useful insights for designing inclusive education strategies. The one-on-one format also ensured that each participant received sufficient attention during the learning process.

The educational procedure consisted of four main stages: (1) initial counseling and explanation, (2) visual media distribution, (3) video tutorial screening, and (4) direct simulation. Counseling was delivered briefly at the outpatient clinic registration area, using simple language tailored to participants' backgrounds. Leaflets and X-banners were placed and distributed to provide visual reinforcement. Participants then watched a video tutorial that explained how to download, register, and use the online queuing system via smartphone. Finally, each participant practiced the process using their own devices or those provided by the team, accompanied by a facilitator to guide and correct each step.

Evaluation of the program was conducted using a structured post-activity questionnaire. The questionnaire contained Likert-scale items assessing satisfaction with the educational material, facilitator's clarity, effectiveness of simulation, perceived benefits, and level of

confidence in using the system. The instrument was distributed immediately after the simulation, ensuring high response rates and fresh impressions from the participants. While no pre-test was implemented due to practical constraints, participant familiarity was assessed informally before education, and the majority had no prior experience with the app.

For documentation purposes, the activity included visual evidence in the form of photographs and educational media displays. To enhance readability and impact in future reporting, As seen in Figure 1 it is recommended that visual materials such as X-Banner designs, leaflet excerpts, and participant activity snapshots be presented as separate, clearly labeled images. Any embedded text within visuals should be enlarged or supplemented with captions to ensure accessibility and clarity for readers and reviewers.

Figure 1. Activity Education Media

3. Results and Discussion

Based on the Table 1, of the total participants, there were 22 men (48.89%) and 23 women (51.11%). The almost equal percentage of male and female participants indicates that this activity had a fairly even involvement of both gender groups. This also indicates that education about online queuing systems in health facilities is relevant to all groups without significant differences based on gender. The age distribution of respondents in this activity came from various age groups from <20 years to >50 years. From the data above, the majority of participants came from the <20 years age group (42.22%), and 21-35 years age group (33.33%). Meanwhile, the 36-50 years age group (20.00%) and >51 years (4.44%) had fewer participants. This may indicate that the interest or need for online queue education is higher among younger age groups compared to older age groups for the current activity.

Table 1. Participants

Category	n	%
Gender		
Male	22	48,89
Female	23	51,11
Age		
<20 Years	19	42,22
21-35 Years	15	33,33
36-50 Years	9	20,00
>51 Years	2	4,44
Total	45	1,00

Based on Table 1, the gender distribution of participants is relatively balanced, with 48.89% male and 51.11% female respondents. This nearly equal proportion suggests that the topic of education on online queuing systems in health facilities is considered relevant across both gender groups. The minimal difference in participation reflects a shared interest and perceived importance of understanding digital queuing systems, regardless of gender.

In terms of age distribution, participants came from various age groups, ranging from <20 years to >50 years. The majority of participants came from the age group of <20 years (42.22%) and 21-35 years (33.33%). This shows that younger age groups have a higher interest or need for understanding online queuing systems. Most likely, this is influenced by the higher level of digital literacy among young people, as well as their tendency to adapt more quickly to technology-based services. Meanwhile, the 36-50 years (20.00%) and >51 years (4.44%) age groups recorded lower participation. The low engagement of older age groups may reflect challenges in accessing technology or a lack of confidence in using digital systems, necessitating a more personalized, patient, and repetitive educational approach for these groups.

Overall, these results suggest that online queue education is most effective for younger age groups, but it is still important to design an inclusive education strategy so that all age groups can adapt and feel comfortable using a digital healthcare system. Adjusting education delivery methods based on the demographic characteristics of participants is key to the success of future programs.

Figure 1. The appearance of Bhayangkara Hospital: (a) Handover of X Banner to Bhangkara; (b) Hospital online queue education to patients and families in outpatient clinics.

This community service activity aims to provide education and simulation of using the online queuing system for participants, to increase their understanding and confidence in using it. The evaluation was carried out based on several main aspects, including material understanding, delivery effectiveness, and the benefits of the simulation provided. The following question items were conducted after the education:

3.1. Understanding of the Educational Materials

Most participants felt that the educational materials were easy to understand, with 51.1% of participants stating "Very Satisfied" and 40% stating "Satisfied". Only a small number of participants were dissatisfied (4.4%), while no one was dissatisfied at all. This indicates that the educational materials were well organized and could be easily received by participants.

This indicates that the educational materials were well organized and could be easily received by participants. The importance of designing community empowerment activities that are simple and directly address the needs of the community. For example, the use of easily accessible visualization media in public workshops allows citizens to generate information and express their ideas, despite not fully integrating them into the design process. The importance of designing community empowerment activities that are simple and directly address the needs of the community. For example, the use of easily accessible visualization media in public workshops allows citizens to generate information and express their ideas, despite not fully integrating them into the design process.

In the implementation of this activity, we considered a pedagogical approach, given that the main target audience is adults. Some of the steps taken include the application of didactic functions, where educational materials are structured to optimize clarity of delivery

(explicitness), rationalize the learning process, and encourage active participation from respondents. The development of effective materials also requires attention to the characteristics of the media used as well as relevant pedagogical principles. In addition, adjusting materials based on respondents' feedback is an important step to improve the overall quality and effectiveness of learning [17].
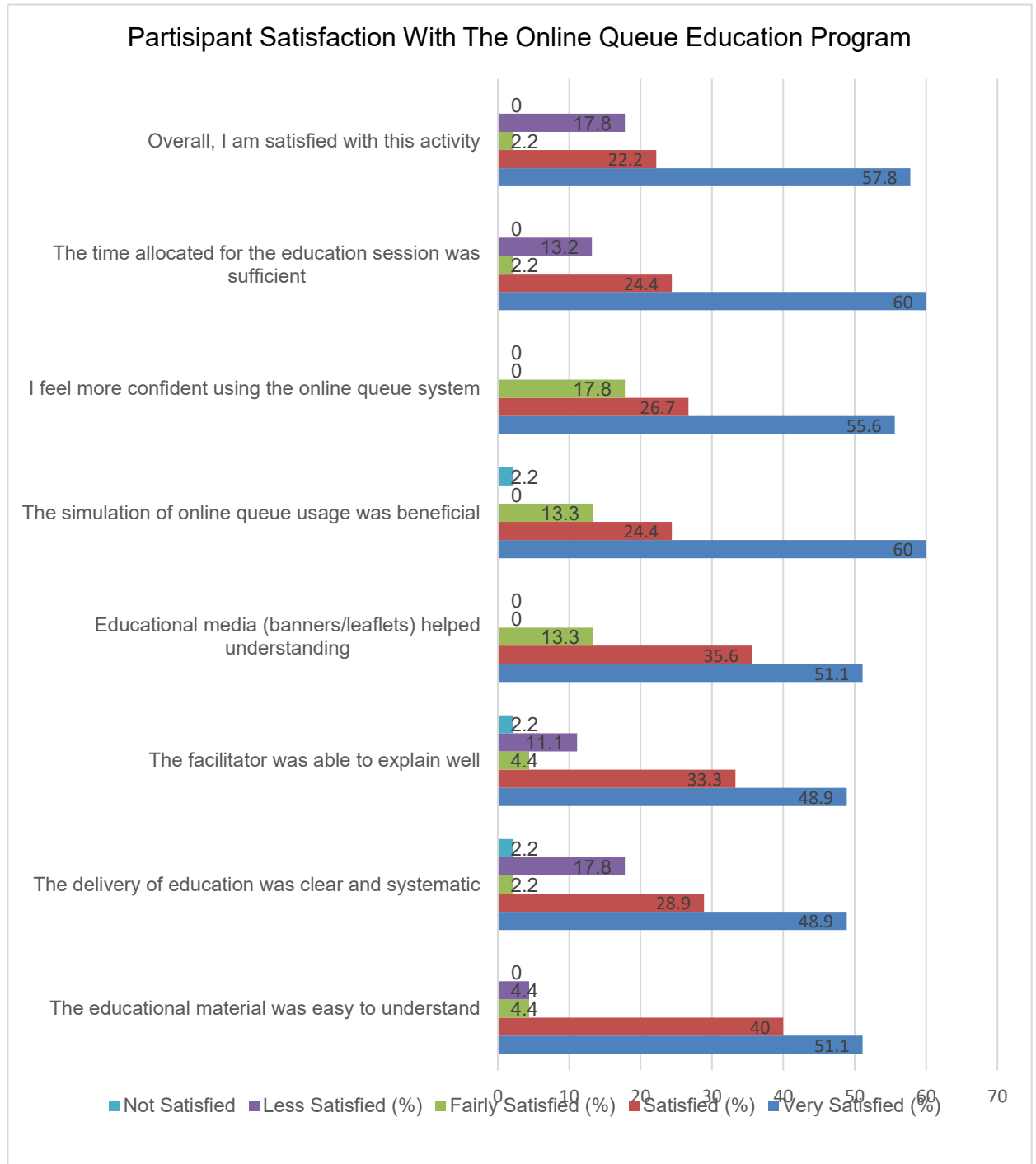

Figure 2. Participant Satisfaction with The Online Queueu Education Program

From a theoretical standpoint, this study supports the Technology Acceptance Model (TAM), which suggests that perceived ease of use and perceived usefulness are critical factors influencing technology adoption. The simulation and personalized guidance provided during the education session enhanced both these factors, leading to higher confidence and willingness to use the system. Moreover, the educational media used (leaflets, banners, and video tutorials) aligned with adult learning principles by combining visual, auditory, and kinesthetic learning methods, as also proposed in the work of [17] regarding material adaptation for different learning styles.

In the process of understanding educational material, five main stages are interrelated and form the foundation of effective learning. The first stage is personal experience and motivation, where respondents are invited to activate their prior knowledge and build interest and motivation as an initial driver in receiving new material. Next, the recognition and reproduction stage focus on the respondent's ability to recognize, recall, and reproduce new information as the initial basis for understanding. The third stage, genetic understanding, emphasizes the importance of understanding the origins, historical context, and development of a concept or material so that respondents can see the logical connection and process of knowledge formation. The next stage is structural understanding, where learners are required to understand how the information in the material is organized, including the relationship between the concepts in it. Finally, the systemic understanding stage emphasizes the integration of new knowledge into a broader framework and its application in various contexts or real-life situations. To achieve a thorough understanding, characteristics such as depth, completeness, clarity, and validity is very important to note because these four aspects become indicators in assessing the extent to which learners have understood the material as a whole and meaningfully [18].

Understanding the educational process involves recognizing the stages of learning, the importance of continuous assessment and feedback, and the integration of various educational theories and methodologies. By focusing on these aspects, educators can enhance the effectiveness of teaching and learning, ultimately leading to better educational outcomes.

3.2. Regularity and Clarity of Material Delivery

A total of 48.9% of participants were "Very Satisfied", and 28.9% were "Satisfied" with the way the education was delivered. However, there were 17.8% of participants felt "Less Satisfied", indicating the potential for improvement in the delivery method to make it more systematic and interesting. Clarity in teaching is a crucial element that directly contributes to the success of the learning process. Delivered instruction has been shown to significantly improve learning outcomes. Students who receive instructions from teachers that are communicative and easy to understand tend to demonstrate higher learning effectiveness, experience lower levels of anxiety, and have more positive attitudes towards both the teacher

and the subject matter. Clarity in delivering current educational materials has an impact on activity outcomes [19].

In addition, clarity in delivery also plays an important role in reducing unnecessary cognitive load. When information is presented in a structured, concise, and easy-to-understand manner, respondents can more easily process and absorb the material in depth. As such, their mental energy can be focused on understanding the concepts, rather than on trying to interpret unclear messages. This ultimately contributes to an increase in respondents' learning motivation and self-efficacy [19], [20]

Furthermore, the impact of clarity in learning is often indirect. Its positive effects are mediated by various factors, such as decreased cognitive load and increased internal motivation of respondents. Clear instructions help respondents manage their cognitive resources more efficiently, which in turn supports the achievement of more optimal academic outcomes. Thus, clarity in teaching is not just a matter of communication techniques, but an integral part of effective pedagogical strategies [19], [20].

3.3. Competence of the Facilitator in Explaining the Material

From the evaluation results, 48.9% of participants felt "Very Satisfied", and 33.3% felt "Satisfied" with the facilitator's ability to explain the material. Although most participants were satisfied, there were still 11.1% who felt "Less Satisfied" and 2.2% who were "Dissatisfied", indicating the need for improvement in delivery techniques or facilitator interaction with participants. The competence of facilitators in explaining material is multifaceted, involving guiding learning, continuous adaptation, domain-specific expertise, and effective assessment and feedback mechanisms. Continuous professional development and tailored training programs are essential to enhance facilitators' skills and ultimately improve educational outcomes.

Facilitators have an important role in guiding learners to achieve concrete learning outcomes through various strategies and the application of best practices [21]. To this end, they must develop deep expertise in learning content, and be able to combine cognitive and situational approaches for effective management of professional development content. Facilitators are required to demonstrate readiness and high competence in integrating technical skills and soft skills relevant to the world of work [22].

Effective facilitators also make strategic use of formative assessment to help respondents understand how far they have come while identifying and closing knowledge gaps [23]. This becomes an important foundation for improving the overall quality of learning outcomes. In addition, the ability to provide constructive evaluation and feedback is key, both in the classroom and in more practical learning environments [24].

3.4. Effectiveness of Educational Media (Banners/Leaflets)

The use of educational media such as banners and leaflets as considered effective, with 51.1% of participants stating "Very Satisfied" and 35.6% stating "Satisfied". There were no participants who were dissatisfied, indicating that this educational media was successful in helping participants' understanding of the material provided. Effective banners and flyers should be able to capture immediate attention through appealing visual design and short but impactful messages. To increase interactivity, these traditional media can be enriched with digital elements such as QR codes that direct respondents to additional resources online, creating a more dynamic patient experience. For the message to be truly memorable, the content must be tailored to the needs of the user, so that the material displayed feels relevant and can encourage their active participation in its utilization.

The integration of digital media and technology in education has been shown to have a positive impact on various aspects of learning, including improved literacy, critical thinking skills, and social-emotional skills [25]. In the context of online queuing education at Bhayangkara Hospital, the utilization of similar technologies can be an effective means to increase public understanding of the hospital's digital service system. For example, the use of social media platforms and interactive visual materials such as short videos, infographics, or digital education modules can help explain how to use the online queuing system more easily and interestingly [26]. Just as the Newspapers in Education program encourages active engagement of teachers and students, online queue education also entails a participatory approach where hospital staff actively guide and inform patients. In this way, technology not only accelerates services but also shapes a society that is more digitally literate and ready to make optimal use of healthcare innovations [27].

The effectiveness of educational media, including banners and leaflets, depends on their ability to engage and motivate students, convey relevant information, and complement other teaching methods. While digital media and interactive technologies are increasingly favored, traditional media can still play a valuable role when used thoughtfully and creatively.

3.5. Benefits of Simulating the Use of the Online Queuing System

A total of 60% of participants felt "Very Satisfied", and 24.4% felt "Satisfied" with the benefits of the online queue simulation. However, there were 13.3% of participants felt "Quite Satisfied" and 2.2% felt "Less Satisfied". This shows that the simulation had a positive impact on most participants, although there is still room for improvement in its implementation. Simulating the use of online queuing systems offers several significant benefits across various sectors. Simulating online queuing systems provides a multitude of benefits, including improved efficiency, enhanced customer satisfaction, better resource management, economic advantages, optimized decision-making, and technological advancements. These benefits are evident across various sectors such as healthcare, banking, theme parks, smart cities, and manufacturing, making the adoption of such systems highly advantageous.

The integration of technologies such as the Internet of Things (IoT) and context-aware systems in queue management has opened up great opportunities to create a more proactive and user-friendly service environment, including in the healthcare sector [28], [29] At RS Bhayangkara Pontianak, education about the online queue system is a strategic step to maximize the benefits of this innovation. By educating patients on how to use the virtual queuing system through simulations-whether directly in the waiting room or through social media and other digital platforms-patients can understand the service flow more clearly and feel more confident in accessing hospital services. The main benefits of this education are a reduction in uncertain waiting times, increased space efficiency as no physical queue is required, and a much more comfortable patient experience [30]. Through simulation, patients can try out the steps of registering, monitoring the queue, and receiving service turn notifications, so that they are better prepared to use the system in real situations. This simulation-based education not only supports the hospital's digital transformation, but also builds a more modern, efficient, and patient-focused healthcare culture.

3.6. Confidence in Using the Online Queuing System

A total of 55.6% of participants felt "Very Satisfied", and 26.7% felt "Satisfied" about the increase in confidence in using the online queuing system after participating in this activity. However, 17.8% still felt "Somewhat Satisfied", indicating that additional approaches are needed, such as more intensive hands-on practice or individual mentoring for participants who still feel hesitant. The relationship between self-confidence and education is multi-faceted, impacting different aspects of experience and outcomes. Confidence in education is influenced by a variety of factors including educator development, target engagement, feedback mechanisms, and the learning environment. Understanding and improving these elements can lead to improved educational outcomes and greater confidence among educators and respondents.

In the context of online queuing education at Bhayangkara Pontianak Hospital, people's confidence in using digital systems is strongly influenced by several key factors that also apply to education. First, a good relationship between hospital staff and patients creates an essential sense of trust, similar to the relationship between teachers and students. When staff provide patient and communicative guidance, patients will feel more comfortable to try the online queue system [31], [32].

Secondly, providing positive feedback and space for reflection also plays an important role. For example, if patients have a positive experience after using the system by information that they have done it right their confidence will increase for the next use. Education can be reinforced through simple training, simulations, or interactive video tutorials [33], [34]. Third, the learning environment, in this case, the hospital's digital environment such as the queuing app or website, can be designed to be user-friendly and intuitive. This experience is similar to online learning environments that often encourage greater confidence as users feel they can

learn at their own pace [35]. Finally, implementing innovative educational methods such as video-based queuing simulations, interactive games, or short workshops in the waiting room, will increase patient engagement and help them become more confident in using the technology. All these approaches form a service ecosystem that supports digital transformation in an inclusively and sustainably manner [36].

3.7. Time Allocation for Education

An evaluation of the time allocated for education showed that 60% of participants were "Very Satisfied", and 24.4% were "Satisfied". However, 13.2% of participants were "Not Satisfied", which may indicate that the time allocated still needs to be adjusted according to participants' needs. The time allocated for online queuing education at Bhayangkara Pontianak Hospital plays an important role in the effectiveness of community learning of the digital service system. Based on the principles of time allocation in education, the success of education is highly dependent on the balance between duration, method, and participant engagement. Evaluation of the education time showed that 60% of participants were "Very Satisfied" and 24.4% were "Satisfied", indicating that the majority felt the time provided was effective. However, 13.2% of participants were "Dissatisfied", indicating that the duration or methods used did not fully address the needs of all participants.

Referring to the results of educational research, too short an educational time may not be enough to form a strong understanding and confidence, while too long a time can lead to boredom [37]. Therefore, the optimal time allocation approach is important - that is, determining the ideal education time according to the complexity of the material and the characteristics of the participants. In practice, education sessions can be tailored to the digital literacy level of participants, and reinforced with strategies such as assignment logs (e.g., queue simulation cards) and guided reflection (e.g., short post-education debriefs) to help participants better understand the online queue flow and feel actively involved. Hospitals can also consider providing education in various formats (live, short video, QR code to guide) to be flexible with different times and learning styles. With proper time management in this education, RS Bhayangkara will not only increase public understanding of the online queuing system but also strengthen its image as an institution that is adaptive to digital transformation and patient needs.

3.8. Overall Satisfaction with the Activity

In general, the activity received a positive response, with 57.8% of participants feeling "Very Satisfied", and 22.2% feeling "Satisfied". However, there were 17.8% of participants felt "Less Satisfied", so further evaluation needs to be done regarding which aspects still need improvement so that similar activities can be optimized in the future. The satisfaction with online education queues, such as those used for managing student interactions during office hours or advising sessions, can be influenced by several factors. Overall, satisfaction with

online education queues is influenced by multiple factors, including instructor responsiveness, course design, interaction levels, technology, and self-motivation. Online queues specifically help in managing equitable attention and improving student-instructor interactions, which are crucial for maintaining high satisfaction levels in online education settings.

In the context of online queue education at Bhayangkara Pontianak Hospital, several key factors influencing participant satisfaction are relevant when compared to the findings in online education. First, the knowledge and responsiveness of the staff (who in this case act as instructors) is very important. When hospital staff have a good understanding of the online queuing system and can respond quickly and communicatively to patients' questions or confusion, the satisfaction of education participants increases significantly [38]–[40]. Second, education design and content are also key determinants. Education that is designed in a structured way with clear explanations of the queue flow, accompanied by visual media or interactive simulations, will be much more interesting and easy to understand. This increases learning effectiveness and participant comfort [38]–[40]. Third, interaction and engagement play a big role. Education that allows patients to actively ask questions, try out online queue simulations, or participate in Q&A sessions tends to increase understanding and satisfaction. This participatory approach makes education feel more personalized and meaningful [41], [42]. Fourth, the quality of the digital platform and online queuing system used is crucial. A stable, accessible, and user-friendly system will increase patient trust and comfort. Conversely, a platform that is confusing or has frequent glitches may decrease satisfaction despite education [43]. Fifth, online queue systems also create equity in attention and service. Patients no longer have to worry about being ignored as digital queues guarantee a fair and transparent turnover. This provides a sense of fairness and certainty, two things that greatly affect patient satisfaction in public service systems [40], [44].

These findings are consistent with prior studies on digital health education. For example, [3] and [4] also reported that digital queue systems improve operational efficiency but require focused user training to be effective. Our study reaffirms this, showing that short, focused educational interventions especially when delivered one-on-one can quickly boost user readiness, even among first-time users. However, consistent with [2], our findings highlight that digital transformation in public hospitals must be inclusive, considering variations in digital access and literacy.

By considering all these factors in the implementation of online queue education at RS Bhayangkara Pontianak, the hospital has not only improved patients' understanding of the digital system, but also strengthened the overall quality of service in terms of efficiency, engagement, and patient satisfaction. When compared to similar programs, such as the online queue education at Universitas Muhammadiyah Yogyakarta's Dental Hospital [14], this activity had a more hands-on, simulation-based approach, which likely contributed to a higher satisfaction rate and greater immediate confidence. While the UMY study relied heavily on

posters and passive media, our activity emphasized live practice, which appeared to be more effective, particularly for first-time users.

In conclusion, the results demonstrate that structured, personalized digital health education particularly when focused on usability and supported by visual and interactive media can lead to significant improvement in patient comprehension and confidence. Nonetheless, to ensure broader and more equitable adoption, future programs should include additional support strategies, such as scheduled follow-ups, peer mentoring, and collaboration with primary care centers like Puskesmas to reach vulnerable populations.

4. Conclusion

The educational intervention on the SIMKES Khanza-based online queuing system at Bhayangkara Pontianak Hospital significantly enhanced participants' understanding and confidence in accessing digital health services. High levels of satisfaction and improved user confidence, particularly among younger participants, highlight the relevance of simulation-based and participatory learning models. The involvement of patients, hospital staff, and community input in designing educational materials proved effective in increasing both adoption and satisfaction with the system.

To ensure sustainable implementation, hospitals should integrate digital queue system education into routine services and invest in continuous capacity building for healthcare staff. Developing inclusive, multilingual instructional media and strengthening collaboration with primary health centers are also crucial for reaching digitally underserved populations. Monitoring digital usage patterns and conducting future research, particularly among elderly users or low digital literacy groups, will be essential to evaluate long-term effectiveness and refine digital health literacy strategies across diverse healthcare settings.

Acknowledgment

References

[1]   S. Soman, S. Rai, P. Ranjan, A. S. Cheema, and P. K. Srivastava, "Mobile-Augmented

Smart Queue Management System for Hospitals," in *2020 IEEE 33rd International Symposium on Computer-Based Medical Systems (CBMS)*, 2020, pp. 421–426, doi: 10.1109/CBMS49503.2020.00086.

[2] N. R. Ting, S. F. bin Sufahani, M. H. A. Wahab, and S. Z. S. Idrus, "Improvement of queuing management system for public hospital in Johor, Malaysia," 2023, p. 020058, doi: 10.1063/5.0128488.

[3] A. N. Pramudhita, "Queue model in health facilities information system," in *2017 5th International Conference on Electrical, Electronics and Information Engineering (ICEEIE)*, Oct. 2017, pp. 152–157, doi: 10.1109/ICEEIE.2017.8328780.

[4] H. Kim, "A study on the effects of online appointment systems on patients and hospitals," *Int. J. Appl. Eng. Res.*, vol. 11, no. 14, pp. 8213–8216, 2016, [Online]. Available: https://www.scopus.com/inward/record.uri?eid=2-s2.0-84982949095&partnerID=40&md5=e47840bb62c8eee1532f0c31b4d771cd.

[5] J. J. M. Mayor, "EC Health Medical Clinic and Diagnostic Center Appointment System," in *2021 IEEE 13th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)*, Nov. 2021, pp. 1–4, doi: 10.1109/HNICEM54116.2021.9731815.

[6] O. Moussa, S. Alshakhsi, D. Al-Thani, and R. Ali, "Can Operational Transparency Enhance the Perception of Waiting Time? A Case Study from the Healthcare Sector," in *2022 9th International Conference on Behavioural and Social Computing (BESC)*, Oct. 2022, pp. 1–7, doi: 10.1109/BESC57393.2022.9995186.

[7] O. H. Salman, M. I. Aal-Nouman, and Z. K. Taha, "Reducing waiting time for remote patients in telemedicine with considering treated patients in emergency department based on body sensors technologies and hybrid computational algorithms: Toward scalable and efficient real time healthcare monitoring syste," *J. Biomed. Inform.*, vol. 112, p. 103592, Dec. 2020, doi: 10.1016/j.jbi.2020.103592.

[8] C. J. C. Paraiso, M. J. A. Mejia, M. D. P. Pagatpatan, C. K. A. Remo, and J. V. Apan, "Design of an RFID-Based Smart Queueing System Integrated with Computer Vision Utilizing Dynamic Source Routing Algorithm," in *TENCON 2024 - 2024 IEEE Region 10 Conference (TENCON)*, Dec. 2024, pp. 649–652, doi: 10.1109/TENCON61640.2024.10903103.

[9] K. Wang, "Accessibility, Cost, and Quality of an Online Regular Follow-Up Visit Service at an Internet Hospital in China: Mixed Methods Study," *J. Med. Internet Res.*, vol. 26, p. e54902, Oct. 2024, doi: 10.2196/54902.

[10] P. Kathiravelu, A. R. Bhimireddy, and J. W. Gichoya, "Network Measurements and Optimizations for Telehealth in Internet's Remote Regions," in *2023 Tenth International Conference on Software Defined Systems (SDS)*, Oct. 2023, pp. 39–46, doi: 10.1109/SDS59856.2023.10329044.

[11] J. R. Skelly and T. O'Connor, "Guidelines for the use of the attend anywhere platform

for telecommunications within the pain service," *Ir. Med. J.*, vol. 114, no. 7, 2021, [Online]. Available: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85116308576&partnerID=40&md5=ca87882a9dfa42c598298e6ab9499d5f.

[12] Z. Wang, Y. Wang, Y. Qiu, and C. Jin, "Strategic Resource Allocation in Dual-Channel Healthcare Systems: The Role of Telemedicine in Physician Assignment," *IEEE Trans. Autom. Sci. Eng.*, vol. 22, pp. 13569–13587, 2025, doi: 10.1109/TASE.2025.3549822.

[13] Yaski, "Sistem Informasi Kesehatan Khanza untuk Rumah Sakit," *Website YASKI*, 2025. https://www.yaski.or.id/.

[14] R. P. O. Kusumastiwi, Regia Aristyanto, and Fahmi Yunisa, "Analysis of the Effectiveness of Online-Based Patient Queue Management System Innovation: Study at the Dental and Oral Hospital, Universitas Muhammadiyah Yogyakarta, Indonesia," *Community Med. Educ. J.*, vol. 5, no. 2, pp. 491–499, May 2024, doi: 10.37275/cmej.v5i2.557.

[15] P.T. Chen, C.L. Lin, and W.N. Wu, "Big data management in healthcare: Adoption challenges and implications," *Int. J. Inf. Manage.*, vol. 53, p. 102078, Aug. 2020, doi: 10.1016/j.ijinfomgt.2020.102078.

[16] K. H. Andarista, *Penerapan Pelaksanaan Standar Operasional Prosedur Pelayanan Kesehatan Pasien Rawat Jalan Pada Rsu Fastabiq Sehat Pku Muhammadiyah.* repository.unissula.ac.id, 2023. https://repository.unissula.ac.id/28553/

[17] R. Hanifa, F. N. Yusuf, S. R. Yusra, and D. Suherdi, "Adapting EFL materials and its influences on Indonesia secondary school students' language learning," *Asian-Pacific J. Second Foreign Lang. Educ.*, vol. 9, no. 1, p. 69, Sep. 2024, doi: 10.1186/s40862-024-00297-7.

[18] I. G. Kuleshova, I. V. Kiselnikov, and E. K. Breitigam, "Stages of understanding educational material: The issues of contents," *Sci. Educ. Today*, vol. 9, no. 5, pp. 97–109, Oct. 2019, doi: 10.15293/2658-6762.1905.06.

[19] N. Serki and S. Bolkan, "The effect of clarity on learning: impacting motivation through cognitive load," *Commun. Educ.*, vol. 73, no. 1, pp. 29–45, Jan. 2024, doi: 10.1080/03634523.2023.2250883.

[20] S. Bolkan and A. K. Goodboy, "Conditional indirect effects of clarity on students' information processing: disentangling sources of cognitive load," *Commun. Educ.*, vol. 73, no. 3, pp. 247–266, Jul. 2024, doi: 10.1080/03634523.2024.2303438.

[21] C. Blassingame, "Facilitation Skills," in *Career Pathways in Adult Education*, New York: Routledge, 2023, pp. 34–41. https://www.kas.de/c/document_library/get_file?uuid=8159de20-2e04-f18b-002e-8cf996146504&groupId=252038

[22] S. Prediger, B. Roesken-Winter, R. Stahnke, and B. Pöhler, "Conceptualizing content-related PD facilitator expertise," *J. Math. Teach. Educ.*, vol. 25, no. 4, pp. 403–428, Aug. 2022, doi: 10.1007/s10857-021-09497-1.

[23] F. Otaki, M. Gholami, I. Fawad, A. Akbar, and Y. Banerjee, "Students' Perception of Formative Assessment as an Instructional Tool in Competency-Based Medical Education: Proposal for a Proof-of-Concept Study," *JMIR Res. Protoc.*, vol. 12, p. e41626, Mar. 2023, doi: 10.2196/41626.

[24] S. P. Dewi, A. Wilson, R. Duvivier, B. Kelly, and C. Gilligan, "Perceptions of medical students and their facilitators on clinical communication skills teaching, learning, and assessment," *Front. Public Heal.*, vol. 11, Jun. 2023, doi: 10.3389/fpubh.2023.1168332.

[25] J. A. Kotler and M. K. Brooks, "The evaluation and impact of educational media and technology on children and adolescents," in *Encyclopedia of Child and Adolescent Health*, Elsevier, 2023, pp. 408–416. doi: 10.1016/B978-0-12-818872-9.00174-6

[26] A. E. E. Sobaih, I. A. Palla, and A. Baquee, "Social Media Use in E-Learning amid COVID 19 Pandemic: Indian Students' Perspective," *Int. J. Environ. Res. Public Health*, vol. 19, no. 9, p. 5380, Apr. 2022, doi: 10.3390/ijerph19095380.

[27] M. Simons, T. F. H. Smits, and P. Janssenswillen, "Newspapers as teaching tools for media literacy education what makes teachers use newspapers in their classrooms?," *EMI. Educ. Media Int.*, vol. 57, no. 4, pp. 332–352, Oct. 2020, doi: 10.1080/09523987.2020.1848510.

[28] A. Wang, S. Guan, K. S. Koong, and L. Y. Koong, "An M/M/1 and M/M/2 queuing solution to improve virtual scheduling in healthcare," *Int. J. Electron. Healthc.*, vol. 9, no. 1, p. 42, 2016, doi: 10.1504/IJEH.2016.078744.

[29] M. Ngorsed and P. Suesaowaluk, "Hospital Service Queue Management System with Wireless Approach," 2016, pp. 627–637. https://doi.org/10.1007/978-981-10-0539-8_61

[30] R. Klimek, "Sensor-Enabled Context-Aware and Pro-Active Queue Management Systems in Intelligent Environments," *Sensors*, vol. 20, no. 20, p. 5837, Oct. 2020, doi: 10.3390/s20205837.

[31] A. G. Rodríguez Buitrago and L. Y. Sandoval-Estupiñán, "El valor de la confianza en la escuela," *Rev. Investig. en Educ.*, vol. 20, no. 1, pp. 40–57, Apr. 2022, doi: 10.35869/reined.v20i1.3966.

[32] M. Platz, "Trust Between Teacher and Student in Academic Education at School," *J. Philos. Educ.*, vol. 55, no. 4–5, pp. 688–697, Jan. 2022, doi: 10.1111/1467-9752.12560.

[33] H.-Q. Cao and C. Han, "The effect of Chinese vocational college students' perception of feedback on online learning engagement: academic self-efficacy and test anxiety as mediating variables," *Front. Psychol.*, vol. 15, Jun. 2024, doi: 10.3389/fpsyg.2024.1326746.

[34] I. T. Awidi and J. Q. Klutsey, "Using Online Critical Reflection to Enhance Students' Confidence, Motivation, and Engagement in Higher Education," *Technol. Knowl. Learn.*, Aug. 2024, doi: 10.1007/s10758-024-09751-4.

[35] H. Wei and Y. Luo, "Uncovering the state of academic motivation, achievement emotion, self- confidence, and achievement goals in online/offline language instruction," *Learn. Motiv.*, vol. 89, p. 102085, Feb. 2025, doi: 10.1016/j.lmot.2024.102085.

[36] K. Daniel, M. M. Msambwa, F. Antony, and X. Wan, "Motivate students for better academic achievement: A systematic review of blended innovative teaching and its impact on learning," *Comput. Appl. Eng. Educ.*, vol. 32, no. 4, Jul. 2024, doi: 10.1002/cae.22733.

[37] A. Liu, Y. Wei, Q. Xiu, H. Yao, and J. Liu, "How Learning Time Allocation Make Sense on Secondary School Students' Academic Performance: A Chinese Evidence Based on PISA 2018," *Behav. Sci. (Basel).*, vol. 13, no. 3, p. 237, Mar. 2023, doi: 10.3390/bs13030237.

[38] C. Hu, H. Wei, R. Zhou, and Y. Ma, "Study on the influence of online course design on Students' online learning satisfaction the moderating effect of MOOC platform quality," *Appl. Math. Nonlinear Sci.*, vol. 9, no. 1, Jan. 2024, doi: 10.2478/amns-2024-2257.

[39] Y. He and X. Fu, "Learning Satisfaction of Learners and Curriculum Design under Different Online Teaching Platforms," *Int. J. Emerg. Technol. Learn.*, vol. 17, no. 10, pp. 227–239, May 2022, doi: 10.3991/ijet.v17i10.30937.

[40] T. D. A, V. G, S. N, and S. R, "An Empirical Study on Students' Satisfaction Towards Sustainable Online Education," *ECS Trans.*, vol. 107, no. 1, pp. 10225–10235, Apr. 2022, doi: 10.1149/10701.10225ecst.

[41] Y. Wu, X. Xu, J. Xue, and P. Hu, "A cross-group comparison study of the effect of interaction on satisfaction in online learning: The parallel mediating role of academic emotions and self-regulated learning," *Comput. Educ.*, vol. 199, p. 104776, Jul. 2023, doi: 10.1016/j.compedu.2023.104776.

[42] Y. Zhang and C.-H. Lin, "Student interaction and the role of the teacher in a state virtual high school: what predicts online learning satisfaction?," *Technol. Pedagog. Educ.*, vol. 29, no. 1, pp. 57–71, Jan. 2020, doi: 10.1080/1475939X.2019.1694061.

[43] Q. Ali, "Exploring the Students' Perceived Effectiveness of Online Education during the COVID-19 Pandemic: Empirical Analysis Using Structural Equation Modeling (SEM)," *Behav. Sci. (Basel).*, vol. 13, no. 7, p. 578, Jul. 2023, doi: 10.3390/bs13070578.

[44] D. Mussulman, K. Jensen, J. R. Amos, and J. Osborn, "Measuring impact: Student and instructor experience using an online queue," *2020 ASEE Virtual Annual Conference Content Access*. peer.asee.org, 2020, [Online]. Available: https://peer.asee.org/measuring-impact-student-and-instructor-experience-using-an-online-queue.