Development of the "Digihet" Multimedia Education Program to Improve Health Quality in the Setara Community Group

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Abstract— The digital divide and low health quality are challenges faced by the Setara South Sempaja community group. The impact of flooding is a health problem frequently experienced by this community group. The Technology and Health Education Program (Digihet) is designed to address this issue by providing education on the use of digital technology and clean and healthy living patterns to vulnerable groups affected by health problems. This study aims to develop and evaluate the effectiveness of the Digihet program in improving digital literacy, specifically in clean and healthy living patterns, and the quality of life of the community. The Digihet program is developed using multimedia development techniques, starting from the concept design stage to distribution. The Digihet program teaches about 10 clean and healthy living skills for households, including childbirth assisted by healthcare professionals, exclusive breastfeeding for babies, weighing babies and toddlers, using clean water, washing hands with clean water and soap, using healthy latrines, eradicating mosquito larvae at home, eating fruits and vegetables every day, engaging in physical activity every day, and not smoking indoors. Data were collected through beta testing, and the research results showed that the Digihet program is effective in increasing digital literacy in forming clean and healthy living patterns. The results of this study are expected to serve as a basis for developing multimedia health education programs and contribute to enhancing the understanding of the relationship between digital literacy, public health, and information technology in the context of household health quality.

*Keywords—*Education Technology, Community Health, Flood, Digihet, Multimedia

I. INTRODUCTION

Samarinda is the capital city of East Kalimantan Province. Empirical data shows an increasing population and community activities in Samarinda. This indirectly causes bigger problems, one of which is flooding (Rachman et al., 2024). The topography, with many areas below river level, contributes to 30% of the flooding in Samarinda (Sifriyani & Ruslan, 2023; Banjarsanti et al., 2020). Other causes include land conversion, drainage quality, and human behavior (Agus et al., 2023). One high-risk flood area is North Samarinda District (Anwar et al., 2021). The advancement of digital technology significantly impacts the economy and public health in the current era. Educational programs focused on technology and health literacy can be key to improving community life quality and economy.

Floods have become a routine phenomenon for residents of RT.14 South Sempaja Sub-district, North Samarinda District. Residents tend to accept the health impacts of floods passively. Floods can have serious health impacts (Abdullah et al., 2024). The risk of waterborne diseases due to wastewater contamination can increase, leading to respiratory infections, diarrhea, and skin diseases (Keya et al., 2023; Apriliyanti et al., 2022; Sudaryo et al., 2020). Contaminated floodwater may contain harmful bacteria, viruses, and chemicals (Abdullah et al., 2024). Flood conditions can also create environments conducive to mosquito breeding, increasing the risk of vector-borne diseases like dengue fever and malaria (Apriliyanti et al., 2022; Wibawa et al., 2024).

In this context, this research aims to explore the potential empowerment of the Setara community group in Samarinda through the Technology and Health Education Program or "Digihet," which integrates digital and health aspects. Setara is an acronym for Healthy, Smart, and Prosperous Community Group, located at St. K.H. Wahid Hasyim 1 RT.14 (Neighborhood-14), South Sempaja Sub-district, North Samarinda District, East Kalimantan Province. The Setara Community Group is an economically non-productive community group currently consisting of 55 people, mostly housewives. This group meets bi-weekly to conduct religious studies and discuss programs that will be implemented in RT.14 South Sempaja Sub-district.

Data collection revealed that the Setara community's primary issue is health. According to Public Health Center Sempaja data from 2021 to 2023, the top two diseases in RT. 14 South Sempaja Sub-district are Upper Respiratory Infections, diarrhea, and hypertension. RT.14 South Sempaja is a flood-prone area during heavy rains, with

floods typically lasting several hours before receding slowly.

With the rapid population growth and environmental challenges such as routine flooding and low technology literacy among the Setara community, there is an urgent need to develop a program focusing on these two critical aspects. This study refers to empirical data showing that a strong understanding of digitalization and public health can significantly impact economic and social well-being.

The Digihet program will teach 10 household healthy living skills, empowering family members to know, want, and be able to implement clean and healthy living patterns and actively participate in community health movements to achieve healthy households (Megasari et al., 2024). A healthy household practices 10 clean and healthy living behaviors (Susianti et al., 2022; Hayati et al., 2023).

Through a comprehensive and empowering approach to two different fields, information technology and health, this study aims to contribute valuable insights to related research literature. A thorough analysis of the situation and issues, along with the solutions offered through the Digihet program, can serve as an important foundation for sustainable and impactful community empowerment efforts. The findings from this study are expected to provide insights and inspiration for similar programs in various other communities, contributing to a better understanding of the interplay between the digital economy, public health, and information technology in relevant and inclusive local contexts.

This research is based on several studies on the impact of training on family skill improvement through technology utilization. Sri & Margareta (2020) found that technology usage skills training significantly affects productivity. Participants became more creative in using time and resources to produce economically valuable goods after the training. Another study by Ramdhan (2023) showed that training and technology utilization positively and significantly impacted productivity by 75.9%. Andrea et al. (2023) developed an edu-game application, demonstrating that educational games can effectively enhance children's understanding of the material. Karim & Khamidah (2023) found that edu-game applications effectively helped children understand taught materials through artificial intelligence utilization.

The research also focuses on health education through technology utilization. The developed multimedia application will provide knowledge and skills about 10 clean and healthy living behaviors using health technology. This education can improve community health quality, as supported by previous research. Putri et al. (2023) stated that interventions in specific groups caused significant differences in anxiety levels. Comprehensive and structured socialization positively impacts health. Hurang et al. (2023) showed that cultural changes are a factor in behavioral changes. Fitriyah et al. (2024) showed that clean and healthy living behavior at the household level could increase awareness of implementing clean and healthy living patterns and optimal healthy environments. Knowledge formation is a key factor in behavior formation. Faaroek et al. (2023) found that counseling and training effectively increased knowledge about clean and healthy living behaviors. Fadylah et al. (2023) showed that clean and healthy living behavior counseling significantly increased knowledge by 70.73%.

Through a measured approach, this research aims to contribute to understanding the role of digital technology and health education in empowering vulnerable communities and improving their quality of life. The research findings can serve as a foundation for developing more effective and sustainable education programs in the future.

II. METHOD

The Digihet – Health Education Program is a learning program about 10 healthy living skills for households. This education program will empower partners to know, want, and be able to implement clean and healthy living behaviors and actively participate in community health movements to achieve healthy households. A healthy household practices 10 skills, including (Hayati et al., 2023; Setiawati & Rozinah, 2020):

1. Childbirth Assisted by Healthcare professionals
   Childbirth assisted by healthcare professionals, including doctors, midwives, or paramedics, follows standards for the use of clean, sterile, and safe equipment. These measures can prevent infections and other dangers that pose risks to the safety of both mother and newborn.

2. Exclusive Breastfeeding
   Awareness of the importance of breastfeeding for children aged 0 to 6 months is a crucial indicator of successful Clean and Healthy Living Behavior practices at the household level.

3. Regular Weighing of Babies and Toddlers
   This practice facilitates the monitoring of infant growth. Weighing can be done at Integrated Healthcare Center from when the baby is 1 month old until 5 years old. Integrated Healthcare Center also serves as a place to monitor child growth and provide complete immunizations. Regular weighing helps in early detection of malnutrition cases.

4. Handwashing with Soap and Clean Water
   This practice is essential for personal hygiene and preventing the transmission of various diseases due to clean, germ-free hands.

5. Using Clean Water
   Clean water is a fundamental requirement for a healthy life.

6. Using a Healthy Toilet
   Toilets are vital sanitation infrastructure related to waste disposal and water for cleaning purposes.

7. Eradicating Mosquito Larvae
   Mosquitoes are vectors of various diseases, and breaking their life cycle is crucial in disease prevention.

8. Consumption of Fruits and Vegetables
   Fruits and vegetables provide essential vitamins, minerals, and fiber necessary for optimal and healthy growth.

9. Engaging in Daily Physical Activity
   Physical activity can include sports or work-related activities that involve movement and energy expenditure.
10. No Smoking Inside the House
    Active smokers can be sources of various diseases and health issues for passive smokers. Quitting smoking or at least not smoking inside the house can protect families from numerous health problems.

This program will be conducted comprehensively and sustainably until the community has the knowledge and skills to independently implement clean and healthy living behaviors and teach other community members around them.

The health education form will be combined with technology development, making it easy for partners to understand through an interactive multimedia application. The success of this health education will benefit each healthy family member, leading to healthier, smarter children, active working family members, and household expenditures focused on fulfilling family nutrition.

A. Multimedia Development Life Cycle

Research implementation in the Setara community group is based on the multimedia development method. The Multimedia Development Life Cycle (MDLC) method is used for developing multimedia-based software such as educational games or interactive media (Mendelson & Zwillinger, 2024). The stages of multimedia development are outlined in Figure 1.
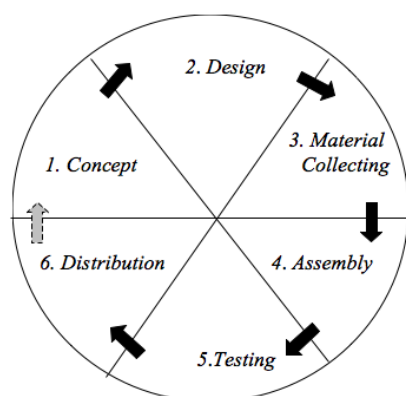

Figure 1. Multimedia Development Life Cycle
(Barron, 2024)

As shown in Figure 1, multimedia development starts with:
1. Conceptualizing the application flow using the Unified Modeling Language (UML). UML is a system design tool commonly used for multimedia application design (Yigitbas et al., 2024; Barral et al., 2023). This stage outlines the health education needs analysis.
2. Designing the application interface according to the initial concept, from the opening scene to the interactive media.
3. Collecting requirements from literature studies, materials on 10 clean and healthy living behaviors,

interviews with public health center officials, and gathering materials from the internet, including images, sounds, and music, to support the application.
4. Developing the multimedia application according to the requirements and design, naming the application Digihet.
5. Testing the application with public health center using the beta testing method. Beta testing involves end users testing the software before release (Foster & Towle, 2021; Mohd & Shahbodin, 2015).
6. The final stage is distribution, where the ready-to-use application is distributed to the community.
7. The application that has undergone beta testing will also be re-evaluated if errors or bugs are found in the program or material delivered.

B. Concepts

Figure 2 shows the use case diagram concept of the Digihet application. The user is the general public, and the application is designed to be as user-friendly as possible. Users can choose educational menus consisting of 10 education options, including materials on 10 healthy living skills for households, encouraging mothers to exclusively breastfeed babies, teaching children to enjoy fruits and vegetables, and advising fathers not to smoke indoors. Users can also control the background music's on/off setting. The background music can be muted if users find it distracting or too loud for focusing on the learning material.
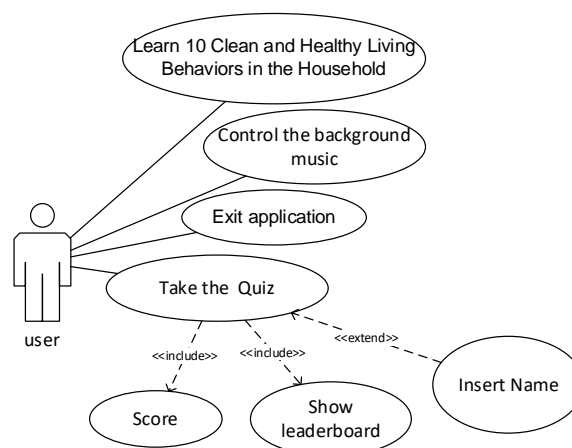

Figure 2. Use Case Diagram of Digihet Application

In addition to containing 10 healthy living skills for households, the application also features quizzes to test users' abilities. This concept is illustrated in the activity diagram in Figure 3. Before starting the quiz, users can enter their names and answer 10 multiple-choice questions. The quiz content is based on the 10 healthy living skills for households. Each question is worth 10 points, and if answered correctly, users can score 100 points. The time limit for the quiz is 15 minutes, assuming 90 seconds per question. After completing the quiz, the final score and star rating will be displayed. Users can see their scores and compare them with others who have used the application on the same device (not connected to an online database). If users' scores are in the top 5, their

names and scores will be saved and displayed on the leaderboard. Otherwise, their scores will not appear on the leaderboard.
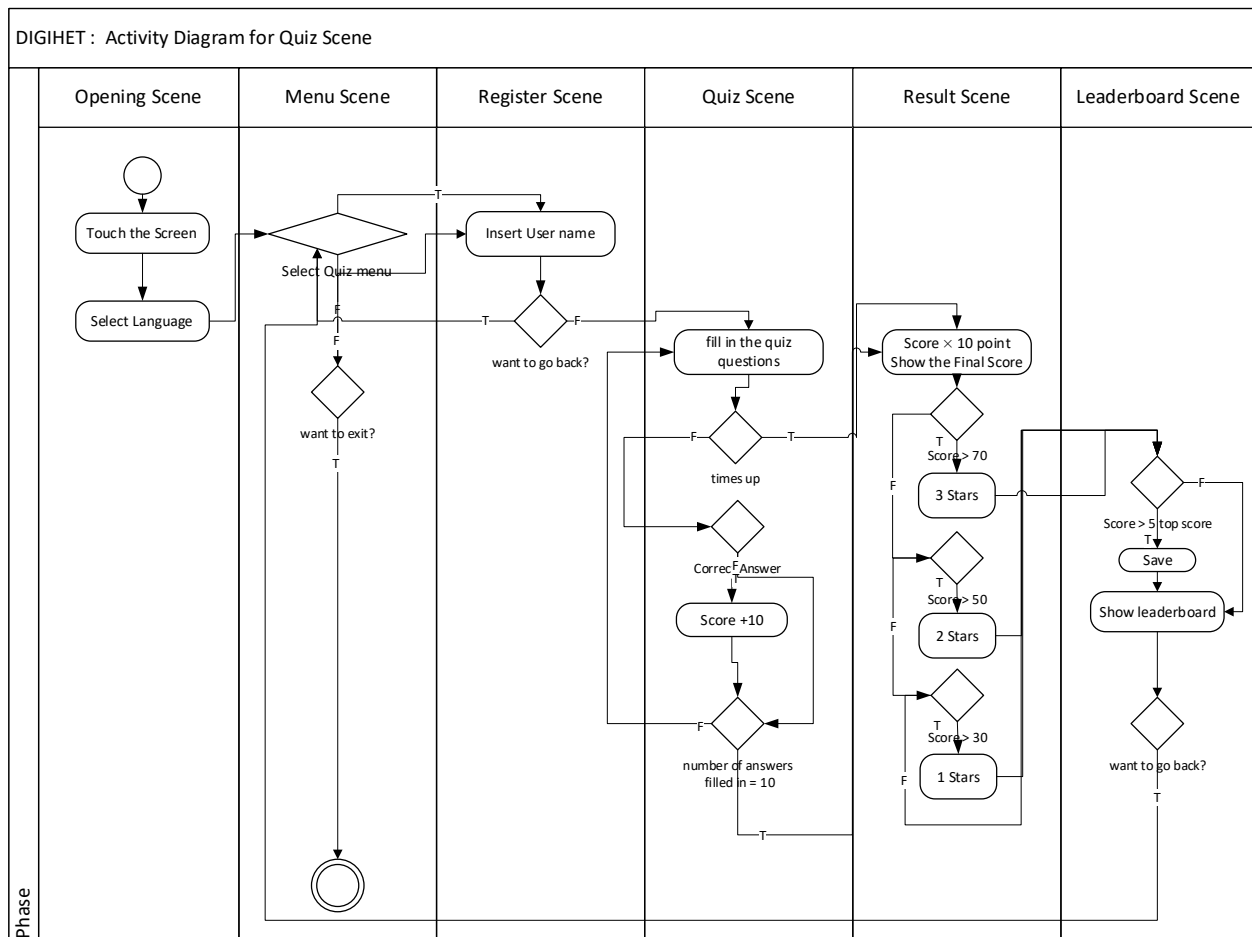

Figure 3. Activity Diagram of Digihet Quiz Scene

C. Design

After completing the application concept, the next step is designing the Graphical User Interface (GUI). The designed GUI includes:

1. Opening Scene
   Contains the application title "Digihet" and the developer's name. Users can choose the language for the application, either Indonesia or English. If English is chosen, all materials and GUI will be in English, and vice versa.
2. Main Menu Scene
   Contains two buttons: "Learn" and "Quiz." The "Learn" button directs users to the educational materials on healthy living skills, and the "Quiz" button directs users to the quiz section.
3. Learn Menu Scene
   Contains 10 buttons for selecting the 10 healthy living skills for households. Each button directs the user to detailed educational materials on a specific healthy living skill.
4. Education Video Scene
   Contains 10 educational materials and videos on healthy living skills for households. This scene provides visual and auditory learning aids to enhance user understanding and engagement.
5. Register Scene
   Appears before starting the quiz, where users must enter their names. The name entry is limited to 6 characters to optimize memory usage in the application.
6. Quiz Scene
   Contains 10 multiple-choice questions on healthy living skills for households. The questions and answer options are randomized to prevent memorization, and a countdown timer is provided to limit the time for each question.
7. Result Scene
   Displays users' final scores after completing the quiz. Scores are calculated based on the number of correct answers, and a star rating is provided based on the user's performance.
8. Leaderboard Scene
   Shows the top 5 scores of users who have completed the quiz. Users can compare their scores with others, fostering a sense of achievement and competition.

D. Material Collecting

Materials collected include the 10 healthy living skills from the public health center, images from the internet for application backgrounds, videos, music, and sound effects to support the Digihet multimedia application.

III. RESULT AND DISCUSSION

The Digihet Health Education Program was developed using multimedia development methods. This application provides learning about 10 healthy living skills for households, empowering the community to know, want, and be able to implement clean and healthy living behaviors and participate actively in community health movements to achieve healthy households.

A comprehensive data analysis will be presented to describe the effectiveness of the Digihet program in improving digital literacy and healthy living skills. The Digihet application is developed for use on both Personal Computer (PC) and smartphone platforms. This means the application can be used by public health center during health and hygiene seminars for the community. The application on smartphones allows it to be used anywhere, as most people own smartphones nowadays, enabling mothers, fathers, and children to access the application anytime and anywhere using their smartphones.

A. Assembly

The application was developed using Construct 3 tools. The designed scenes are implemented as layouts in Construct 3, including:

1. Opening Layout

Figure 4 (a) shows the layout displayed when the user opens the "Digihet" application. It contains developer information and, if touched, will display the language selection menu. Figure 4 (b) shows the two language options available in this application, namely Indonesia and English. If the user presses the English flag button, all materials and the GUI will use English, and vice versa.

(a)   (b)

Figure 4. Opening Layout of the Digihet Application

2. Main Menu Layout

Figure 5 shows that this layout is the main scene of the Digihet application. Users can choose to learn or take a quiz. If the learning menu button is pressed, the user will be directed to the material on 10 clean and healthy living skills for households. If the quiz button is pressed, the user will be directed to answer 10 practice questions about the 10 healthy living skills. In this layout, users can also press the speaker icon button to turn the background music on/off. The background music can be muted if the user feels disturbed or unable to focus on the learning material due to the loud background music. Users can also press the "X" button to exit the application.

Figure 5. Main Menu Layout of the Digihet Application

3. Learn Menu Layout

Figure 6 shows the interface of the Learn Menu Layout. This layout contains 10 menu buttons, which, if pressed, will direct to 10 educational materials on clean and healthy living skills for households. Users can also press the "◄" (back-arrow) icon button to return to the main menu.

Figure 6. Learn Menu Layout

4. Education Video Layout

In this layout, users can read material on the 10 educational materials on clean and healthy living skills for households. The materials presented are:

1) Childbirth assisted by healthcare professionals
2) Exclusive breastfeeding for babies
3) Weighing babies and toddlers
4) Using clean water
5) Washing hands with clean water and soap
6) Using healthy latrines
7) Eradicating mosquito larvae at home
8) Eating fruits and vegetables every day
9) Engaging in physical activity every day
10) Not smoking indoors.

Figure 7 shows that the materials are presented in the form of figures and practice videos, making it easy for users to understand and practice them at home. In this layout, users can control the video playback with YouTube navigation, starting from Play, Pause, Stop, Mute/Unmute, and others. Users can press the "⇨" (right arrow) icon button to view the next material, and can also press the "⇦" (left arrow) icon button to view the previous material.

(a)   (b)

Figure 7. Education Video Layout, (a) shows the material on childbirth assisted by healthcare professionals and (b) the material on eradicating mosquito larvae at home

In this layout, users can also press the " 🏠 " (home) icon button to return to the learn menu and choose other learning materials.

5. Register Layout

This layout is displayed at the beginning after the user presses the quiz button. Figure 8 shows that users must enter their name to proceed to the quiz questions. The username input can only be filled with a maximum of 6 characters, so users can only enter their nickname. This is done to save application memory storage on the user's device. Users can only enter letters A to Z in this input field, a filter that functions to prevent typing errors if users press numbers or certain symbols that will cause their name to error. After entering the name, users can press the "Start Quiz" button to start the quiz questions. Users can also press the "◄" (back-arrow) icon button to return to the main menu and cancel the quiz.

Figure 8. Register Layout

6. Quiz Layout

Figure 9 shows the assembly result of the quiz layout interface. This layout contains 10 questions about 10 clean and healthy living skills for households. The questions are presented in multiple-choice format, with 4 answer options from A to E. The questions and answer choices are displayed randomly, so users cannot memorize them. This layout also includes a countdown timer. The time to answer 10 questions is 15 minutes, with an estimated 90 seconds per question. If the user presses one of the answers, the text color of that answer will turn yellow, and the next question will be displayed. If the user does not answer, the next question will not be displayed. This layout will not provide notifications for correct or incorrect answers, as the correct answers will only be calculated and displayed in the result layout.
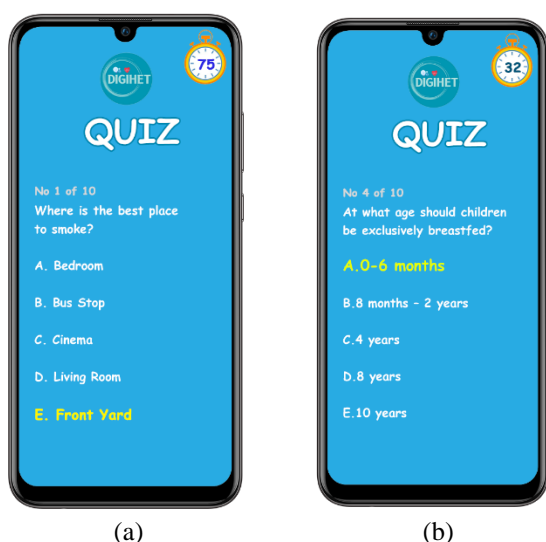

(a) (b)

Figure 9. Quiz Layout (a) question-1 about healthy smoking habits and (b) question-2 about exclusive breastfeeding

If the user has finished answering all the questions or the time runs out before completing all the quiz questions, the application will directly go to the Result layout.

7. Result Layout

This layout will display the user's score after completing the quiz. The score displayed ranges from 0 to 100 points. Each correct quiz answer is multiplied by 10; if all answers are correct, the user will score 100, and vice versa if all answers are wrong or unanswered, the user will score 0 and will not receive any star rating. There are 3-star rating types in this quiz: if the user scores above 30, they will receive a 1star rating; if they score above 50, they will receive 2 stars; and if they score above 70, they will receive 3 stars. The 3 stars is the highest rating. Figure 10 shows that in this interface, a score of 100 is displayed, meaning the user answered all 10 questions correctly and received a 3-star rating. In this layout, if the user presses the "Next" button, they will go to the leaderboard layout.

Figure 10 shows the layout that contains the user score history who has answered the quiz questions about 10 clean and healthy living skills. The score data is sorted from highest to lowest. The user's name with the highest score will be at the top. This layout can only display a maximum of 5 user names with the highest scores. Users can see their score history every time they complete all the questions in the leaderboard. Users can also compare their scores with other users using this application, but still on the same device (not connected to an online database). If the user's score is in the top 5 scores, their name and score will be saved and displayed on the leaderboard. If the user's score is low and not in the top 5 scores, it will be deleted and not displayed on the leaderboard.
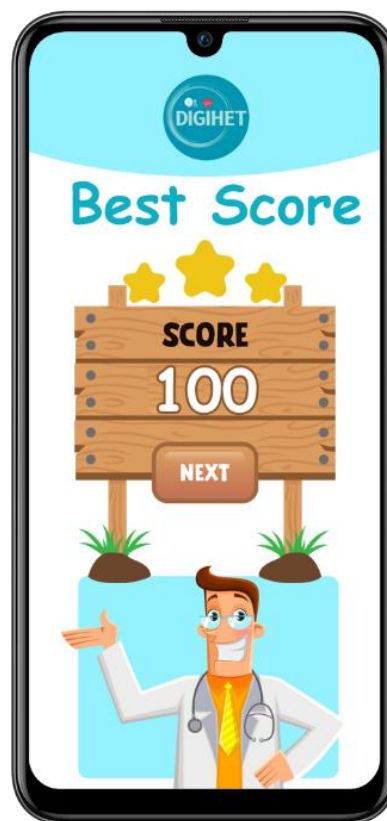

Figure 10. Result Layout

8. Leaderboard Layout

Figure 11 shows the layout that contains the user score history who has answered the quiz questions about 10 clean and healthy living skills. The score data is sorted from highest to lowest. The user's name with the highest score will be at the top. This layout can only display a maximum of 5 user names with the highest scores. Users can see their score history every time they complete all the questions in the leaderboard. Users can also compare their scores with other users using this application, but still on the same device (not connected to an online database). If the user's score is in the top 5 scores, their name and score will be saved and displayed on the leaderboard. If the user's score is low and not in the top 5 scores, it will be deleted and not displayed on the leaderboard.
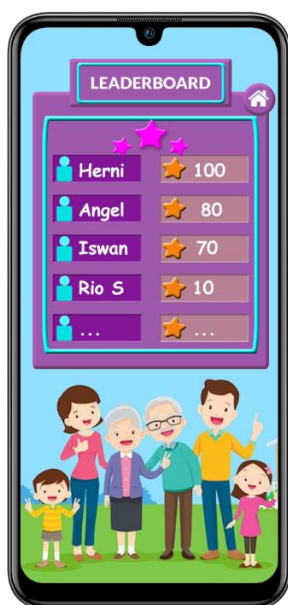
In this layout, if the user has finished viewing the top scores, they can press the " 🏠 " (home) icon button to return to the main menu.

B. Testing

The application was tested with the public health center using the beta testing method. Beta testing is the process of software testing conducted by end users before release. Table 1 shows several forms of questions presented and feedback provided during this testing, with 5 respondents from public health center staff giving their responses to the application's functionality and features.

Figure 11. Leaderboard Layout

Table 1. Feedback for Beta Testing

Respondent	Feedback		
	GUI		Layout
1	Text	: Good	1. Opening : Ok
	Color	: Good	2. Main Menu : Interesting
	Graphic	: Good	3. Learn : Informative and interesting
	Sound	: too loud	4. Education Video : Good
	Animation	: Insert more video	5. Register : Good
			6. Quiz : It will guide the people
			7. Result : Good
			8. Leaderboard : Ok
2	Text	: Sometimes I feel confused with the links	1. Opening : Good
	Color	: Ok	2. Main Menu : Font type is suitable and clear
	Graphic	: The functionality of the buttons, sound and some graphics	3. Learn : Nice graphic and interactive
			4. Education Video : Use difference color for the text and link
	Sound	: Put on/off button	5. Register : Good
	Animation	: Ok	6. Quiz : Put on/off button for sound
			7. Result : Use difference color for the text and link
			8. Leaderboard : Good
3	Text	: Ok	1. Opening : Ok
	Color	: Ok	2. Main Menu : Ok.
	Graphic	: Ok	3. Learn : Good
	Sound	: Ok, reduce noise	4. Education Video : Easy to understand
	Animation	: Ok	5. Register : Ok
			6. Quiz : Ok. Variety the types of activity
			7. Result : Interesting
			8. Leaderboard : Interesting
4	Text	: Good	1. Opening : Good
	Color	: Good	2. Main Menu : Good
	Graphic	: Ok	3. Learn : Easy to learn and understand
	Sound	: Interesting	4. Education Video : Interesting and simple to understand, please replace the smoking video with another video that is more polite
	Animation	: Ok	5. Register : Ok
			6. Quiz : Easy to use and interactive
			7. Result : Good
			8. Leaderboard : Good
5	Text	: Ok	1. Opening : Ok
	Color	: Colors should be more attractive	2. Main Menu : Ok
	Graphic	: Ok	3. Learn : it is one way to get information easily
	Sound	: Ok	4. Education Video : Ok
	Animation	: Easy to understand	5. Register : Give more length
			6. Quiz : Good. Well arranged
			7. Result : Ok
			8. Leaderboard : Ok

From the results of the beta testing in Table 1, it can be concluded that most of the responses given by the respondents were positive, indicating that the Digihet application is ready to be distributed to the community. However, there were some revision requests related to the video content and sound control navigation.

C. Distribution

The final stage is distribution. The Digihet application was installed on the smartphones of the Setara community group members. The community was invited to learn how to use this application. Trials were also conducted by performing knowledge tests before and after using the Digihet application. Pre-tests and post-tests were conducted to measure the community's knowledge of the 10 clean and healthy living skills for households before and after using this application.

The trials were conducted with 25 community respondents, consisting of 6 adult men, 12 mothers, 3 teenage boys, and 4 teenage girls. Figure 12 shows a chart illustrating the increase in community knowledge about clean and healthy living patterns before and after using the Digihet application. There were 10 categories of questions about the 10 clean and healthy living skills for households that were answered by the 25 respondents.

From the pre-test scores, it can be seen that before learning about the 10 clean and healthy living skills, only 48% of the community understood knowledge about childbirth and 28% understood knowledge about exclusive breastfeeding. After this community group was taught using the Digihet application and tested again (post-test) on the 10 clean and healthy living skills, the percentage of knowledge increased. The knowledge score for childbirth increased from 48% to 68%, and the knowledge score for exclusive breastfeeding also increased from 27% to 64%.
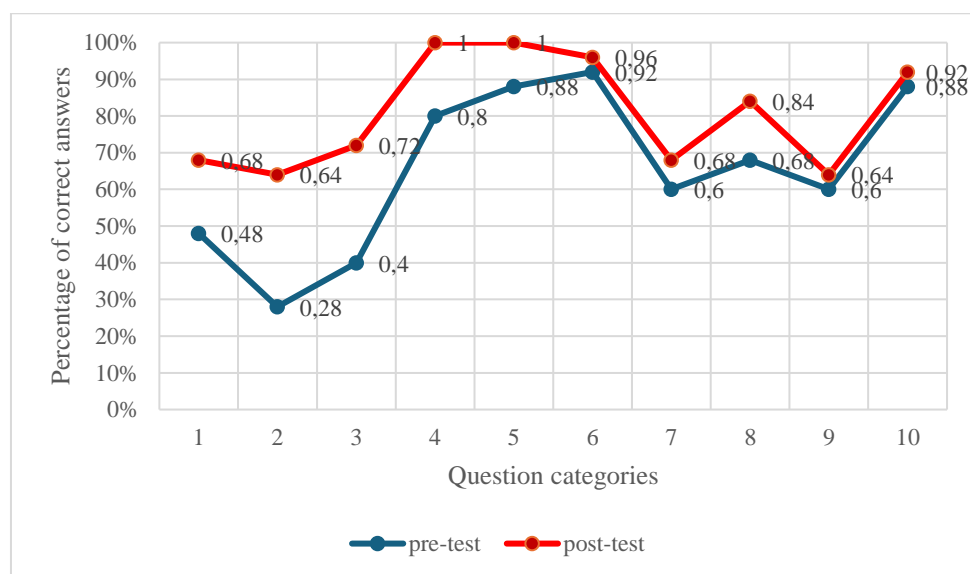

Figure 12. Chart of Community Knowledge Improvement on 10 Clean and Healthy Living Skills through the Digihet Application

The chart in Figure 12 also shows a significant increase in knowledge scores from the 10 categories of questions about clean and healthy living skills for households. In total, the pre-test percentage score only reached 65.2% of the total correct answers to questions about clean and healthy living skills, whereas after using the Digihet application, the post-test score increased to 80.8%. This proves that the Digihet application successfully increased knowledge on the 10 categories of questions about clean and healthy living skills for households.

IV. CONCLUSION

The "Digihet" program successfully improved digital literacy and awareness of clean and healthy living in the Setara community, South Sempaja. This program was developed using the Multimedia Development Life Cycle (MDLC), which includes the stages of concept, design, material collection, assembly, testing, and distribution.

The resulting Digihet application presents 10 clean and healthy living skills in an easily accessible and interactive format, which is crucial for a community frequently facing floods, ensuring that health education continues uninterrupted by environmental conditions. Pre-test and post-test results showed an initial knowledge score of 65.2%, which increased to 80.8% after the intervention with the Digihet application. This increase confirms the program's effectiveness in promoting clean and healthy living behaviors through multimedia application development.

The success of Digihet in South Sempaja suggests that this educational model can be tested and developed in other areas of Samarinda in the future. Developing more varied content and interactive features, along with continuous evaluation, is recommended to enhance the program's effectiveness in the future. The findings of this study underscore the importance of digital literacy and

health education in improving the quality of life of the community.

REFERENCES

Abdullah, M. A., Shaikh, B. T., Sikander, A., & Sarwar, B. (2024). Public Health and Health System's Responsiveness During the 2022 Floods in Pakistan: What Needs to Be Done?. Disaster medicine and public health preparedness, 17, e567.

Agus, F., Kamil, Z. A., & Gifari, O. I. (2023, December). Object Oriented Design Systems for WebGIS Flood Risk Classification in Samarinda, Indonesia. In IOP Conference Series: Earth and Environmental Science (Vol. 1282, No. 1, p. 012003). IOP Publishing.

Andrea, R., Yusnita, A., Daud, J., & Khoirunnita, A. (2023, November). Combination Probability in Finite State Machine Model for Intelligent Agent of Educational Game "I LOve Maratua". In The International Symposium on Computer Science, Digital Economy and Intelligent Systems (pp. 252-265). Cham: Springer Nature Switzerland.

Anwar, Y., Setyasih, I., & Ningrum, M. V. R. (2021, March). Multi-ethnic communities adaptation to flooding in the north samarinda sub-district, samarinda city, east kalimantan province, indonesia. In IOP Conference Series: Earth and Environmental Science (Vol. 683, No. 1, p. 012079). IOP Publishing.

Apriliyanti, M. D., Prayitno, H., & Ma'rufi, I. (2022). Health impacts and post-flood handling in Ijen District, Bondowoso Regency. Health Notions, 6(5), 206-215.

Banjarsanti, S. S. N., Kukuh, P., & Margaritifera, T. (2020, July). Flood handling with priority scale determination in Samarinda Seberang from East Kalimantan Province Indonesia. In IOP Conference Series: Materials Science and Engineering (Vol. 885, No. 1, p. 012037). IOP Publishing.

Barral, L. V., Pinet, F., Tacnet, J. M., & Jousselme, A. L. (2023). Combining UML profiles to design serious games dedicated to trace information in decision processes. In Research Anthology on Game Design, Development, Usage, and Social Impact (pp. 212-239). IGI Global.

Barron, E. N. (2024). Game theory: an introduction. John Wiley & Sons.

Fadylah, N., Maharani, D., Enjelin, M., Kodea, F. F., Ambuasi, S. B., & Rabiah, R. (2024). Penyuluhan Kesehatan Tentang Perilaku Hidup Bersih dan Sehat untuk Meningkatkan Kesehatan Masyarakat. Idea Pengabdian Masyarakat, 4(02), 132-137.

Faaroek, S. A., Larasati, A., Yohana, A., Alfaza, H. R., Kristina, L., Anggraenita, O., & Husada, V. (2023). Counseling on Clean and Healthy Living Behavior in Early Childhood in Belimbing Village, Tangerang Regency. Asian Journal of Community Services, 2(6), 479-488.

Fitriyah, N., Yuniarti, T., Wahyono, E., Prayoga, R. A., Fatriani, R. M., Wicaksono, A., ... & Nuraini, L. (2024). Clean Water Issues, Community Behavior and Communication Models in Sustainable Development Goals 6 in Banten West Java Indonesia. International Journal of Sustainable Development & Planning, 19(1).

Foster, E., & Towle Jr, B. (2021). Software engineering: a methodical approach. Auerbach Publications.

Hayati, M., Nababan, D., & Manurung, J. (2023). Hubungan Strategi Promosi Kesehatan Dengan Tingkat Perilaku Hidup Bersih dan Sehat (PHBS) Pada Tatanan Rumah Tangga di Kecamatan Silih Nara Kabupaten Aceh Tengah. Prepotif: Jurnal Kesehatan Masyarakat, 7(1), 383-392.

Hurang, C. N., Nurhasanah, N., & Mardahlia, D. (2023). The Influence of Patient Safety on Nurse Performance at Santa Familia Hospital. In Proceeding of International Conference on Multidisciplinary Research (Vol. 1, No. 1, pp. 400-414).

Karim, S., & Khamidah, I. M. (2023). "The Behavior Change of Intelligent Agent Using Finite State Machine in "Save Karang Mumus" Game", International Journal of Information Engineering and Electronic Business(IJIEEB), Vol.15, No.5, pp. 13-22, 2023. DOI:10.5815/ijieeb.2023.05.02

Keya, T. A., Leela, A., Habib, N., Rashid, M., & Bakthavatchalam, P. (2023). Mental health disorders due to disaster exposure: a systematic review and meta-analysis. Cureus, 15(4).

Megasari, A. L., Hardianti, H., Hilal, A., Betan, A. B., Yanti, P. D., & Wiranti, B. (2024). Management of Implementing Clean and Healthy Living Behaviorin Households in Manisa Village. International Journal of Health Sciences, 2(1), 202-216.

Mendelson, E., & Zwillinger, D. (2024). Introducing game theory and its applications. CRC Press.

Mohd, C. K. N. C. K., & Shahbodin, F. (2015). Personalized learning environment: alpha testing, beta testing & user acceptance test. Procedia-Social and Behavioral Sciences, 195, 837-843.

Putri, M. A., Ardan, M., & Mardahlia, G. (2023, July). Analysis of Occupational Safety and Health Risks in Solid Medical Waste Management in Hospital. In Proceeding ADRI International Conference on Multidisciplinary Research (Vol. 1, No. 1, pp. 333-341).

Rachman, M. G., Kurniawan, O., & Nugraha, A. (2024, May). Formulating flood mitigation through public participation, remote sensing analysis, and flood genetic understanding: study case Samarinda City flood January 2020. In IOP Conference Series: Earth

and Environmental Science (Vol. 1339, No. 1, p. 012010). IOP Publishing.

Ramdhan, M. (2023). Pengaruh Pelatihan Kewirausahaan, Kemampuan Memanfaatkan Teknologi, dan Tingkat Pendidikan Terhadap Produktivitas Pelaku UMKM Di Wilayah Situ Panjalu Ciamis. Jurnal ASIK: Jurnal Administrasi, Bisnis, Ilmu Manajemen & Kependidikan, 1(1), 1-11.

Setiawati, E., & Rozinah, S. (2020). Pemberdayaan Ibu-Ibu Rumah Tangga Dalam Upaya Meningkatkan Ekonomi Keluarga Melalui Pengelolaan Usaha Rumahan di Tangerang Selatan. Aksiologiya: Jurnal Pengabdian Kepada Masyarakat, 4(2), 231-240.

Sifriyani, S., & Ruslan, R. (2023, January). Analysis of the causes of flooding in Samarinda City using spatial statistics: Geographically weighted regression. In AIP Conference Proceedings (Vol. 2554, No. 1). AIP Publishing.

Sri, D., & Margareta, C. (2020). The Effect of Entrepreneurship Training, the Ability to Use Technology and Education on the Productivity of Women Entrepreneurs of UMKM. Economic and Education Journal (Ecoducation), 2(2), 142-158.

Sudaryo, M. K., Prameswari, M. F., Umniyati, H., & Guha-Sapir, D. (2020). Acute Infection Following Flood Disaster: An Example from Bojonegoro District, East Java, Indonesia. Indian Journal of Public Health Research & Development, 11(3).

Susianti, S., Rudiyanto, W., Windarti, I., & Zuraida, R. (2022). Edukasi Perilaku Hidup Bersih dan Sehat (PHBS) pada Rumah Tangga di Desa Kalisari Kecamatan Natar Kabupaten Lampung Selatan. JPM (Jurnal Pengabdian Masyakat) Ruwa Jurai, 6(1), 1-5.

Wibawa, B. S. S., Wang, Y. C., Andhikaputra, G., Lin, Y. K., Hsieh, L. H. C., & Tsai, K. H. (2024). The impact of climate variability on dengue fever risk in central java, Indonesia. Climate Services, 33, 100433.

Yigitbas, E., Schmidt, M., Bucchiarone, A., Gottschalk, S., & Engels, G. (2024). GaMoVR: Gamification-based UML learning environment in virtual reality. Science of Computer Programming, 231, 103029.