

Interactive Media to Maintain Normal Sugar Levels for Diabetics By Using The Design Thinking Method

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Abstract

In general, learning media is widely used to share needed information, especially for the health of people with diabetes. Still, few people can understand health education for people with diabetes, and special attention is needed for sufferers, especially the elderly, to maintain a lifestyle of food, drink, and exercise. Lack of understanding in health discussions and insight often causes many people with diabetes to experience complications of other diseases, so in this study, we used interactive media to support health understanding by using design thinking approach technology that can make it easier for sufferers to understand diabetes, because of a direct approach with sufferers. The design thinking method has five stages, empathize, define, ideate, prototype, and test, which are carried out to help solve problems by adjusting to the needs of sufferers and used as a reference in application development. The final stage of this research is to test the respondents to determine whether the solutions applied can solve the patient's problems. The test was carried out using a questionnaire given to 50 respondents from the general public with complaints of diabetes symptoms, giving a calculation result of 80.2% agreeing that the respondents felt helped by the Ayasha application. Suggestions for further research are necessary additions that include the presentation of more comprehensive information about diabetes and a feedback feature for users to make it easier to understand, and further updates are needed.

Keywords

Interactive Media, Design Thinking, Diabetes, Sugar Levels, Learning

1. Introduction

Design Thinking is an innovation-centered approach that takes design tools to integrate as needed. Design Thinking can be applied to increase ideas in meeting solution needs that can integrate technology into innovation thinking, and the design process also encourages creative ideas to build products (Chou 2018). The Design Thinking approach is used in designing educational applications to maintain normal sugar levels for people with diabetes to determine how to maintain normal sugar levels for sufferers (Lazuardi and Sukoco 2019).

The Design Thinking method used in the empathy, define, ideate, prototyping, and testing stages can help the user experience solving problems as needed by using the google form media for distributing the questionnaire, having diabetes for more than three years, taking 50 respondents to understand the needs and problems that users get after distributing the questionnaire, After getting a solution to the problem then making this design based on the validation results that have been made previously. After the application creation is complete, it is necessary to test the respondents to determine whether the solution can solve the problem. The questionnaire given to 50 respondents presents the ease of using the AYOSEHAT educational application (Syabana and Saputra 2020). A comprehensive thinking process that concentrates on creating solutions begins with an empathetic process. This stage makes observations of 50 respondents to prove assumptions and problem mapping based on the data obtained. This test was

carried out in 2 stages: digital prototyping trials and questionnaires (E-issn, Dan, and Barang 2018). It can be used in service innovation, and Design Thinking can be thought of as a sequence of process steps that can be transformed into a service innovation process during the period that has been used in the mechanism of the questionnaire to the respondents to handle a total of 50 respondents. In sending questionnaires to all survey respondents, this research can be done although there is still little to do about service innovation using the Design Thinking method approach (Hehn and Herterich 2018). In the process of offering a solution in solving a fundamental problem, unbook is developed into a solution in the form of a mobile application. When the application development is complete, the application will conduct a trial or test to check the application. The test was conducted on 50 respondents, and the results of the respondents who did the test reached 80%. The Design Thinking method is used in developing the Ayo Sehat application (Amalina et al., 2017).

Interactive media are tools that assist in delivering information in the form of learning applications in which there is information in the form of text, images, sound, or video. The delivery of information that is easy to understand by users (Lessons, Information, and Communication nd). In symptom recognition, this tutorial method aims to introduce the types of symptoms. This material is packaged in visual media that provides learning, this application was tested with 50 respondents, and the results of the responses from users reached an average percentage of 80%. (Sembiring and Wahyuni 2018) .

Most people lack discussion about health and health knowledge, so few people are affected by diabetes. Diabetes is one of the deadliest diseases because this disease lasts a lifetime and can also cause complications with other diseases. Among the various types of diabetes, there is diabetes mellitus which can infect anyone even at a young age. The cause is hyperglycemia which is very susceptible to disorders that cause the failure of the eyes, kidneys, heart, and blood vessels. The blood sugar level is the glucose level that regulates the blood sugar concentration in the body, which is the essential energy source. Clinical symptoms in diabetes usually tend to experience mild or no symptoms (Relationship et al., 2013) (Mirza, Psi, and Psychology, 2017).

The design thinking method approach in this study was used for the use of interactive media, and this study used design thinking because it fits with a direct approach to the user, which aims to convey information related to diabetes, which will later provide some information about maintaining sugar levels by knowing the dose of food. And drinking, eating patterns, taking drugs, and doing physical activity. Users of educational applications can use the results of this study.

1.1 Destination

This study aims to increase interactivity in maintaining normal sugar levels for diabetics using a design thinking approach. The result of this research is interactive media intended for people with diabetes.

2. Method

In conducting research, there are five systematic stages to creating interactive media: data acquisition, application design, application development, testing stage, and finally, reporting and publication.

The first stage is collecting data related to diabetes blood sugar levels and people with diabetes who have had diabetes for more than three years.

The second stage of designing this application describes the system requirements with the concept used for this design is to use the Design Thinking method. Design Thinking has five stages, namely:

- Empathize focuses on observing what the user is doing or is wanting by interacting with the environment and everyday life to be directly involved in creating innovation. In this study, the empathize stage observed and interacted with diabetics to find out what was needed and follow their daily lives.
- Define is done after the empathetic process; after that definition is done to understand the needs and problems that have been empathized to understand the user's desires in the form of interviews, which will later be able to understand the features desired by the user to get solutions to the core problems obtained from the user. So that the solution that is caught by using interactive media in the form of applications designed according to the wishes of the user that can meet their daily needs, the specified target user has diabetes.

- Ideate will be made on the previous Define prisoners on how to produce interactive applications that can answer the problem of maintaining normal sugar levels for people with diabetes. In this process will appear many ideas that allow a solution to user problems.
- Prototype is the stage of the previous process in the empathy stage. The previous idea resulted in conclusions regarding the various flows performed by the user when maintaining normal blood sugar levels for people with diabetes. The flow was then reformulated to become the flow used and used as a reference in designing features in prototype development.
- Test on Design Thinking conducts a trial of the product produced at the previous prototype stage. Testing this application is carried out through two stages: application testing and questionnaires. Users need time to use the application and understand its features, icons, and buttons.

The third stage of Making Interactive Media is making all design concepts that have been compiled as a whole. Design Thinking can be adapted to interactive media and all components that will be combined and produce an educational application in the form of applications that users can use.

The fourth stage is testing by using this application so that system testing can be carried out correctly. This test is carried out by giving a questionnaire to the user to check whether the application is suitable

The fifth stage is Reporting and Publication to publish the results that have been made and where every progress will be seen and included in the document as evidence of progress that has been completed in the research.

3. Analysis and Design

3.1. Educational Application Analysis

Educational application analysis consists of educational application field analysis, design analysis, educational object analysis, and educational application interface analysis.

3.1.1 Analysis of Educational Application Fields

An educational application is a learning application which means that the application has structured or semi-structured activities which are usually intended to be used in educational facilities. In the learning that will be delivered, namely about food, drink, and activities for people with diabetes. Educational applications are built using the C# programming language in the Unity application.

The educational application will be built with three main pages: food, beverage, and sports. Each page will provide information about what foods and drinks are allowed to be consumed by diabetics, the number of doses that can be consumed, then what activities should be done by diabetics.

3.1.2 Design Analysis

Users act as people with diabetes who place themselves in search of information in educational applications. Several objects in the educational application contain information about prevention, treatment, treatment, and exercise. The condition of the user here does not know anything, three main features provide information related to food, drink, and sports.

3.1.2.1 Educational Application Business Process

- a. The user opens an educational application.
- b. Users understand the use of educational applications.
- c. The user selects the "information 1" menu containing the symptoms of diabetes, and then the application will display diabetes symptom information.
- d. If you want to find second information, the user selects the "information 2" menu, which contains diabetes treatment, and then the application will display diabetes treatment information.
- e. If you want to find third information, the user selects the "information 3" menu, which contains diabetes prevention, then the application will display diabetes prevention information.
- f. The user selects the settings menu, which contains instructions on how to use the application.
- g. The user selects the "food" menu, and then the application displays a food selection page for people with diabetes.

- h. Next, choose the type of food to get information about the food.
- i. The user selects the "drinks" menu, and then the application displays a drink selection page for people with diabetes.
- j. Next, choose the type of drink to get information about the drink.
- k. The user selects the "sports" menu, and then the application displays a sports page for people with diabetes.
- l. Next, choose a sport type to get information about the sport.

3.1.3 Educational Object Analysis

Educational applications will be built on a mobile-based basis where this application can only be used on mobile devices.

3.1.4 Educational Application Interface Analysis

This educational application interface displays two dimensions (2D). The interface that will be built is the main page interface which is a place to get information on educational applications. Several main pages will display an information interface related to these pages, information about what types of food can be consumed by diabetics and the number of doses that can be eaten. Then there is information about the types of foods people with diabetes can eat. People with diabetes can consume what types of drinks, the number of doses that can be drunk, and the tone of information regarding daily activities that must be carried out by people with diabetes, ranging from light to strenuous activities (exercise).

3.2 Educational Application Software Design

The design of this educational application is made using Design Thinking, which is as follows: (Figure 1)

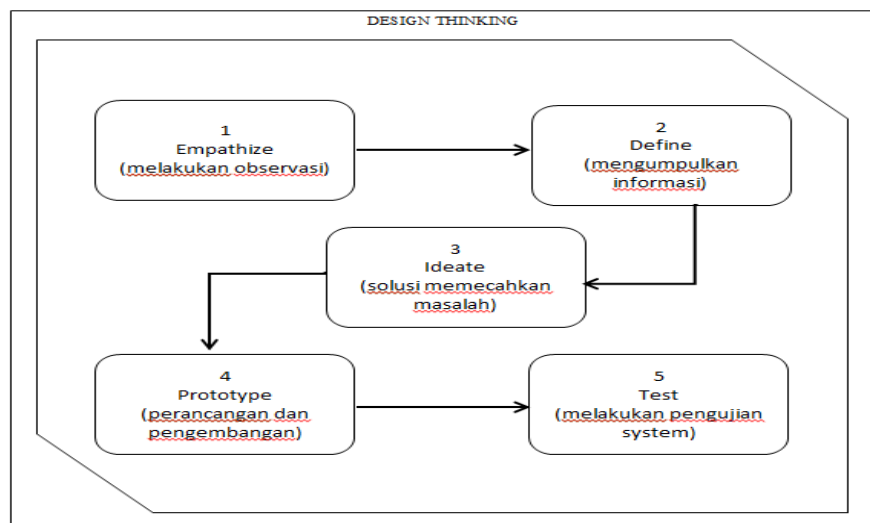


Figure 1. Design Thinking Method

3.2.1 Empathize

The empathize stage aims to interact directly with the sufferer related to the condition experienced by the sufferer with the aim of obtaining information in the empathize stage to obtain information can be done as follows.

1. Conduct interviews with diabetics.
2. Conduct an interview with a doctor.
3. Observe sportsmen and sportswomen related to sports or activities that must be done for diabetics.
4. Make observations on the environment of diabetics.

5. Make observations to non-environmental diabetics (outside view).
6. Apply the results of the information that has been obtained to oneself.

3.2.2 Define

The define stage is to collect information required from the results of observations and interviews that have produced a definition of the problem at the empathize stage to find a solution that can solve the problem, according to the results that have been obtained. The results of the solution can be applied as a reference for diabetics in maintaining a diet.

That a diabetic who often experiences complaints of high sugar levels that can make them have difficulty in maintaining a diet. With a diabetes application that can help remind diabetics in always improving their diet and health. "When there is a diabetic who has bad habits in diet and activities, so that nothing worse happens to a diabetic, therefore solutions emerge that can help in managing diet and activities. The solution is to build an educational application that can help diabetics in managing their diet and activities".

3.2.3 Ideate

The ideate stage is as a solution in overcoming problems that occur in patients, solutions that will be produced in the form of educational applications. In this stage of the educational application will perform the role of an educational application, the design can be seen in Figure 2.

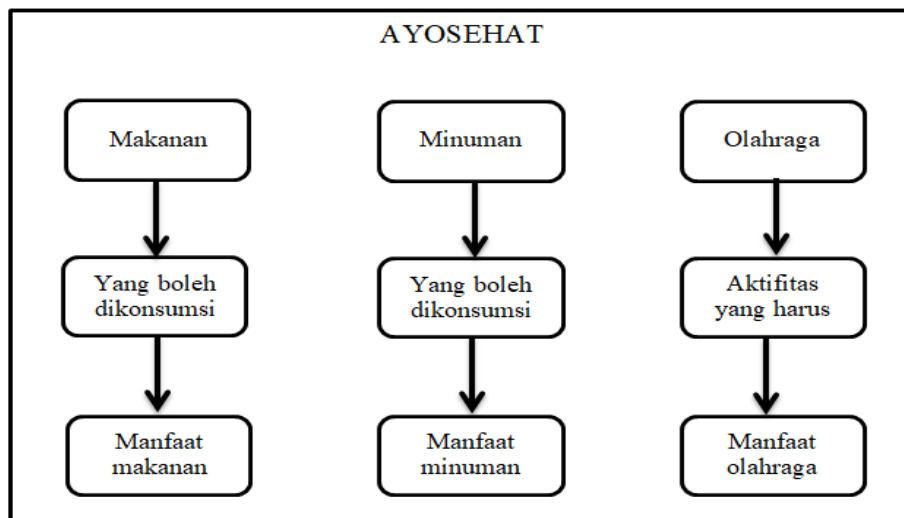


Figure 2. The educational application design concept

3.2.4 Prototype

The prototype stage is the creation of a collection of objects in the form of technology, images or sounds needed in the development of educational applications, the collection of objects such as text, images and sounds is adjusted to the needs in application development, this stage is to learn and develop the information that has been obtained in the previous stages, at this stage can turn ideas into forms that can be used, the prototype idea can be seen in Figure 3.

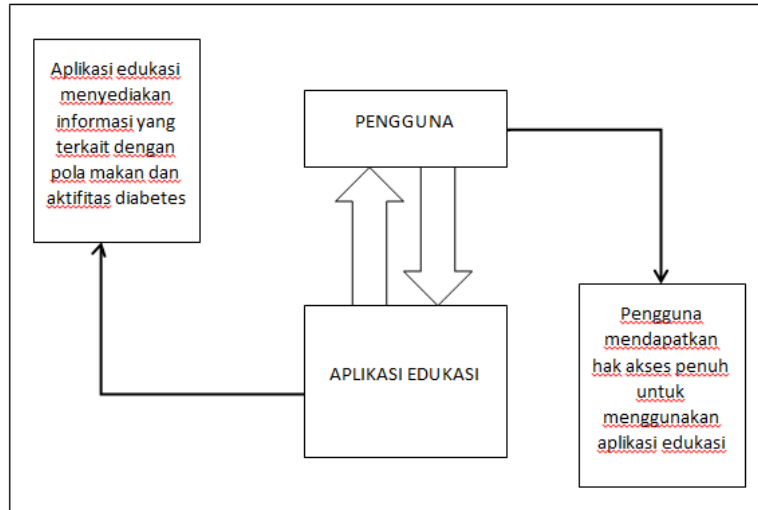


Figure 3. Educational Application Prototype

3.2.5 Test

Test stage is a process that carries out the development of the application by testing the system that has been made to patients to check in order to get response results after trying this educational application. At this stage, it will show various response results to the educational application whether the results are in accordance with what the user expects or not and whether the solution of the educational application can map the problems that occur to diabetics

4. Implementation and Testing

4.1 System Implementation

The implementation of the system is carried out in the form of a computer program with coding, which is the result of the overall software design into a programming language. The programming language used in making the educational application (AyoSehat) is C# with Unity 2018.3.1f. Educational applications can be used on desktops with Windows operating systems and gadgets with a minimum of Android 4.

4.2 Testing the Education Questionnaire Application

The test was carried out on 50 respondents consisting of general public who had complaints of diabetes symptoms. Testing was conducted using the AyoSehat app. After the AyoSehat application is run, the user will fill out a questionnaire that has been presented containing questions about the respondent's background and responses regarding the AyoSehat application, in table 1 is the result of the questionnaire from the respondent after using the application can be seen as in Table 1.

Table 1 Questionnaire Questions

	PK01	PK02	PK03	PK04	PK05	PK06	PK07	PK08	PK09	PK10
Strongly Disagree	05	05	-	10	00	05	05	-	-	-
Disagree	05	05	10	05	05	05	05	05	-	-
Neutral	05	05	10	05	05	05	05	05	05	-
Agree	15	20	10	10	15	15	20	10	15	10
Strongly agree	20	15	20	20	25	25	15	30	30	40

After the respondent uses the application, they will fill in the value of the application, the results of the assessment can be seen in Table 2.

Table 2 Results of Questionnaire Questions

Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
30	45	50	140	235

Percentage of Value

Value Percentage	Information
0% - 20%	Strongly Disagree
21% - 40%	Don't agree
41% - 60%	Neutral
61% - 80%	Agree
81% - 100%	Strongly agree

From the data that has been obtained, it is then processed by multiplying each answer point with a predetermined weight with a table of weight values.

Then the results of the calculation of respondents' answers are as follows:

First question

- 1) Respondents who answered strongly agree (5) = $235 \times 5 = 1175$
- 2) Respondents who answered agree (4) = $140 \times 4 = 560$
- 3) Respondents who answered in doubt (3) = $50 \times 3 = 150$
- 4) Respondents who answered disagree (2) = $45 \times 2 = 90$
- 5) Respondents who answered strongly disagree (1) = $30 \times 1 = 30$

Total Score = $1175+560+150+90+30=2005$

The highest total score for the item Strongly Agree is $5 \times 50 \times 10 = 2500$, while the score Strongly Disagree is $1 \times 50 \times 10 = 500$. So, if the respondent's total score is 2005, then the assessment of the respondent's interpretation of the AyoSehat application is the resulting value using the Index % formula.

Index formula % = $\text{Total Score} / Y \times 100$

Then the final solution of the case example: (Figure 4)

$$\begin{aligned}
 &= \text{Total Score} / Y \times 100 \\
 &= 2005 / 2500 \times 100 \\
 &= 80,2 \%
 \end{aligned}$$

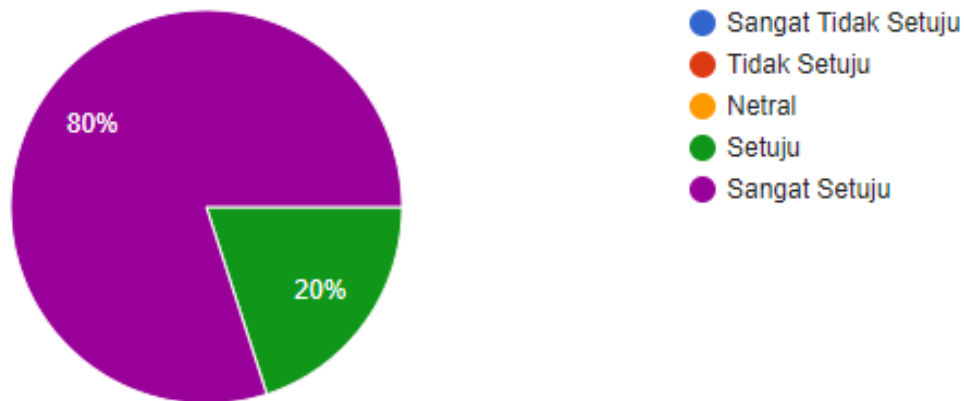


Figure 4 of the result of the questionnaire diagram

5. Conclusion

This research has produced an educational application about introducing healthy food to maintain normal sugar levels in diabetics, which is implemented using the design thinking method. This educational application was built to provide learning through interactive media in the form of various kinds of food, drinks allowed to be consumed by diabetics, and types of exercise that diabetics can do. The Ayo Sehat application has been tested on 50 respondents by trying to run the Ayo Sehat application. From the results of the test questionnaire shown in table 4, it can be concluded based on the responses given by the respondents that the Ayo Sehat application meets the percentage of 80.2%, so the application of the interface and learning information has been applied to the Ayo Sehat application.

Reference

- Amalina, Sabika, et al. "Design UniBook Application Prototype Using Design Thinking Approach Method.": 50–55. 2017.
- Ayu, Ida, Sawitri Dian, Rendy Akbar, and Andi M Ahsan Mukhlis. "Design Thinking As A Method Of Creative Education Of Teenage Children." 2. 2019.
- Cesar, Julio, and Rosaria De FSM Russo. "ScienceDirect ScienceDirect Design Thinking Integrated in Agile Software Development: A Design Thinking Systematic Integrated in Agile Software Literature Review Development: A Systematic Literature Review." *Procedia Computer Science* 138: 775–82. 2018. <https://doi.org/10.1016/j.procs.2018.10.101>.
- Chou, David C. "Computer Standards & Interfaces Applying Design Thinking Method to Social Entrepreneurship Project." 55(May 2017): 73–79. 2018.
- E-ISSN, Issn, Lost And, and Found Items. "Application of Design Thinking Methods in Ui/Ux Design Models for Handling Applications for Loss and Findings of Scattered Goods Reports." 03(02): 75–93. 2018.
- Firmansyah, Iqbal, Muhammad Aminul Akbar, and Tri Afrianto. "Development of Healthy Food Recognition Educational Game Using Kinect." *Journal of Information Technology and Computer Science Development (J-PTIHK) Universitas Brawijaya* 2(10): 3817–26. 2018.
- Hehn, Jennifer, and Matthias Herterich. "Design Thinking Methods for Service Innovation - A Delphi Study -.2018.
- Idris, Andi Mardiyah, Nurhaedar Jafar, and Rahayu Indriasari. "EAT PATTERNS WITH BLOOD SUGAR LEVELS OF TYPE 2 DM Patient Diet and Blood Sugar Levels of Type 2 DM Patient." *MKMI Journal*: 211–18. 2014.
- Blue, Muhammad Lutfi, and Iwan Sukoco. "Design Thinking David Kelley & Tim Brown: The Brains Behind the Creation of the Gojek Application." *Organum: Scientific Journal of Management and Accounting* 2(1): 1–11. 2019.
- Mclaughlin, Jacqueline E et al. "A Qualitative Review of the Design Thinking Framework in Health Professions Education." 8:1–8. 2019.
- Mirza, Rina, M Psi, and Lecturer in Psychology. "No Title." 2(Dm). 2017.
- Subjects, Subjects, Information Technology, and AND Communication. "Application Of Interactive Multimedia Tutorial Model To Improving Student's Concept Understanding." : 11–18.
- Relationship, The, Between Duration, Diabetes Mellitus, and Simple Random Sampling. "Relationship of Disease Duration and Blood Sugar Levels with Subjective Complaints of People with Diabetes Mellitus." (July 2017): 231–39. 2013.
- Rosmiati, Mia. "Interactive Animation as an English Language Learning Media Using the ADDIE Method." *Paradigm - Journal of Computer and Informatics* 21(2): 261–68. 2019.
- Sándorová, Zuzana, Terézia Repáňová, Zuzana Palenčíková, and Norbert Beták. 2020. "Leisure, Sport & Tourism Education Design Thinking - A Revolutionary New Approach in Tourism Education ?" *Journal of Hospitality, Leisure, Sport & Tourism Education* 26(December 2019): 100238. <https://doi.org/10.1016/j.jhlste.2019.100238>.
- Sembiring, Evaliata Br, and Dwi Wahyuni. "Interactive Multimedia Recognition Of Rare Animal And Plants." 1(2): 103–12. 2018.
- Syabana, Refly Ilham, and Pramana Yoga Saputra. "Application Of Design Thinking Method In User Interface Design." 2020.
- Wulandari, Retno et al. "Testing on the "Return" Application Based on Mobile / Android Applications With Design Thinking Methods." 5(2): 182–87. 2020.

Biography

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