

User interface design of Be-Health application for children's learning with a gamification approach



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ABSTRACT

Introduction: Indonesia has the fourth-largest child population globally, estimated at 80 million children by the Central Statistics Agency (BPS). The application of Clean and Healthy Living Behavior (PHBS) in early childhood can reduce the number of early childhood health complaints in Indonesia. In addition, the role of positive parenting is also needed to keep the child's environment clean and healthy. This study aimed to determine the attractiveness, clarity, efficiency, accuracy, and novelty of the Be-Health application as a target for parents to help implement PHPBS for early childhood.

Methods: The data was taken from the Statistics Agency in 2018. The Be-Health application's implementation stage used the application development method Extreme Programming (XP). XP was chosen because it is a simple, effective, and efficient application development method. There are five stages in developing the Be-Health application, including five stages, including planning, design, coding, testing, software increment.

Results: Be-Health app is an Android-based application that provides a means to help parents apply PHBS to early childhood. Children can play and learn using the Be-Health application that applies the concept of gamification. It allows children to play and learn to complete learning missions about the application of PHBS through the Be-Health application.

Conclusion: Based on the results of the prototype design of The Be-Health application using the User Experience Questionnaire (UEQ), it can be concluded that the Be-Health application prototype has above average value for the attributes of attractiveness, clarity, efficiency, stimulation and novelty.

Keywords: gamification, health care, children, positive parenting.

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INTRODUCTION

According to Basic Health Research in 2010, the diarrhea prevalence in Indonesia was around 42.2%. The incidence of diarrhea is 9.0% experienced by school-age children.¹ Typhoid in the school-age group has the highest prevalence compared to all existing age groups, 1.9%.² Rosso and Arlianti showed that many diseases suffered by children in the early years of their growth around the years 0-5 years could reappear during the school period, especially in the early years of school, namely 6-8 years. It is related to the intensity of children's activity, especially in playing activities. Children do not understand the importance of clean and healthy living behavior.³

Healthy Life Behavior Program (PHBS) is a form of behavior that can be applied to children early. Since 1996 the Center for Community Empowerment, now called the Center for Health Promotion

& Community Empowerment, has begun introducing PHBS.⁴ According to the Indonesian Ministry of Health (2016), PHBS is a behavior related to health and carried out based on self-awareness so that families and other family members can help themselves and the surrounding community in the health sector. One of the efforts that can be done to improve PHBS is to make habituation and formation of PHBS behavior towards children.⁵

However, getting children to have a clean and healthy lifestyle requires a special and creative way, considering that early childhood is unique and gets bored easily. Parenting patterns play an important role in implementing children's clean and healthy lifestyle habits. According to Wiranata, parents who nurture and provide habituation to children with love and without involving punishment will certainly be more optimal in their application.⁶ Positive parenting will provide a sense of security and comfort

to children. The application of positive parenting in providing habituation to a clean and healthy lifestyle in early childhood is considered very appropriate. Habituation will be created if the child is given repetitive activities appropriately and easily accepted.

PHBS can be socialized through various mass media, print media, and electronic media. With the development of technology, the current mobile phone has an important role. When connected to the internet, a cellular phone has much content that can be used for various activities. One of them is currently many games in the form of applications that can be used by children so that it becomes addictive. Those who are addicted can even spend hours playing it.⁴

Based on the explanation of the problem above, a mobile application called Be-Health was created. The Be-Health application provides users with a fun experience familiarizing early

childhood with maintaining a clean and healthy lifestyle. The Be-Health application familiarizes children with implementing a clean and healthy lifestyle with the gamification feature. According to Lee and Hammer (2011), the notion of gamification is learning by playing games, namely, there are missions that students must complete, and each time completing a task on that mission, the student gets the point.⁷ The existence of the gamification feature so that children can recognize activities regarding PHBS in a fun way. The games in the Be-Health application will be designed in the form of levels from easy to high difficulty so that parents of children can monitor the development of children's knowledge about PHBS can be seen from the last level done. In addition to the gamification feature, other main features help parents teach the implementation of PHBS to children, including children's health facts, healthy short stories, and asking doctors. This feature is useful to help parents in teaching their children about PHBS.

This study aimed to determine the attractiveness, clarity, efficiency, accuracy, and novelty of the Be-Health application as a target for parents to help implement PHBS for early childhood.

METHODS

General Background of Research

PHBS is one of the first steps to reduce the number of health complaints experienced in Indonesia today, especially in early childhood. One of the efforts to increase PHBS can be started from parents' activities that set an example for children always to wash their hands, keep the place clean, and get used to a clean environment. In addition, parents can also introduce games that can represent PHBS to children. Children cannot be separated from playing activities such as games. With games, the children are easier to accept knowledge and new things from their playing environment; therefore, parents can give a game about the implementation of PHBS as a medium for playing and learning children about the implementation of PHBS.⁸ The children's playing and learning media are currently supported by the development of existing technology, such as smartphones and the

internet. However, parents must be wise in giving access to children to use existing technology. According to Pramono and Paramita, if children are addicted to existing technology, especially playing applications on smartphones, they can spend their time playing for a full day.⁴ This can harm the child's psychology in thinking.

Sample of Research

Indonesia has a child population of 80 million children; the data was taken from the Statistics Agency in 2018. Figure 1 explains that Indonesia has the fourth-largest population globally, and more than half of Indonesian children are in 5 provinces.

Most of the child population in Indonesia lives in large and densely populated cities such as Jakarta. The level of urban poverty and pollution is a challenge for parents to apply PHBS to their children in the surrounding environment. Some people choose to live in urban areas because all access and facilities are easier and more complete, even though the population level in urban areas is higher and more dangerous than in rural areas.¹⁰

Instruments and Procedures

Be-Health application was implemented using Extreme Programming (XP) as an application development method. XP was chosen because it is a simple, effective, and efficient application development method. For XP development scheme can be seen

in Figure 2.

According to Figure 2, there are five stages in the development of the Be-Health application, including:

A. Planning.

Following Figure 2, the initial stage for the development of the Be-Health application is planning. The planning stage can be started by conducting observations, surveys, and interviews on system requirements that allow users to understand business processes and get a clear picture of the features that exist in the Be-Health application, to match the targets and needs of end-users. In the planning process, interviews and surveys are carried out with parents who have children under the age of 6 years to follow the system's needs. Interviews & surveys were conducted offline by applying health protocols & online using the zoom platform.

B. Design

The second stage was the design stage, which manufactured system modeling based on the results of the analysis of the needs of the system and user requirements that have been done at the planning stage before, in addition to modeling the system at this stage also make database modeling and architectural modeling of users to be used later. In the phase design, they also make the Be-Health application's User Interface (UI). Some descriptions of the basic UI design for the Be-Health application

Fourth largest child population in the world
More than half of Indonesian children are in 5 provinces

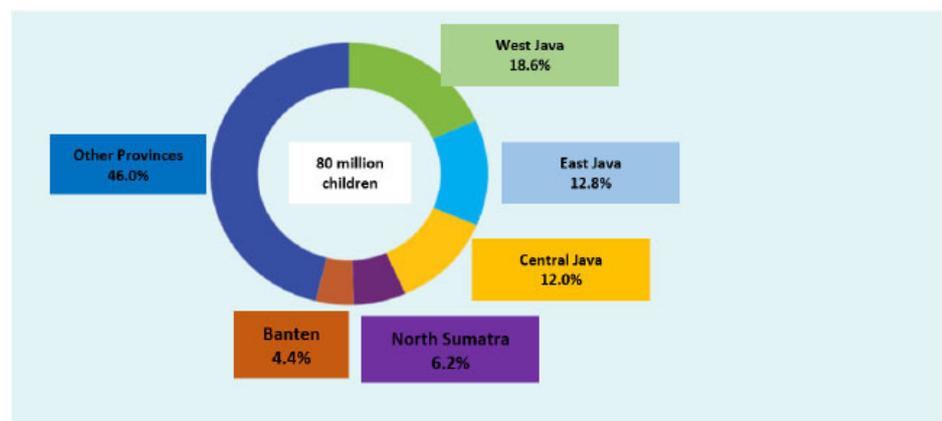


Figure 1. Geographics of Indonesian Children in 2018.⁹

can be seen in Appendix 5 regarding the description of the technology that will be developed. In appendix 5, the design can change at any time by adjusting the needs that have been written in stage 1. The design stage uses the Figma application.

C. Coding
This stage is the implementation stage of the system model design, user architecture, and database that was created previously in the form of program code that produces a *prototype* of the program created. For

making the Be-Health application using the Java programming language or native Android, the database used for master data in the Be-Health application uses My Structured Query Language (MySQL). Prototype implementation to Java programming language using a text editor android studio and discussions using the application Zoom online.

D. Testing
At the testing stage, testing of applications that have been coded in the previous stage is carried out, testing is carried out on application users or end-users, with the aim of getting feedback from users to develop applications. Testing of application functions can use the testing method black box, while testing applications on users using the User Experience Questionnaire (UEQ). The testing phase is faced directly by the target users and users in just to try the application so that we can determine the motion and the first impression when trying Be-Health applications, then we provide a questionnaire created in the Google Form.

E. Software Increment
This stage is the application development stage that has been made and tested on users at the stage testing. The feedback uses a questionnaire at the testing stage, as a system development requirement and evaluation material to improve the Be-Health application.

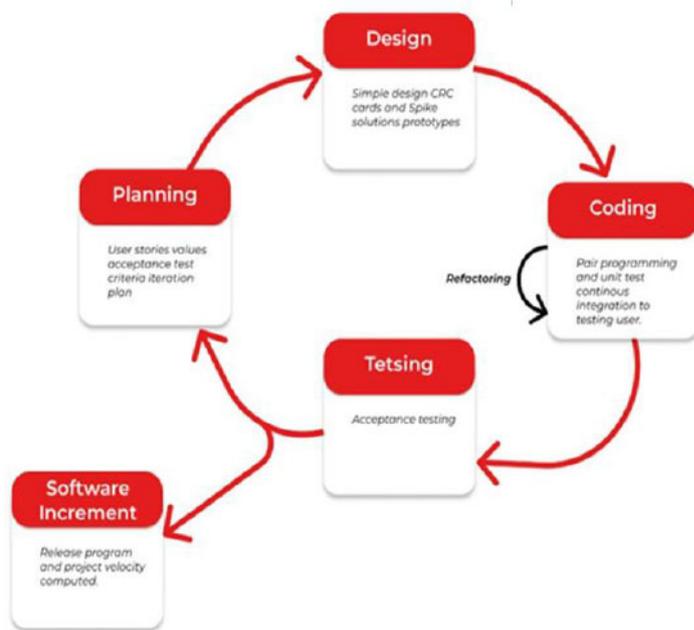


Figure 2. XP Development Scheme.

Percentage of Population in Urban and Rural Areas who Have Health Complaints in the Last Month According to Characteristics, 2017-2019

Karakteristik	2017	2018	2019
(1)	(2)	(3)	(4)
Area Type			
Urban	28.66	30.63	31.73
Rural	28.58	31.37	33.17
Gender			
Male	27.44	29.36	30.66
Female	29.82	32.58	34.08
Age Group (Years)			
0-4	39.57	44.33	47.87
5-9	30.43	33.86	38.06
10-14	21.75	23.01	26.06
15-19	18.16	19.85	21.62
20-24	17.62	19.25	19.98
25-29	19.30	21.07	23.12
30-34	22.22	23.22	22.68
35-39	24.18	25.54	24.86
40-44	27.57	29.19	29.38
45-49	31.13	33.79	34.17
50-54	35.87	37.95	39.31
55-59	40.04	43.40	43.08
60+	48.91	51.28	51.08
Education			
No/Never Schooled and Not Graduated	34.98	38.12	40.83
Elementary School/Equivalent	28.77	31.23	32.58
Middle School/Equivalent High	23.60	25.64	26.54
School/Equivalent	22.46	23.96	24.53
College	21.87	23.10	24.17

Figure 3. Percentage of Population Health Complaints Last 3 Years of the 2017-2019.

Data Analysis

Based on data from the BPS Health in 2019 regarding the percentage of health complaints about urban and rural residents, there was an increase in the number of health complaints ranging from ages 5-9 years and 10-14 years during the last three years from 2017-2019 as shown in Figure 3.

RESULTS

Currently, Be-health applications are already in the stage of application development, especially in the stages of coding or encoding. The User Interface and User Experience have been developed for two main users in the Be-Health



Figure 4. The Main Page of the Be-Health Application.

application, namely Doctors and General Users (children and parents). With the differences, users can classify access to each feature that can be used and cannot be used by every user who uses the Be-Health application. In addition, there are several features in the Be-Health application, the first is a health fact feature that is useful for learning and parental knowledge to increase knowledge about the application of PHBS to children. The second is a short story feature that parents can use to strengthen their children's imagination

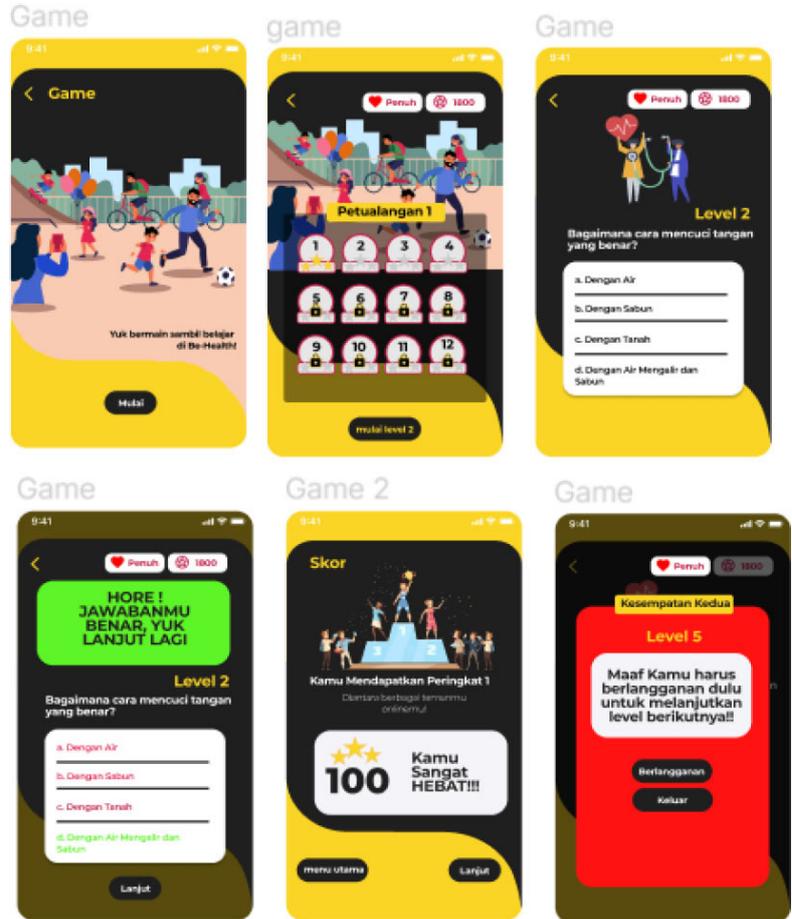


Figure 5. Health Game Page.



Figure 6. Health Facts Page.

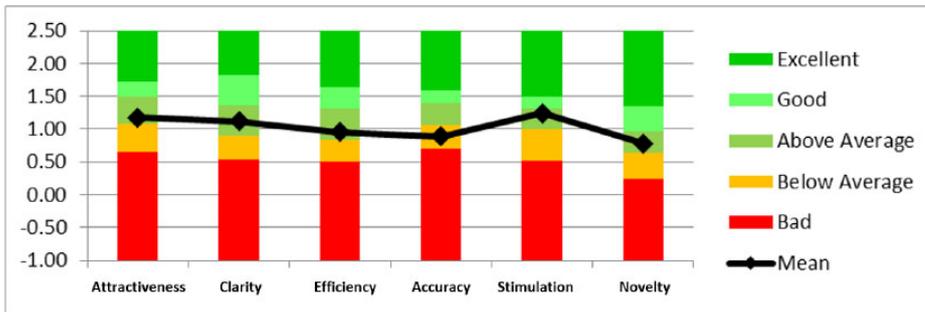


Figure 7. The Results of the User Trial Using the UEQ Method

through short stories used as children's imaginative stories to learn about PHBS in their daily lives. The next feature in the Be-Health application is asking a doctor. This feature is useful as a medium of communication and consultation for parents with pediatricians when parents need doctor assistance in implementing PHBS in their children's environment and when children experience symptoms of certain diseases. The last feature is children's play, this feature is intended for children as a medium for learning and playing with PHBS through the missions that exist at each level. Here are some screenshots of what the Be-Health app looks like.

Based on the features built in the Be-Health applications, it will require cooperation with the pediatrician to support the learning and application of PHBS in the Be-Health applications that parents can use as a medium of learning for their children in applying PHBS and as a child playing media. With the development of technology in the industrial era 4.0 this time, the potential to reduce the number of child health complaints in Indonesia and the application of PHBS in children's daily lives will be easy through the Be-Health application, because with the Be-Health application parents and children can learn and play together about PHBS. From the trial results of using the prototype of the Be-Health application that uses the User Experience Questionnaire (UEQ) method to users, it can be concluded that the Be-Health application has good attractiveness, clarity, efficiency, stimulation, and novelty. The user trial results using the UEQ method on the Be-Health application can be seen in [Figure 7](#).

DISCUSSION

This research creates a mobile application called Be-Health. The Be-Health application provides users with a fun experience in familiarizing early childhood with maintaining a clean and healthy lifestyle. The Be-Health application familiarizes children with implementing a clean and healthy lifestyle with the feature gamification. The existence of the feature gamification so that children can recognize activities regarding PHBS in a fun way. The games in the Be-Health application will be designed in the form of levels from easy to high difficulty so that parents of children can monitor the development of children's knowledge about PHBS can be seen from the last level done. In addition to the feature, gamification has other main features that help parents in teaching the implementation of PHBS to their children, including children's health facts, healthy short stories, ask the doctor. This feature is useful for helping parents in teaching their children about PHBS.

This study uses a measurement tool for adaptation results with the addition of several items. The respondents perceive the items in this measuring instrument as experiencing repetition of meaning so respondents become a little confused because the form of one statement with another seems to have the same meaning. On the one hand, this measuring instrument has relatively few items, which are 26 items. The researcher also did not see respondents who were tired of filling out the questionnaire, even though some of them only complained about the items that had the same meaning.

CONCLUSION

It can be concluded that the Be-Health application is proven to have above-average scores for attractiveness, clarity, efficiency, accuracy, and novelty. The Be-Health application has the right target and is useful for parents to assist in implementing PHPBS for early childhood. Therefore, further research with larger samples and different study designs needs to be done to identify factors influencing attractiveness, clarity, efficiency, accuracy, and novelty of the Be-Health application.

AUTHOR CONTRIBUTION

All authors have contributed to this research process, including conception, design, collection and assembly of data, analysis and interpretation of the data, drafting of the article, and critical revision.

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CONFLICT OF INTEREST

There is no conflict of interest for this manuscript.

ETHICAL CONSIDERATION

This study was approved by the Research Ethics Committee of the Universitas Dinamika, Surabaya, Indonesia.

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who have helped and provided guidance and advice in the process of this practical work. The author realizes that there are still many shortcomings in this practical work so constructive criticism and suggestions from all parties are expected so that this application can be improved for the better. Hopefully, this journal can be accepted and useful for the author and all parties.

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