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Designing “Breast Self Examination” Application For Detecting Breast Cancer As Effort For Women Ages 15-20 Years

Diana Aqidatun Nisa¹,

Visual Communication Design, Architecture and Design Fakultas,
Universitas Pembangunan Nasional “Veteran” Jawa Timur

Breast cancer is the second dangerous disease for women after cervical cancer in the world. In 2012, it became the most disease suffered by women in Indonesia. Ministry of health records in 2013 that the patient of breast cancer is increasing for women from the age group between 15-20 years old. Health institutions have been doing education campaigns about preventive action against this disease to young women. However, the feeling of embarrassment, fear, and overconfidence of being healthy would have prevented them from reviewing their breast condition checked by medical doctors or specialists. Their lack of awareness about the disease's danger has made them checked regularly, neither review their breast to the doctor nor do a self-examination. The education about breast cancer is vital to gain awareness of young women. It should be delivered by the media that close to them, for instance, using smartphone technology. Breast cancer information via smartphone can summarize much information; besides, it is easy to access privately anywhere, anytime. It can be delivered in an instructive, brief, yet still interactive and easy to learn without being boring. The smartphone application called “SAATNYA SADARI” design is based on qualitative research. The method is carried out by studying the literature, questionnairing among young women between 15-20 years old, interviewing the specialist, and surveying the Hospital and Indonesian Cancer Foundation. BSE is focused on the early detection of breast cancer and self-examination education so that the women can do it as a routine.

Keywords: Smartphone application, breast cancer, young women, awareness

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Introduction

Breast cancer is a significant threat that can lead to death. Women hold enormous potential for developing breast cancer than men. Reinforced by data from the Ministry of Health of Indonesia in 2015, the female population data in 2012 showed the highest among other cancers, namely breast cancer, with 12.9% of the total mortality of 43.3%. Advance knowledge about breast cancer is no guarantee that someone will pay attention to her breasts, especially when she finds her breasts are okay. Based on Desanti et al. (2013: 6), a woman who knows the dangers of breast cancer did not understand how to prevent and perform regular breast examinations. The information delivered through print media such as brochures, newspapers, magazines, books, and many more has minimal explanations about breast and breast cancer alone. The requirements explain breast cancer insights and how to avoid them and treat breast and breast examination for interactive media.

Breast cancer is better detected and prevented in early adolescence because the Indonesian Health Department data showed that cancer prevalence is relatively high in 15 years. In adolescence, women are experiencing physical development such as breast expansion and perfect the formation of reproductive hormones caused by the hormone Estrogen, which, if unchecked, can lead to cancer in women. If the detection of breast cancer can be done since the beginning of the symptoms of breast cancer can be avoided, or the risk can be reduced not to cause death and does not leave scars deeper.

Early detection can help women find breast cancer symptoms. Submission of information about breast cancer in the late teens 15-20 years of age must be adapted to the learning method they can easily understand. The digital concept is closely related to teenagers born after 1980 because they are perceived as digital or digital native generation (Prensky in Helsper and Rebecca, 2010: 4). Data knew to Internet users in 2018 in Indonesia in age, adolescents age, 15-19 years, are the most significant internet users among other age categories (Indonesian Internet Service Provider Association, 2019). Adolescents who were born in the early 2000s known as the Millennial generation. This generation is growing along with advanced digital technology. The younger generation can absorb information quickly, prioritize visual, and able to perform activities in parallel. They also like the internet as a medium of learning. There are three factors associated with internet use education: fact-checking, training and learning, current affairs, and interests searching like reading news, sports information, health, and other activities (Helsper and Rebecca, 2010: 5). Therefore, smartphone chose as the medium used for the design of BSE applications for adolescents.

Methods

The design uses a research instrument interview, questionnaires, observation, and existing studies. The observation was made in the Indonesian Cancer Foundation and Airlangga hospital to know the procedure of examining and treating cancer there. Interviews were conducted with dr. Oemy Syarif Indonesian Cancer Foundation board as Bandung and dr. Bambang Sunyoto as a surgeon. This interview is required to determine the needs (features) in the application to be made. Existing studies of women's health through the interface of two applications, namely American Early Detection Plan and Check Yourself! (Nisa, 2019).

Data Analysis Research

Analysis of the research instruments used qualitative methods to approach the Intersubjectivity Agreement. This approach gathers opinions, views, or data obtained from many subjects that aim to generate a meeting point between data (Kriyantono, 2014).

Survey

Indonesian Cancer Foundation provides inspection services for cancer patients, raising donations and educating the community, mostly high school teenagers. Hospital is a referral when someone should get further treatment. A person already has cancer because there are physical signs, so that the application will be made to support public education conducted by ICF. Since these applications focus on the procedure of BSE and breast care for women.

Interview

breast cancer, according to the doctor, the death rate could be reduced if known early. Therefore, girls should start a healthy lifestyle and care for the intimate parts of her femininity. BSE can be done alone without the help of others but must know how to do it right. So it takes a video to show how to perform BSE, treat breast (through breast massage), and information about the dangers of breast cancer and a healthy lifestyle. Dr. Bambang Sunyoto, based on his experience in patients with breast cancer, they have had to get special treatment, for example, surgery. He added that the application should make it easier for a person to reach the doctor or hospital in their respective areas.

Existing Studies

We concluded that settlement layout and composition favored by teens is a graphical element that has a systematic but fun, especially in applications Check Yourself!. The application creatively makes arrangements of different layouts on each page and bright colors and contrast. Flow navigation is also made simple and powered by the selection of attractive icons and clear font legibility. The user interface for teenagers, in general,

should be made fun of so that the teens to be comfortable and not get bored. Thus the appropriate interfaces teenage characters allow them to absorb the content of the app.

Based on the research results, obtained design data content relationships with smartphone applications. Table 1 shows the results from the implications.

Research Results	Problem	Content Data
Causes of breast cancer	How to avoid breast cancer?	Increased awareness by providing information about the various causes of breast cancer
Poor data collection from the first patient of breast cancer	How can I make a clinic/hospital can get accurate answers of the patient?	Provides logging feature activities based on the condition of the patient's breast
Means of prevention and early detection Breast cancer	How do women can do prevention and early detection?	Told how to do prevention, and taught early detection through breast self-exam features
Clinics, hospitals and cancer institutes Indonesia providing seminars/ counseling	How do I ensure that women continue to increase their vigilance and apply insights from seminars/ counseling?	Provide facilities to interact with clinics, hospitals, and cancer institutes in Indonesia.
adolescent girls	How to convey information to teen breast cancer?	Submission of information in a fun way to look appealing, not scary, and given a definite invitation to the media, with which they

Table 1. relationship between research results and content data

Result And Discussion

Concept Design

This application's purpose is so that adolescent girls ages 15-20 years know to pass on public knowledge about breast cancer and alert early breast health. Communications is fun with pictures, so teens can receive information quickly and be concerned with breast health.

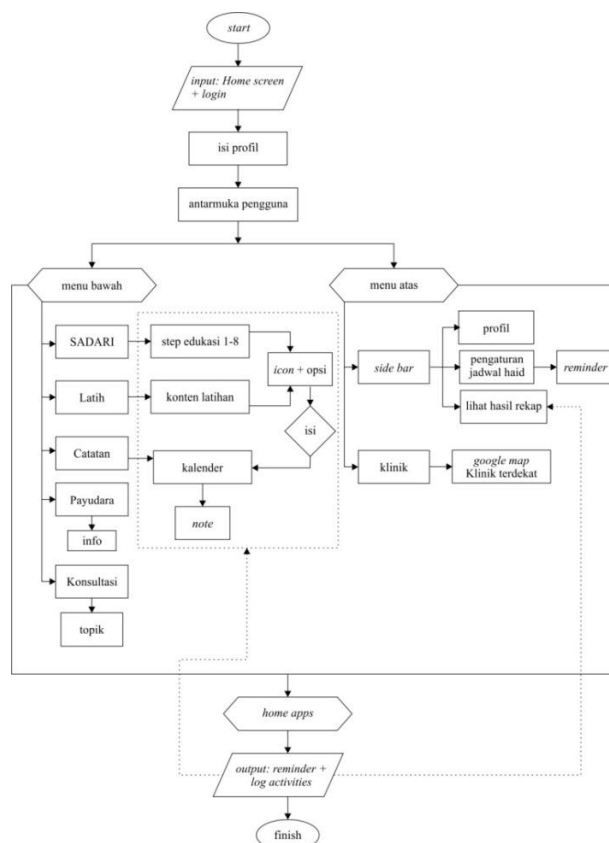


Fig. 1 Hierarchy application of "Time BSE"

The application form of a personal nature was made like a diary of teenagers who have a primary calendar. Users will be given knowledge about breast and steps to perform BSE and breast exercises at an appropriate scheduled time.

The design of the application "SAATNYA SADARI" is divided into several features that the first stage of preparation. The stage contains user data charging since cancer can not be known with certainty; the cause can be from a close relative or a person's lifestyle. Second, fill the menstrual schedule associated with the determination of the BSE schedule. To be more accurate for the early detection of breast cancer, BSE should be done at least a week after menstruation. Then set the time of notification to alert the user to perform BSE. Third, breast exercises with 13 different series of movements and BSE at a specified time. Fourth, filling the calendar, which is useful to view a summary of the results of breast exercises, automatically predict menstruation time, and view schedules BSE. Other than that, This calendar is also useful as a diary relating to the issues surrounding women's breasts—fifth, a feature that contains knowledge relating to breast cancer. Sixth, the consultation feature can be used by users to consult with a physician. Moreover, seventh, namely, recommendation maps feature a clinic or hospital with a cancer surgeon in each city.

Application hierarchy

Figure 1 is an application hierarchy “SAATNYA SADARI” from the welcome screen to the service recommendation clinic/hospital. This application begins with a title screen, welcome screen, login, and home screen. At the welcome screen, a character greets users that serves as a guide. After the opening page, the user will enter into the login screen to create a new account. Furthermore, new users will be heading to the profile screen to fill her status. This page will only appear if new users install this application.

The home screen’s user entries, which consist of six main features, led to the BSE page, Practice page, Breast pages, Consultation Notes page, and additional pages that have clinics page and sidebar. All pages are represented by icons that mirror, barbells, notebook, bra, hospital, and icons indicating the location. First, the user performs a fill out the period schedule in the sidebar to determine the BSE schedule calculated two weeks from the start of menstruation. Once charging is complete, profiles, and the period date, users can use BSE and Exercise features.

The Application

This application’s visual design is a flat design that is a minimalist design that prioritizes usability (Cousins, 2013). Flat design gives the impression of a neat, open space, a suburb of exact, bright color, and is dimensionless. This technique’s principle makes a more straightforward design in which the decorative elements are judged to be essential so easily applied to smartphones to attract users’ attention because it is easy to use and precise function, especially in the small size of the screen. Another function is to alleviate technical problems that can optimize the work to multiple platforms.

Character

The reference is taken from high school teenagers. The reason behind this choice is because they have normal body proportions. The main character is shown only half of the body, as shown in **Figure 2**. Therefore, the characterizations focus on the face and body proportions of the head and abdomen. The selection of character in terms of the young body’s proportion has no apparent curved posture as adults. They have thus made less prominent in the breast, waist, and hips. Eyes, nose, and lips shape are not made realism.



Fig. 2 Alternatives design of the main character Opening Pages

Fig. 3 Display on the registration page and login page

Icon and Splash Screen

The icon used in this application reflects the breast’s topics, as depicted in **Figure 3**. The breast image is not shown directly but is represented by a bra to reduce the sensuality side. It is then coupled with a pink ribbon that indicates that the application is related to breast health and cancer. “BSE” writing on this icon has a purpose of making girls can immediately realize the meaning of the icon that is consciously concerned with breast from now. The splash screen is also contained gimmick, so users know the mission of this application as a means of breast cancer campaign and to persuade users to take care of her breasts.

Registration page

The registration page is a page for users to sign up for an account application. The login page provides space for users to protect personal data privacy and is useful for this application.

Profile Page

This page is specifically for recording user background as initial data. The details of the profile based on the

questions asked by the doctor when asking the patient's history, but options are shown only include essential information, i.e., date of birth, weight, history of cancer, early menstruation, consumption of hormone pills/ birth control, and user state.

Display profile page

Button-down options are on the three details is a history of cancer, hormone pills consumption / KB, and user status. It is the answer to status details.

Home Screen

Figure 4 The home screen, which can be seen, shows six main features of BSE, Exercise, Note, Breast, consultations that are placed on the bottom screen, and a sidebar on the top. Five features on the bottom are functionalized to interact with the user. There is also a useful sidebar menu to make changes to their profile, settings menstrual schedule, and view user activity results. On the home screen, users meet the main characters who will accompany the user when using the application. She will introduce herself, tell the steps that must be taken to run the application, and provides a call / lively appeal to users.

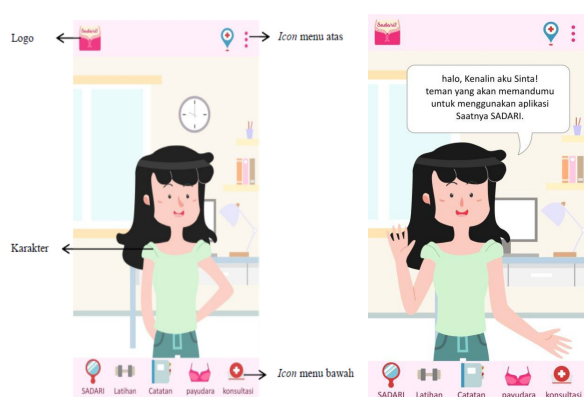


Fig. 4 Display on the app home screen

Breast Self Examination

It is crucial to perform regular self-breast examinations every month after the menstrual period. Detail steps are provided with pictures due to the importance of women doing self-breast examination correctly.

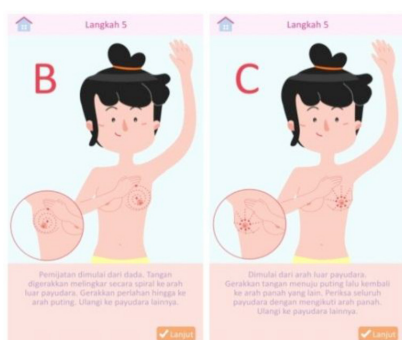


Fig. 5 the steps on BSE page

Steps to perform BSE are preceded by a preparatory stage to start the detection of breast cancer. First, users should ensure facing a large mirror that can be seen clearly throughout the body. This activity can be done in the bath with soap to moisture. After that, straighten the hair not to block the breast and not interfere with the detection process. Next, users should follow BSE steps, as shown in **Figure 5**. After performing every step, users should press the Continue button in order to continue the next step. Another function of the Continue button is feedback from users of the applications that the user has made such a move, and the app will record the user's activities.

Exercise

On the exercise page, the first view is the timeline of the exercise in four weeks. In the first week, there are six days of training and one day of rest. Every three days in a row, users should perform the same exercises. Because of many different exercises, an arrangement is made to facilitate the timeline in which one day will open one box only. Then, users will not be confused about finding a series of exercises that are not yet done.

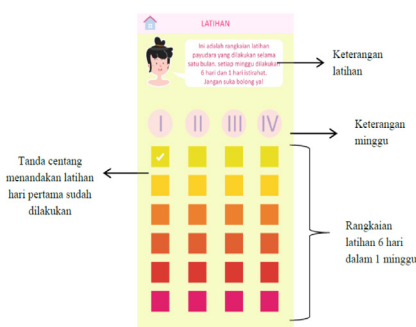


Fig. 6 Timeline view of Exercise feature

Figure 6, this timeline is created not to resemble the calendar because the first exercise should not be done at the beginning of the month from when the user installs the application. When users have finished an exercise, a checkmark will appear on the corresponding box. If one circle has been filled, it will start again from the beginning of the first week of workouts.



Fig. 7 display on the exercise page

In a day of exercise, the user will perform some exercises guided by video at every step. **Figure 7** shows the steps, such as BSE measures. After over one step, the

user must press the button on the application to confirm that the motion exercises have been carried out. If the whole set of exercises a day has been done, the user must fill out their daily activities on the Notes feature.

Results of Note

Figure 8, note Activity is a display page that loads when performing BSE and Exercise are completed.

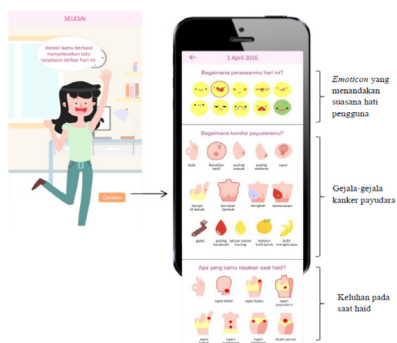


Fig. 8 display of activity page

Before entering the page, the apps will signify that BSE activities and exercises have been completed. The icons on the page are divided into three categories icons. The first icon represents the mood, the second icon is a breast condition, and the third icon is a complaint at menstruation. The mood icon's function is to represent the mood of users from their body or breast conditions. Breast conditions icon serves to determine the presence of symptoms of breast cancer or not. Complaints icon is filled when menstruation period to determine the body's condition that usually happens during menstruation to avoid errors concludes as symptoms of cancer. Figure 8, Breast conditions and complaints icon during menstruation are also provided with certain information to understand each icon.

Record page

Record page is the page where users can see their daily data entry results and see the date to perform BSE. This page is available in the calendar, which contains the results of breast activity records and notes. The preview of the page can be seen in **Figure 9**.

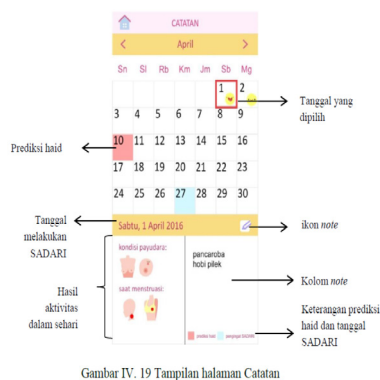


Fig. 9 Record page display

Predictive information available on the calendar is obtained from the female menstrual dates settings menu in the previous month. The description of menstrual prediction is only displayed on the first date predictions. The menstrual prediction function determines a schedule perform BSE calculated from 7 to 10 days after menstruation. Once users fill in data on one day, mood icons can be seen in the calendar, while the breast conditions icon during menstruation is shown on the bottom. A charging note is made by pressing the Pencil icon.

Breast

Figure 10, the breast page is divided into several sub-menus: Breast, Breast Cancer, Health Tips, and Life-style Tips.

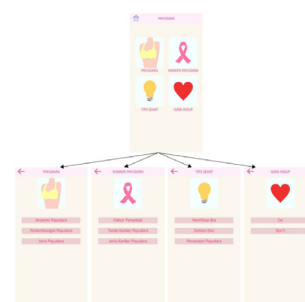


Fig. 10 Hierarchy feature Breasts

Breast sub-menu consists of Breast Anatomy, breast development, and breast type. Meanwhile, the Breast cancer sub-menu contains Breast Cancer Causes, Signs of Breast Cancer, and Breast Cancer Types. Health tips fill with bra election, early detection, and breast treatment tips. While in the Lifestyle sub-menu, there is information about what should be done and what is prohibited. The purpose of classification is set in sequence so that the user can quickly get the information needed.

Consultation

The consultation page is the page that links the user and the doctor where users can express questions. It is divided into two: Q-Form and Inbox. It can be filled with two topics as the title and details as more detailed questions. While on the Inbox page, the user can see all of the answers from the doctor.

Clinic

The clinic page is a search page to find an oncological clinic or hospital in the user's city if the user wants to perform further tests. This page will be integrated with "Google Map" to find the desired hospitals by location/city.

SideBar

The sidebar menu displayed in **Figure 11** is the menu to set all associated with application features that Personal Data, Schedule Notes Menstruation, and View

Results.

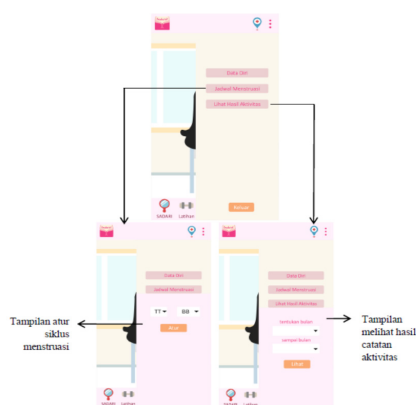


Fig. 11 side bar interface

Personal Data button will lead to a user-supplied status when the beginning of the use of this application. Personal data can be changed at any time according to the user's condition. The menstruation schedule button is used to set a schedule for conducting BSE when in the menstruation period. A button is used to set the date of the first day of the last month if the user had a period, and the date will be visible in the calendar. The last is the display of results activities function so that users can immediately see the details of the activities already carried out and the results of breast records of several months of the year.

Note Activity

Figure 12 shows a note of the activity page after pressing See Note Activities on the sidebar.

Hasil Aktivitas			
April			
Tgl	Aktivitas	Payudara	haid
1	Latihan	nyeri	nyeri payudara nyeri punggung
2	Latihan	baik	-
3	Latihan	baik	-
4	Latihan	baik	-
5	Latihan	baik	-
6	Latihan	baik	-
8	Latihan	nyeri gatal	-
10	Latihan	nyeri gatal	-
11	Latihan	nyeri gatal	-
12	Latihan	nyeri gatal	-
13	Latihan SADARI	nyeri, kemerahan	-

Fig. 12 Display of the results of activity in the form of data records

Figure 12, there is a testimony about breast condition during the menstruation period, which can be seen daily. In that situation, the date of the last day of men-

struation then records the current state of menstruation filled. Breast conditions must always be filled to know if there is a complaint in the breast. Users should be aware of the activity that will be recorded within one day. So if the user does not perform the exercises in one day, then the day will not be registered.

Conclusion

“SAATNYA SADARI” application is designed for women in Indonesia at adolescents age (15-20 years old) to examine their breasts themselves and are interested to learn more about breast health and breast cancer. The purpose is to make them more understand about breast cancer information and prevention of breast cancer. This information is summarized in the smartphone application for easily accessible, more privacy, accredited, and compact sources.

The development of smartphone applications focused on early detection of breast cancer requires adjustment to connect health agencies with women in Indonesia. It will help health institutions change people's mindset to be more conscious and alert with breast cancer. Through this application, reluctance to go to the doctor can now be overcome by digital technology that is easily accessible and conducted independently so that the target user can do this activity whenever and wherever.

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