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Development of The SEJATI Web-based Application as a Media for Promoting Adolescent Health to Prevent Stunting

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ABSTRACT

Background: Adolescence is a vulnerable period, which is a period of physical (hormonal, primary, and secondary sexual state) and psychological (emotions, social relationships, and sexual behavior) with great curiosity. Both anemia in adolescents and early marriage are the main causes of stunting in babies. Adolescents who are anemic will result in anemia in pregnancy, either mothers with anemia during adolescence, or adolescents who experience unwanted pregnancy in a state of anemia (early marriage). Unlike the previous six applications, SEJATI was developed for adolescent boys and girls, providing a consultation page that is more developed than existing applications.
Objectives: The objective of this study is to develop and assess the feasibility of SEJATI, a health promotion application for adolescents, using the SDLC prototype approach to provide improved consultation features and support adolescent health
Methods: This research method uses a qualitative method of SDLC (Software Development Life Cycle) system development, with a prototype approach, through seven stages of development, namely needs analysis, prototyping, prototype evaluation, system coding, system testing, system evaluation, and using the system.
Results: SEJATI is worthy of being used as a health promotion medium for adolescents, with the results of material feasibility >75% both from the material, language, display and increasing motivation to read.
Conclusion: The development of health promotion media using SDLC allows each prototype to be continued and developed so that it can be used optimally and as needed. SEJATI is developed with an SDLC approach, with 7 development steps with the assessment of 2 experts and 5 users as a feasibility test in a small scope. The test results are used as a refinement of SEJATI so that the final prototype can be tested for effectiveness.

Keywords: ***adolescent, media promotion, nutrition, Stunting, web based***

INTRODUCTION

The population in Indonesia is currently dominated by the productive age, namely 15-64 years old, with 25.84% of them being adolescents, namely aged 10-19 years (WHO), around 66.75 million of Indonesia's 281.50 million population in 2023. This situation makes Indonesia said to have entered a demographic bonus period. This situation benefits Indonesia as a developing country because, with the high number of teenagers, Indonesia has human resources that can compete for decades. However, this situation has become a challenge in Indonesia, with many problems experienced by our country Indonesia related to.

Adolescence is a vulnerable period, which is a period of physical (hormonal, primary, and secondary sexual state) and psychological (emotions, social relationships, and sexual behavior) with great curiosity. The changes that have occurred make adolescents vulnerable to problems, especially health, ranging from physical health problems (anemia, and malnutrition), reproductive health (menarche, reproductive health, sexuality, and teenage pregnancy), social health (introduction to adolescents and drugs), and psychological health (emotional regulation and mental health). The problems that occur are a challenge for Indonesia because the quality of adolescents will determine the sustainability of the country. The quality of teenagers who are strong and ready to face the changing times will be the capital for a country to survive and develop in the future. (1) (2) Problems that occur in adolescents are one of the causes of growth failure in babies. Babies born to parents with health problems have a greater chance of stunting than babies with healthy parents both physically and psychologically.[3]

Stunting is a multifactor problem, one of which is due to chronic nutritional disorders and infections that occur repeatedly in the first 1000 days of life, starting from pre-conception to the birth of a child. The government is making various efforts to prevent stunting, including by overcoming anemia in adolescents, preventing early marriage, improving the nutritional status of adolescents, supporting healthy pregnancy (prevention of anemia in pregnancy), overcoming chronic energy deficiency in pregnant women and exclusive breastfeeding.[4] [5][6]

Basic health research data (*Riskesdas*) in 2018 shows that the incidence rate of anemia in adolescent girls in Indonesia is quite high, namely 48.9% so that out of 10 adolescents, 4 of them experience anemia, while the incidence rate of anemia in adolescent boys is 13.1 based on Riskesdas 2010 data [7]. The causes of anemia in adolescent girls include diet due to an unbalanced diet, menstrual periods experienced by adolescent girls, activities and comorbidities, with diet being the main factor for anemia in adolescents. [7]

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Early marriage is the first marriage at the age of less than 19 years for women and men. The early marriage rate in Indonesia is quite high, at 19.7%/year, with the highest early marriage rate in West Java at 36%.[9] Based on data from the ministry of religion of Tasikmalaya city in 2021, as many as 195 people consisting of 24 adolescent boys and 171 adolescent girls got married. This is driven by several factors including economic conditions, religious understanding, customary and cultural factors, education level and free sex. [14]

Both anemia in adolescents and early marriage are the main causes of stunting in babies. Adolescents who are anemic will result in anemia in pregnancy, either mothers with anemia during adolescence, or adolescents who experience unwanted pregnancy in a state of anemia (early marriage). Anemia in pregnancy can cause disturbances in fetal development. Chronic anemia can cause malnutrition in the mother which causes disturbances in the postpartum period, one of which inhibits milk production. This becomes a cycle that is interconnected with each other. Based on the above phenomenon, researchers are interested in researching the development of educational and communication media in adolescents to prevent stunting as a long-term goal and increase adolescents' knowledge of reproductive health and early marriage prevention. Based on data, mobile phone users in Indonesia as many as 67.88% of Indonesians over 5 years old have used mobile phones.

Based on a preliminary study conducted by researchers, it was found that on Google Play data-based, six adolescent education applications that have been developed and disseminated through Google Play are obtained, including the Adolescent Reproductive Health Application, the Ceria Application (not functioning optimally, the information provided is not updated, some features do not work), the Adolescent Room Application, the *"Kescatin"* Application (owned by Pusdatin), the Adolescent Reproductive Health Application (third The application is limited only as a medium for conveying information and is one-way), Sihati-Reproductive Health System (developed by Siti Patimah, 2022 Tasikmalaya Polytechnic) which is a health counseling and consultation media. Unlike the previous six applications, SEJATI was developed for adolescent boys and girls, providing a consultation page that is more developed than existing applications.

METHODS

This research method uses a qualitative method of SDLC (Software

Development Life Cycle) system development, with a prototype approach, through seven stages of development, namely needs analysis, prototyping, prototype evaluation, system coding, system testing, system evaluation, and using the system.

The instruments used in this study are an overview of the design of the display and content of the application in the form of a dummy system, as well as an instrument for assessing the feasibility of the content of the material, the appearance and functionality of each application menu, as a tool for assessing the feasibility of the application test.

The application test will be carried out by including material experts as content validity, media experts as validity for display, and teenagers (junior high school students) to assess the feasibility of SEJATI use.

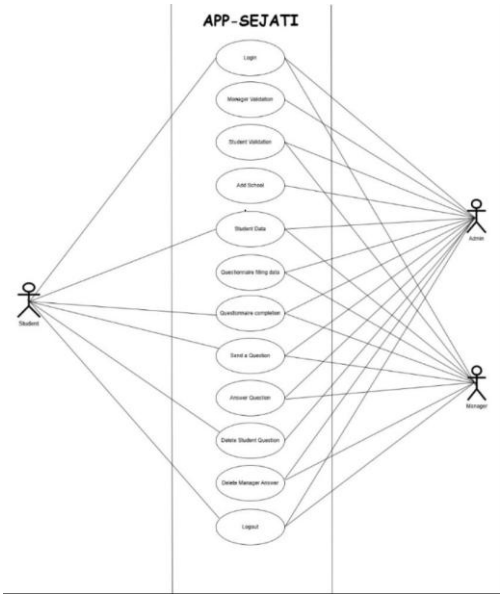
Data analysis uses frequency conversion calculations to assess the feasibility presentation of SEJATI (descriptive data), with qualitative as development data at the system testing stage.

RESULT

The development of a website-based application related to health promotion media for adolescents to prevent stunting, as one of the health cord issues in Indonesia and in the world, namely by disseminating information related to adolescent health and efforts to prevent early marriage through the web apps "Healthy Youth Anti-Stunting and Early Marriage-SEJATI".

a. Needs analysis
   1) There is no application in early adolescents (can be used by primary and first education levels) related to reproductive health and the introduction of early marriage as a preventive measure.
   2) The results of preliminary tests conducted on 10 children aged 10-15 years (randomly), it was found that 7 of them did not know about reproductive health and the impact of marriage in adolescence. T
   3) he stunting rate is still high in Indonesia, especially West Java – Tasikmalaya, supported by the increasing number of early marriages for various reasons.
   4) The reproductive health education curriculum for adolescents has entered schools, but it has not been carried out consistently and in a structured manner

b. Creation of "SEJATI" webs apps
   The creation of "SEJATI" material by 4 researchers, involving the creator of the Webs app (developer-"Dicodein team"), 1 material expert as the validity of the construct in filling in the material on "SEJATI", 1 expert in the field of health promotion media as an assessor on the appearance and feasibility of health promotion media, and 1 technology expert as an assessor of the feasibility of the webs app.



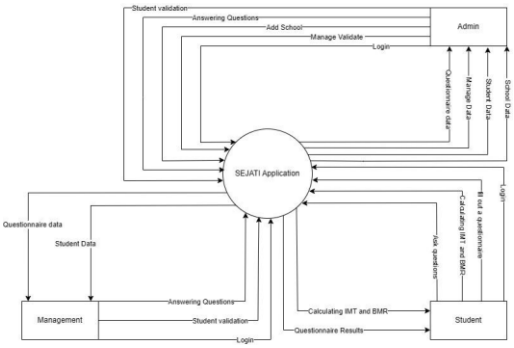


Figure 1. SEJATI dummy

c. prototype evaluation
A re-examination was carried out for the planned prototype, to adjust between the blue print and the initial dummy. Dummy is appropriate and will continue at the manufacturing and codification stages.

d. coding system,
The coding step is done by the application developer by guiding the blueprint and dummy.

e. system testing,
creating temporary landing pages, and testing each tool on the SEJATI application

f. System Evaluation
A small-scale test was conducted on one material expert, 1 media expert, and 5 teenagers as the initial stage of the system trial, and the result:

1) Material expert assessment
The first stage of the assessment was carried out with the help of informatics experts, as a consideration for the assessment of functionality and appearance in general related to the "SEJATI" application. The results of the quantitative assessment were obtained as follows:

Table 1. Material Expert Result assessment

Item	Criteria
Material	
Systematic	
Easy to understand	75%
Cleary	
Relevancy	
Language	
Easy to understand	75%
Ambiguity	

2) Media expert assessment

Table 2. Media expert result assessment

Item	Criteria
Visualization	
Harmonization	
Interesting	
Font	78,57%
Image	
Color	
Symbolize	
Function of tool	
Menu	
Toolbar	
Metadata system	100%
Welfare	
IMT count	
Energy count	

Based on the bar diagram above, it can be seen that both the appearance, feasibility of using language, visual appearance, and function of each button function well, with the average qualitative rating being 3, with a total score of 64>57 (median > score) which illustrates that SEJATI has a very good rating according to media experts. There are several inputs given as an effort to improve the visual appearance and menu, namely: If possible, add motion animations as additional visualizations to clarify the material. Added forgot password and change password menu for users

3) Teenager assessment

Table 3. The result of a small test

Item	Criteria
Material	
Understanding	98,33%
Image help to understand	
Informative	
Language	
Easy to understand	95%
Ambiguity	
Visualization	
Menu	
Apps interesting	
Image	92,50%
Color	
Font	
Cleary to read	
All tool function	
Motivation to read	
Interesting	
Helpful	95%
Cheerful	

N=5

In the feasibility test of phase 1 (small-scale test), conducted on 5 junior high school students (adolescents aged 10-15 years), it was seen that the content of the material, the use of language, and the appearance of SEJATI were attractive, easy to understand with a score greater than 75, and encouraged to open and read SEJATI. There are several comments obtained, namely: The pictures in the caption are still few There are some foreign terms in the material that are confusing Too much writing in explanations

g. Using the system

After a small-scale test was carried out and improvements were made according to the results of the small-scale test, the system was used in one of private Junior High Schools in Tasikmalaya.

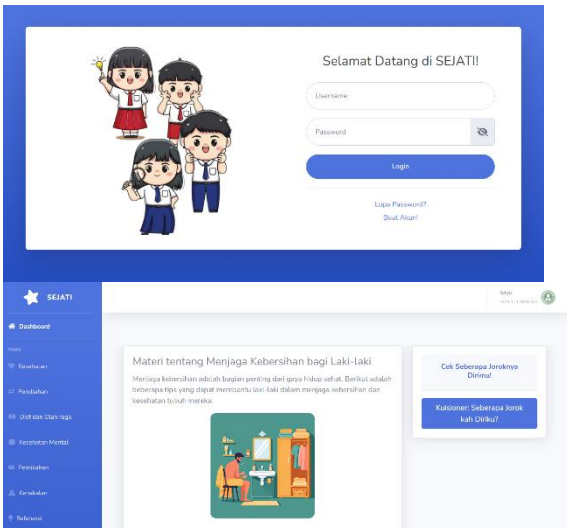


figure 1. SEJATI webs app display

DISCUSSION

SEJATI is a health promotion application for adolescents, especially at the primary and secondary education levels as one of the efforts to increase student knowledge related to reproductive health and prevent early marriage so that it can become an application that helps reduce stunting rates by increasing adolescent knowledge. This application is an application applied in elementary and junior high schools that have a data storage system so that it can be used as one of the adolescent health records within the scope of the school health business (UKS). The data contained in SEJATI can only be accessed by school admins and super admins (researchers as application account owners).

The development of health promotion media using SDLC allows each prototype to be continued and developed so that it can be used optimally and as needed. SEJATI is developed with an SDLC approach, with 7 development steps, with the assessment of 2 experts and 5 users as a feasibility test in a small scope. The test results are used as a refinement of SEJATI so that the final prototype can be tested for effectiveness.

SEJATI still has room for development. The addition of features according to school needs related to recording and collecting student health data is still possible. SEJATI can be integrated with the school health business system (UKS) as an application for recording and documenting student health history.

Each student allows to log in and access his personal data extensively. In addition, students can learn things related to the fulfillment of nutrition and a balanced diet, so this is important in efforts to increase knowledge and change attitudes, especially nutritional patterns and good health habits related to stunting prevention in adolescents (including a calendar to take tablets to increase blood for female students).

SEJATI has a weakness, namely that the system is still connected to the developer center system, so to develop and add capacity or other items, it must go through the apss web developer. In addition, the SEJATI data security system is still vulnerable because the data is centered on the APSS developer.

CONCLUSION

SEJATI is worthy of being used as a health promotion medium for adolescents, with the results of material feasibility >75% both from the material, language, display, and increasing motivation to read.

Although SEJATI has a feasibility of more than 75%, SEJATI still needs to continue to be improved by adding the latest features and materials that can increase adolescents' knowledge more optimally so that they can increase knowledge, change attitudes and behaviors which can ultimately prevent stunting risk factors from an early age (adolescents as prospective parents who will give birth to the next generation).

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