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Article

Feature Requirement With Human-Centered Design Approach to Developing A Psychological-Based HIV

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Abstract: HIV cases among adolescents in Indonesia have been on the rise recently. Moderate to severe depressive symptoms are reported to be experienced by adolescents living with HIV, which coincides with this increase in cases. This suggests that it is essential to initiate strategic initiatives to enhance the efficacy of the initial screening process by implementing application-based HIV risk group identification through the use of psychological approaches. Designing a user interface that is appropriately structured and meets user requirements is crucial to ensuring the effectiveness of the application being developed. This investigation involved the assessment of feature requirements by HIV disease counselors and psychologists in accordance with the Human-Centered Design (HCD) methodology. Counselors who specialize in HIV disease contribute to the query elements utilized in the initial screening assessment. Meanwhile, psychologists contribute to the approval of the questions utilized as an initial screening test, which affects the psychological well-being and accuracy of adolescent users. The stages adopted for the implementation of HCD were modified in accordance with ISO 9241-210. This research generated user personas, use case diagrams, and the User Interface (UI) design for the VitaMind application, which is primarily designed for pre-test screening. This is a multiplatform application that comprises both web-based and mobile components. This application design has been tested using the system usability scale (SUS) method and produced an accuracy score of 86.1%. The primary contribution and novelty of this research lies in the application of Human-Centered Design principles to the development of a mental health-focused, pre-test HIV screening application tailored for students. Usability testing, employing the System Usability Scale (SUS) method, yielded results demonstrating a high degree of usability.

Keywords: *Screening, HIV, Psychology, Human-Centered Design, User Interface*

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1. Introduction

Adolescents are a vital and vulnerable demographic in the HIV epidemiology, as they experience a high incidence of mental health issues [1][7]. In 2020, the HIV epidemic affected 37.7 million individuals worldwide, with a cumulative total of 558,618 HIV/AIDS cases in Indonesia. Recently, there has been a notable rise in HIV cases among teenagers. According to data from the Indonesian Ministry of Health in 2022, around 1,929 adolescents aged 15–24 years were diagnosed with HIV, reflecting a 3.8% rise from the preceding year. This demographic constitutes approximately 50% of new HIV infections in Indonesia in 2024.

The significance of addressing the issues faced by individuals living with HIV (PLHIV), who are referred to as People with HIV (ODHIV) in Indonesia, is that they are

at a heightened risk of developing psychological health issues and mental disorders [8]. College students are a demographic of adolescents who encounter a high prevalence of the condition and face challenges in treatment due to the absence of prevention and care services. These obstacles encompass various challenges, including the initial screening and testing process, as well as the attainment of viral suppression and mental health support. Due to the dearth of services, over 25% of Indonesian teenagers fit the criteria for mental problems [9].

The Indonesian Ministry of Health has implemented a process and stages for HIV testing that involve pre-test counseling, rapid screening, confirmation, and post-test counseling. However, the reach of HIV case management at the pre-test counseling stage is limited due to a variety of challenges. Prior studies indicate that adolescents feel a lack of encouragement to undergo testing, believe they are not at risk, experience insufficient environmental support, harbor concerns about positive outcomes, distrust the necessity for results that are not promptly available, and question the confidentiality of the process. Moreover, individuals at risk of HIV, particularly teenagers, receive exceedingly limited psychological support for preserving their mental health. Pre-test counseling should be the first step in preserving the mental health of individuals at risk of HIV [10][11][12].

Currently, adolescents utilize lots of mental health applications that incorporate chatbot functionality [2]. However, no chatbot application specifically addresses HIV mental health issues [5]. Utilizing a chatbot as a pre-test counseling aid for HIV, the VitaMind app aims to offer a sense of security, comfort, and precise results during pre-test counselling [15]. These features will facilitate more informed decision-making during the following testing phase. This study aims to develop and assess a mental health-focused HIV pre-test chatbot application, with the primary research question concerning the degree to which the design and functionality of the VitaMind Application fulfil user requirements and attain a satisfactory level of usability

2. Materials and Methods

The HCD method is implemented in this study in accordance with the ISO 9241-210:2010(E) standards [3]. ISO 924-210's steps are carried out in a sequential manner in this study by figuring out how it will be used, what the users need, and how to design solutions and an iterative evaluation with experts and users [4]. This makes sure that the system created meets the user's needs and is always improved based on the feedback given. The input phase includes the understanding and specification of the context of use, as well as the specification of user requirements. The process phase includes the production of design solutions and the evaluation of the designs against the requirements. The output phase involves the solution design requirements (Figure 1).

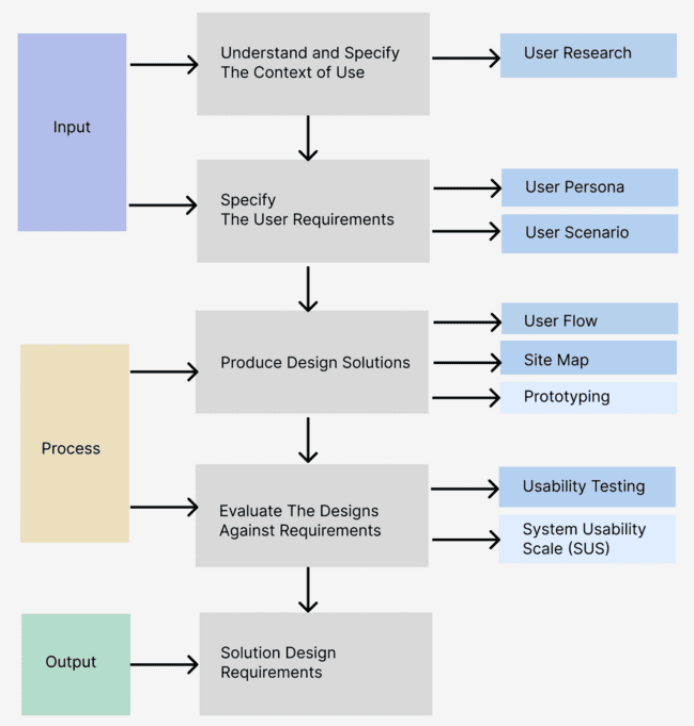

Figure 1. *Human-Centered Design process flow during ISO implementation*

To truly understand and identify the user context, this investigation implements user interviews and discussions. This research involves three consumers to satisfy their requirements, consisting of two HIV counselors, one psychologist, and ten students as end-users. The researcher established preliminary specifications for the design of the HIV counselor and psychologist to guarantee the system's accuracy and to outline the system flow concept for HIV screening applications. Subsequently, the researcher evaluates the function of students. Ethical considerations are a crucial aspect of this research, given the sensitive nature of HIV and mental health. Therefore, this study prioritizes the protection of data confidentiality, user pricavy, and informatin security throughout the processes of application development, testing, and evaluation.

3. Results

The researcher verifies the accuracy of the generated features to ensure the application's efficacy, aligning them with the needs of the target users specified in the user persona. The researcher created user personas informed by insights gathered from college students (Figure 2) and psychologists (Figure 3), adapted to the application's intended audience.

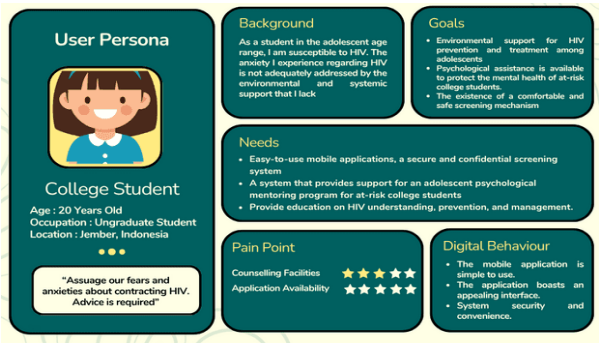

Figure 2. User Persona from College Student

Figure 3. User Persona from a Psychologist

One of the primary features of this application is the pre-test screening conducted with end-users, students, and psychologists who assist in the management of the mental health of HIV patients. The application includes a supporting feature, which is education. This feature assists the primary user in acquiring the knowledge and understanding necessary to implement lifestyle behaviors that can reduce the risk of HIV.

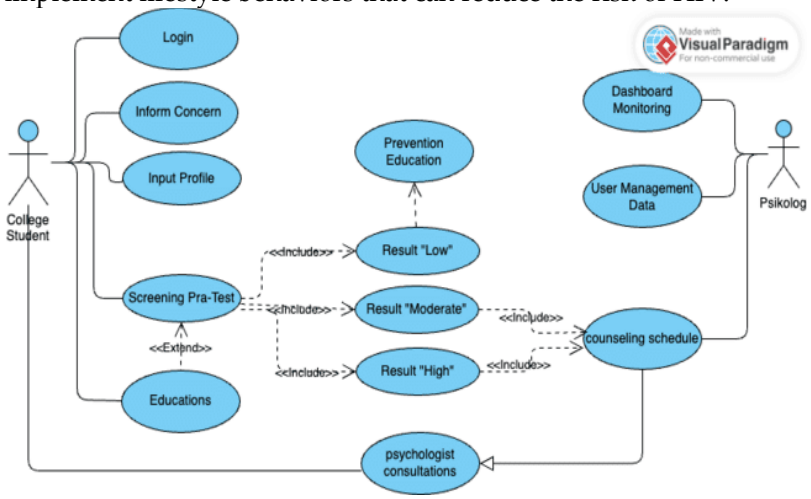

Figure 4. *Use Case Diagram: VitaMind System Concept (Tools by Visual Paradigm)*

Figure 4 illustrates the User Interface (UI) design for the VitaMind mobile application, intended for college students. It has 21 interfaces with four features: authentication, pre-test screening, education, and psychological consultation (Figure 4).

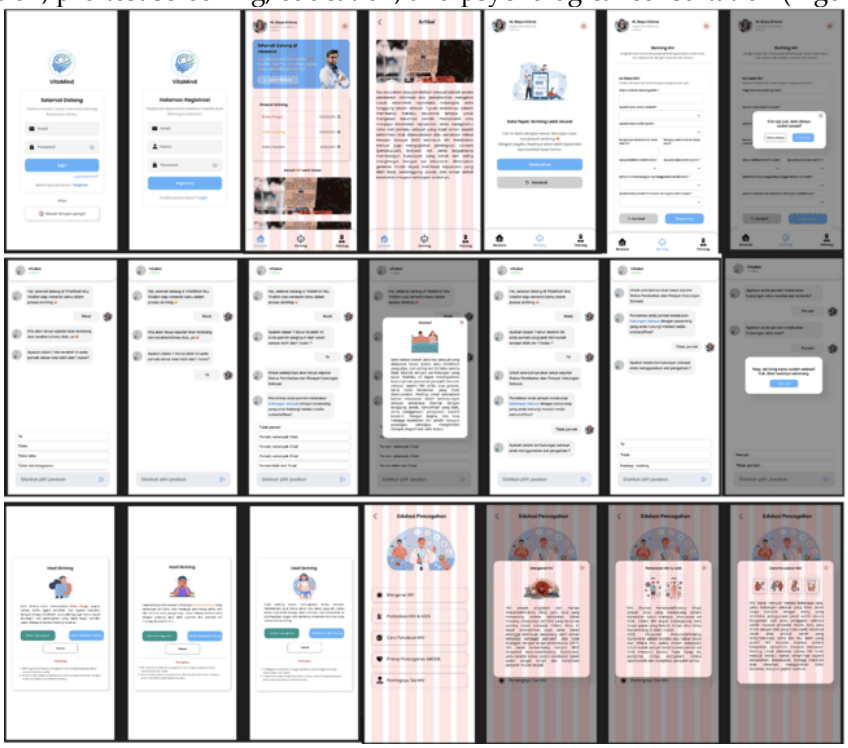

Figure 4. *Prototype VitaMind Mobile Base*

Figure 5 illustrates the user interface design for the web-based VitaMind program, intended for psychologists to schedule mental health counseling and monitor and manage patients at risk of HIV concerning their mental health. The VitaMind application is a multi-platform system that is interconnected. This application was developed according to user requirements and was tailored with feature access aligned with its intended function.

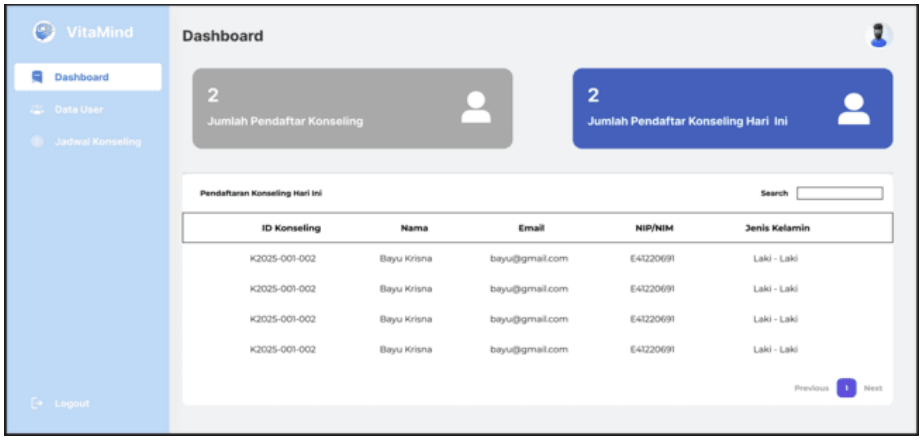

***Figure 5**. Prototype VitaMind Web-Based*

4. Discussion

As a standard for assessing the efficacy of the VitaMind prototype, this design evaluation employs the System Efficacy Scale (SUS). Consisting of 16 queries, the SUS questionnaire was completed by 10 respondents. The queries are intended to evaluate the following: efficiency, learnability, memorability, errors, and satisfaction [13]. To compile SUS queries with the following objectives: 1) The efficiency aspect measures the degree to which the VitaMind application enables users to complete their tasks promptly and accurately without the need for excessive steps. 2) The learnability aspect measures the ease with which the VitaMind application can be comprehended and utilized by new users. 3) The memorability aspect measures the user's capacity to recollect how to operate the application after a specified period of inactivity. 4) The Errors aspect is advantageous for measuring the frequency with which users commit errors when interacting with the system. 5) The satisfaction aspect measures the user's subjective perception of comfort and overall experience when using the VitaMind application.

Table 1. Scoring SUS VitaMind Design

No	Score Total	On Average	SUS Score
R1	61	3.81	93.8
R2	64	4.00	100.0
R3	52	3.25	75.0
R4	45	2.81	60.4
R5	55	3.44	81.3
R6	64	4.00	100.0
R7	50	3.13	70.8
R8	63	3.94	97.9
R9	59	3.69	89.6
R10	62	3.88	95.8

The results of the System Usability Scale (SUS) calculation in Table 1 for ten respondents show an average score of 86.5, which is categorised as "Very Good" (SUS). This value indicates that the system or application being tested has exceptional usability, as the majority of users can efficiently access available features, understand the navigation flow, and feel comfortable. This result also indicates that the user interface and interaction design align with the principles of Human-Centred Design (HCD), as they effectively meet the requirements, expectations, and preferences of the target users. Therefore, this application is considered ready for further development and testing in the real world, with an emphasis on simple improvements to enhance the overall user experience.

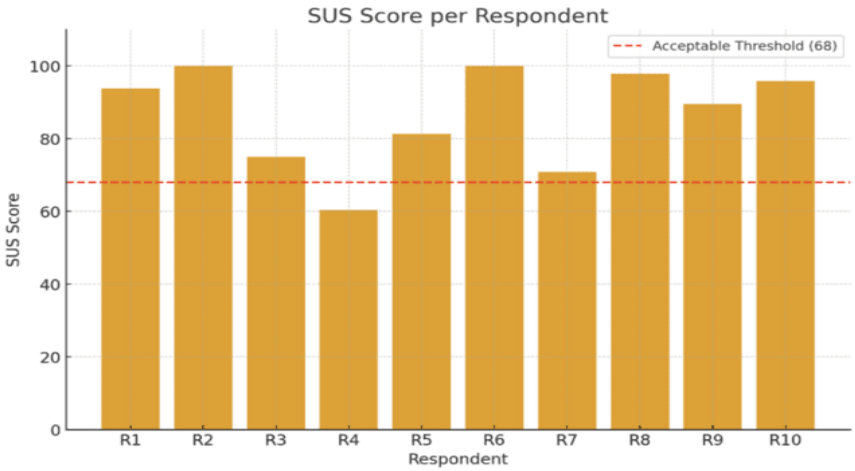

***Figure 6**. Usability Evaluation Results Based on SUS Scores per Respondent*

Figure 6 shows the results of the System Usability Scale (SUS) from ten respondents regarding the developed application. The dashed red line on the graph indicates that all respondents achieved a score greater than the passing threshold (68). Respondents R2 and R6 achieved the highest scores, with a total of 100. Respondent R4 achieved the lowest score, with a total of 60.4. In general, the SUS scores of the respondents varied from 60.4 to 100, with the majority of them scoring above 80. This suggests that the application is user-friendly and well-received. With an average score of 86.5, this application is classified as "excellent usability," indicating that the interface design and system functionality are already effective, efficient, and easy for users to comprehend.

5. Conclusions

This study has applied the Human-Centered Design (HCD) approach based on the ISO 9241-210 standard effectively in designing a mental health-oriented pre-test HIV screening application called Vitamind. This study involved HIV counselors and psychologists in the feature design process to ensure the developed system is in accordance with user needs and takes into account sensitive psychological aspects. This application has been tested using the SUS method with a score of 86.1% in the excellent category, meaning that this application has a very good level of usability and is easy to use by students as target users [14]. Based on the relatively small sample size which has the potential for bias, further research will expand the number and diversity of participants and conduct testing in a real environment over a longer period of time so that the evaluation results can reflect variations in user behavior and increase the generalizability of research findings.

6. Patents

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