

DESIGNING PUBERTY LEARNING MOBILE APPLICATION WITH GAMIFICATION FOR CHILDREN GRADE 4-6 BASED ON UI/UX

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Abstract

Sexuality education and knowledge of puberty in Indonesia are often considered taboo, with misconceptions that it has more negative than positive impacts. The government has yet to implement comprehensive sexuality education in the national curriculum. Research indicates that providing sexuality education significantly reduces the incidence of sexual violence among children. This study employs the Research through Design (RtD) approach, involving iterative cycles of design, prototyping, and testing, to develop a puberty learning mobile application. Methods included literature review, surveys, and interviews with stakeholders, followed by data analysis to create design criteria, prototype testing, and final design development. Results show that although most respondents received some form of puberty education, their knowledge was insufficient, highlighting the need for effective learning tools. The proposed application incorporates gamification, community interaction, and parental guidance features to enhance learning. The study concludes that the interactive and engaging design successfully improves awareness and understanding of sexuality and puberty, with potential for further development.

Keywords: Application Design, Interface Design, Puberty, Gamification

INTRODUCTION

Research by Nurfadhilah, N. (2019) reveals the limited and taboo nature of sexuality education and puberty knowledge in Indonesia. It's seen negatively by the public due to misconceptions, and there's a lack of comprehensive sexuality education in the national curriculum. This is evident from the 2017 Indonesian Demographic and Health Survey, showing poor puberty knowledge among youth aged 15-24. It's recommended to start sexuality education before puberty onset, typically around 10 for girls and 12 for boys, to combat issues like sexual crimes, which increasingly affect both adults and children.

Often victims who are still at an early age do not understand and are not aware that the incident that happened to them is a form of sexual crime and only realized when they grew up. Providing early sexuality education can reduce vulnerability

to abuse. Studies, such as those by Amalia et al. (2018) and Satyadi & Kayanti (2024), highlight the preventive nature of such education. To address these challenges, the author proposes developing a digital learning product focusing on puberty for children aged 8-18, with parental guidance, aiming to raise awareness and understanding of sexuality and puberty from an early age.

LITERATURE REVIEW

Sexuality Education

Sex education, as defined by the Kamus Besar Bahasa Indonesia and translated to English, is education that aims to provide knowledge about sex, genital biological functions, pregnancy, etc. According to WHO, sexuality education gives the youth accurate, age-appropriate information about sexuality and their sexual and reproductive health, which is critical for their health and survival. Research by Goldfarb & Lieberman (2021) highlights its role in various aspects including understanding gender norms, health protection, social skills, crime prevention, self-image, empathy, and healthy relationships. Comprehensive sexuality education, endorsed by UNICEF Indonesia, reduces risky behaviors like early marriage, sexual crimes, and diseases (Mediana. 2021, April 21).

Wajdi & Arif (2021) emphasize the importance of involvement from parents, teachers, communities, and governments for optimal implementation. Sexuality education is often mistaken for education about reproduction. In fact, sexuality education is more than just teaching sexually transmitted diseases. The word 'sexuality' itself gives a broad meaning more in terms of biology, but also in social, psychological, and cultural aspects (Gatra, S. 2023, August 15).

It should begin early, covering topics such as family, body autonomy, anatomy, and puberty (WHO, 2023). Sexuality education must be informed early by parents so that children understand more about who they are and how to maintain and care for their bodies. Sexuality education programs should also be implemented according to the child's development. Dr. Satyadi suggests starting education from age 2-3 by naming organs and affirming gender identity, progressing to teaching body protection from age 3-5, intergender roles from 6-8, and puberty and hygiene from 9-12.

Puberty

Puberty, defined by the Indonesian Pediatrician Association is a transition period from childhood to adulthood that takes place gradually and is caused by complex neuroendocrine factors. typically experience puberty between 9-14 years, while girls between 8-13 years, though various factors like social background, ethnicity, physical and psychological conditions. Rogol & Roemmich (2002) note genetic, hormonal, and environmental influences on puberty, impacting growth, sexual development, and body composition.

While both genders undergo puberty, societal perceptions differ, with menstruation symbolizing a significant change for females. Menstruation in social construction

is seen as something shameful and should be covered up, while the discussion of puberty in men is not discussed with the same narrative as women (UNFPA, 2023: 22). However, discussions about male puberty are often overlooked, leading to unaddressed needs and questions. (UNFPA, 2023).

Sexuality Education Curriculum

In 2018, UNESCO published the second edition of the International Technical Guide on Sexual Education (ITGSE). ITGSE is a comprehensive resource designed to guide and support educators, policymakers, and stakeholders in sexual education worldwide. This guide offers evidence-based recommendations and best practices for the development and implementation of effective sexual education programs. It aims to promote a holistic approach to sexual education that respects human rights, promotes gender equality, and addresses the diverse needs of learners.



Image 1 International Technical Guidance on Sexuality Education.

The UNESCO International Technical Guide on Sexual Education covers 8 key topics, including: Relationships; Values, Rights, Culture, and Sexuality; Understanding Gender; Violence and Staying Safe, Skills for Health and Well-being; The Human Body and Development; Sexuality and Sexual Behavior; Sexual and Reproductive Health.

Each topic aims to achieve objectives in knowledge, attitudes, and skills. The guide is tailored for different age groups (5-8, 9-12, 12-15, and 15-18 years old) and emphasizes cultural adaptation. It acknowledges diverse cultural contexts and aims to integrate local norms while remaining informative and focused on sexuality education. So, later in the developed application, the topics were streamlined into three game topics: Pre-Puberty, Puberty, and Body Image.

Gamification

Jusuf (2016) defines gamification as a learning approach that incorporates game elements to motivate students and enhance their learning experience, aiming to maximize enjoyment and sustain interest in learning. According to Fitriana's research (2023), utilizing interactive educational games can boost student engagement. Gamification offers several benefits, including making learning enjoyable, aiding in task completion, enhancing concentration and comprehension, and fostering competition, exploration, and achievement in the classroom.

Jusuf, H. (2016) outlines key elements of gamification in learning: Points to motivate improvement through accumulation; Badges to reward progress as sections are completed; Levels to progress through tiered levels to access new material; Leaderboard to encourage competition through performance tracking; Challenges to foster healthy competition and learning awareness; Rewards to offer achievements; Characters to support role-playing with selectable characters; Engagement loops to maintain consistent study habits with daily reminders and consequences.

Existing Sexuality Education Application

There are already sexuality education applications on the market today. The author also refers to these applications, namely All About You, Puberry, and Puberteen. The advantage of some of these applications is that the learning method is packaged with attractive illustrations, and places emphasis on tone and layout. However, they often lack updated designs and fail to provide comprehensive content on biological reproduction education.



Image 2 Competitor.

From the literature review we raise the research question: How might we create a sex education app that incorporates gamification principles?

METHODOLOGY

The research utilizes the Research through Design (RtD) approach. As explained by Dr. Mehmet Aydin Baytas from Design Discipline (2022), Rtd is a methodology where designers utilize design artifacts to generate knowledge and understanding. It involves conducting research by designing and prototyping, which allows for the collection of user insights and feedback. Rtd is especially valuable in fields where traditional research techniques may not be effective or where design serves as the primary means of understanding the problem or topic under investigation.

The research began with literature study and primary research through a questionnaire and interviews with users and professionals to identify users' needs to design a puberty learning application. Data analysis led to the formulation of design criteria. A prototype was developed and tested with target users, culminating in the final design.

Firstly, an online questionnaire was distributed to 54 junior and senior high school students in Jakarta and Tangerang to get quantitative data to know more about their experience of puberty learning at school from the curriculum and at home from their parents, and gamification learning. Then, to gather more in-depth answers, interviews were conducted with a doctor who had treated patients who had problems caused by a lack of sexuality education. Then interviews with the teachers were done to know more about the actual teaching of sexuality education in schools. Lastly, interviews were also conducted with 4 elementary, junior, and high school students as target users, and 3 parents of target users. These interviews were held to find out about their personal experience regarding sexuality education and puberty learning.

RESULT & DISCUSSION

Primary Research Results

There are six main things that can be concluded after conducting all the interviews.



Image 3 Interviews with Target User and Experts.

1. Parents, doctors, teachers, and children agree that sexuality education is especially important and should be taught as early as possible, even taught from the age of 4 to introduce basic anatomy and facts. The role of parents and schools is particularly important. Early instruction yields numerous benefits, while neglecting it can have adverse consequences. It should be gradually integrated into the curriculum from elementary to high school.
2. Puberty education varies among schools, with some starting in grade 4 and others beginning in grade 7. Due to its taboo nature, sexual education is often not extensively covered in all schools. Older students are more aware of puberty signs in both genders, while younger ones typically lack this knowledge.
3. Parents with sons often rely more on schools for sexuality education, while those with daughters take a proactive role in preparing for puberty to avoid surprises.
4. Despite being taught about puberty, many individuals still feel unprepared when it happens, highlighting the need for more mental preparation and family support. Those who have not experienced it yet often feel curious due to peer experiences.
5. Puberty-related problems like hygiene issues and discomfort during adjustment are common. Mental readiness plays a crucial role, and lack of it can lead to extreme cases such as teenage pregnancies.

The online questionnaire was completed by 14 junior high students and 39 high school students and can be concluded with statements below.

1. Despite receiving puberty education from various sources like school, home, and the internet, respondents feel they have learned more about it from non-traditional sources.
2. Many respondents feel uncomfortable discussing puberty, possibly due to cultural taboos prevalent in Eastern societies.
3. Most respondents are unaware of government adolescent health services, indicating a gap in the effectiveness of these programs.
4. While respondents generally view school-based puberty and sexuality education positively, quiz data reveals low knowledge retention, suggesting room for improvement.
5. Respondents favor gamified learning methods, finding them more engaging and comprehensible than traditional approaches, particularly when delivered through user-friendly applications.

Data Analysis

Based on the results of research findings, the identified problems stem from systemic and cultural issues, namely sexuality education that is not optimal and its taboo status in society. Feelings of unpreparedness during puberty arise from several

factors: inadequate school curricula, minimal parental discussion, uninspiring learning methods, and exposure to misinformation from unreliable sources.

Ultimately, the root problem lies in the historical and ongoing inefficacy of sexuality education in adequately preparing children and adolescents for puberty and in maintaining their health and well-being in the future.

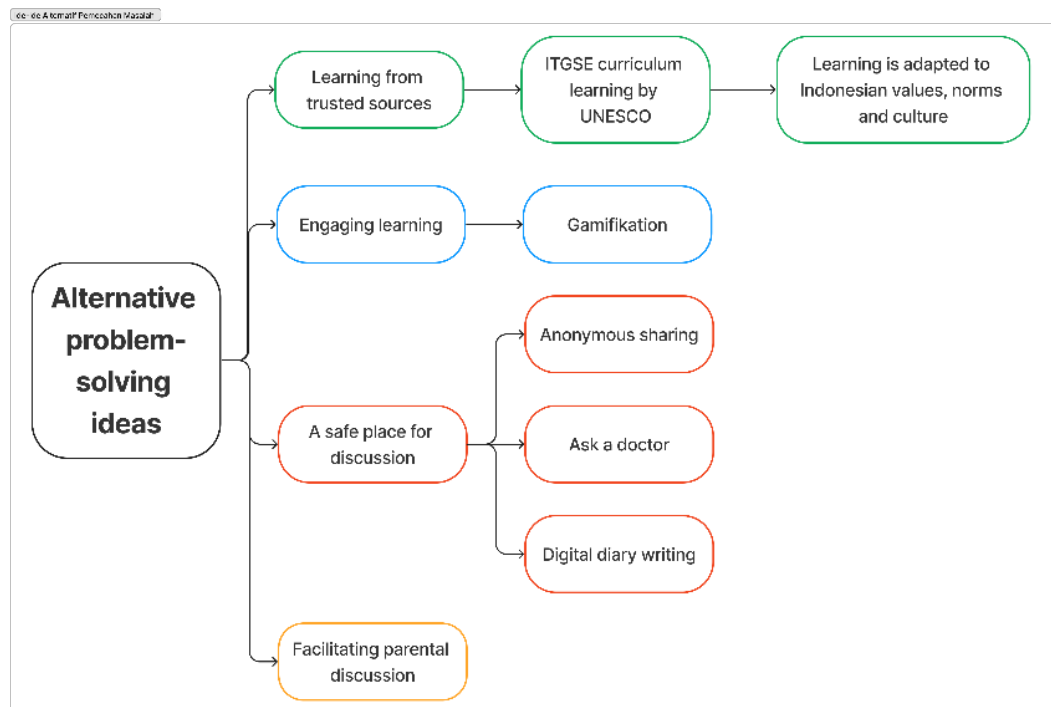


Image 4 Alternative Problem-Solving Ideas.

The author's alternative problem-solving ideas, as summarized in diagram above, advocate for several key strategies. These include adopting a comprehensive and reliable curriculum, such as UNESCO's ITGSE, tailored to Indonesian values, gamification techniques, providing a safe discussion platform, facilitating parental discussions on puberty through a parental mode, to support conversations with their children regarding sexuality education from an early age.

Originally, the design aimed at students aged 8 to 18, encompassing those pre-pubescent or already undergone puberty. However, the research findings showed that high school and junior high students suffer from inadequate elementary-level sexuality education.

Another factor is the limited time limit for the development. Thus, the author proposes focusing on educating the 9-11-year-olds or grades 4-6 elementary school regarding puberty.

Final Product

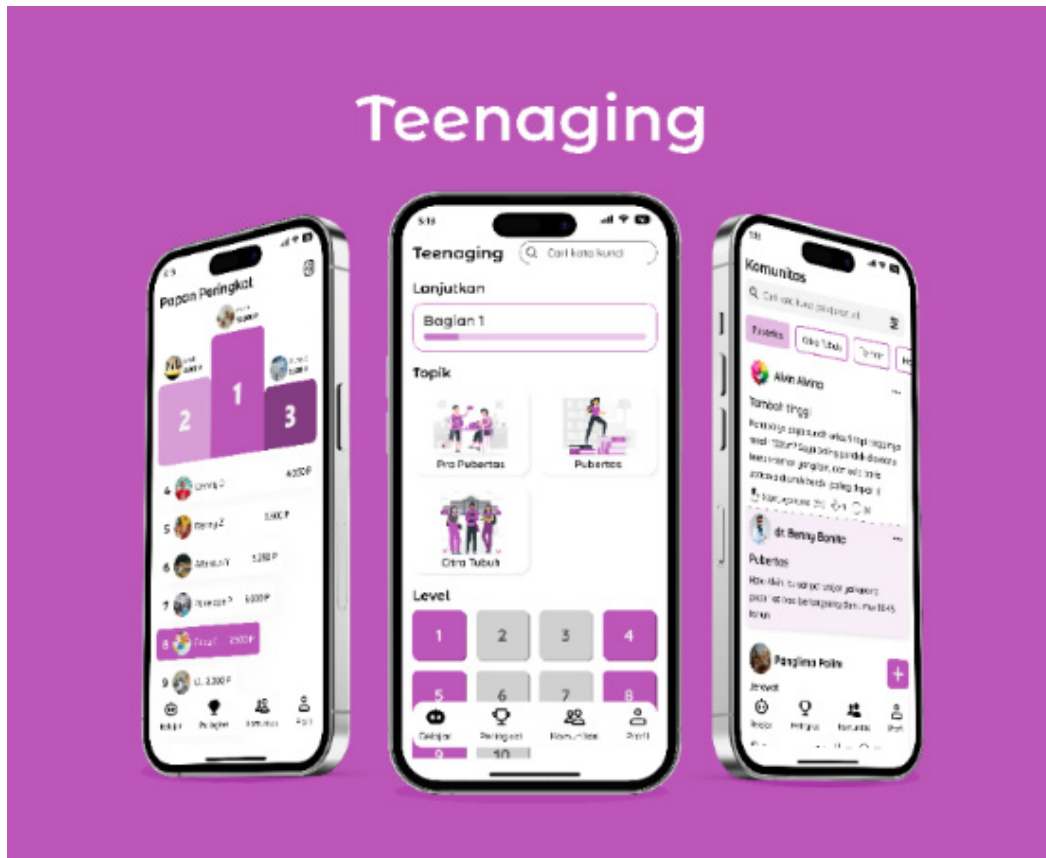


Image 5 Final Product.

The product is named “Teenaging”, which is taken from the word “teen” which means teenager and “aging” which means growing and developing. The target user for this product is students in grade 4-6 and parents who would like to participate in their kids’ learning. The product can be accessed anywhere and anytime, as it is in the form of a mobile application. The product aims to learn sexuality and puberty with gamification according to the age of the child.

After completing the wireframe, a high-fidelity prototype was made, the first UAT (User Acceptance Testing) was carried out, repairs, a second UAT, and a second improvement, then finally the final design was produced. This design incorporates gamification features such as points, badges, levels, leaderboards, and challenges. Drawing from sources like the ITGSE curriculum, the book “Celebrate Your Body” by Sonya Renee Taylor, and Bodytalk website questions, four main discussion topics emerged: Sexual and Reproductive Anatomy and Physiology, Reproduction, Puberty, and Body Image. These were streamlined into three game topics: Pre-Puberty, Puberty, and Body Image, spanning levels 1-10.

- Pre-Puberty, namely levels 1-3, the learning obtained is about what will happen during puberty such as physical changes and emotional changes.

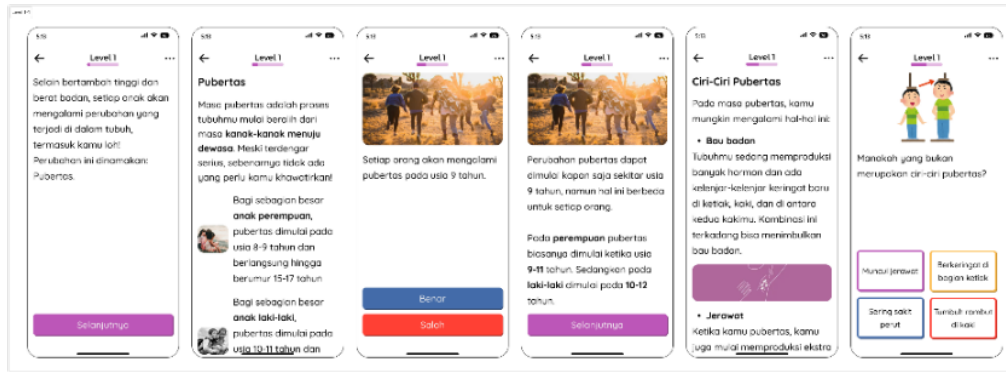


Image 6 Pre-Puberty Game Level 1-3.

- Puberty, namely levels 4-7, the learning obtained is about the main processes experienced as markers of puberty, namely menstruation and wet dreams.



Image 7 Puberty Game Level 4-7.

- Body Image, namely level 8-10, the learning obtained is about the concept of body image which is expected to combat negative body image issues that are felt by many teenagers.

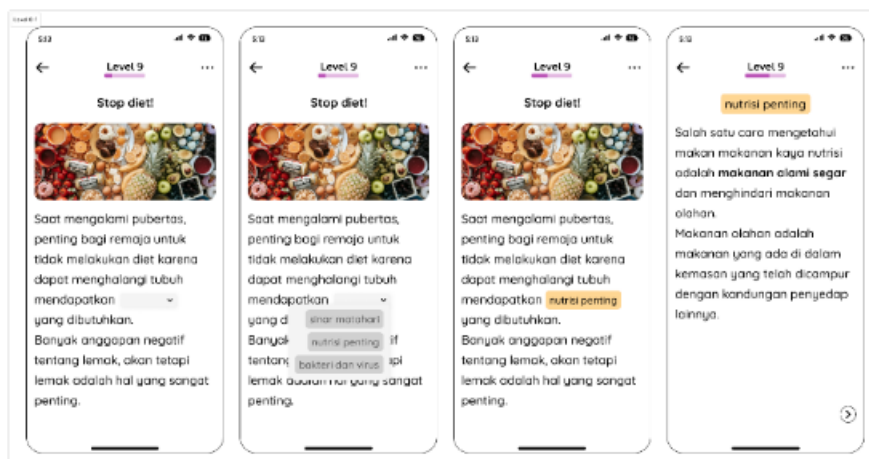


Image 8 Body Image Game Level 8-10.

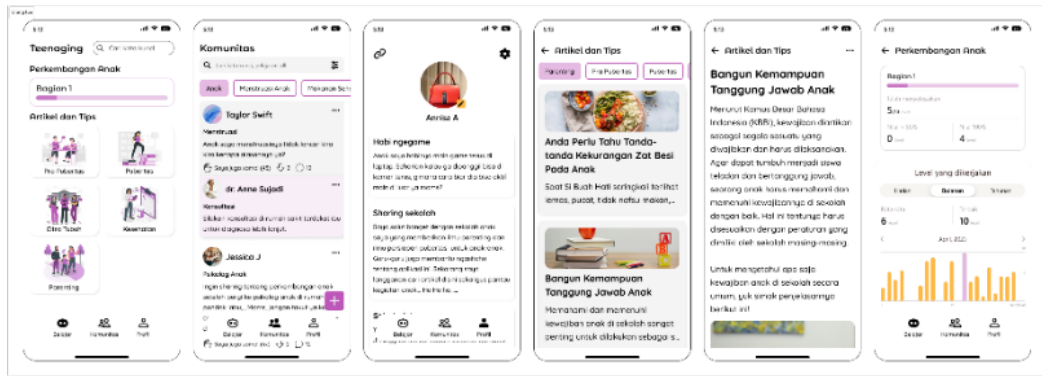


Image 9 Community Page Flow.

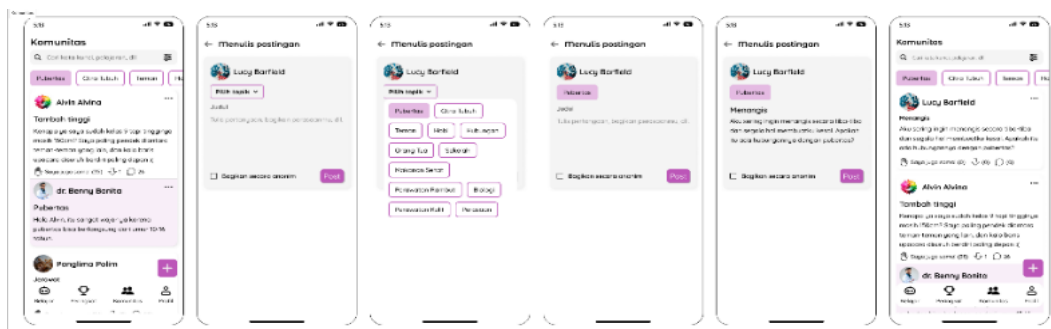


Image 10 Parent Page.

There are three key features from Teenaging: the game main page; community page to share with the community anonymously; parental mode for parents to teach sex-ed to children.

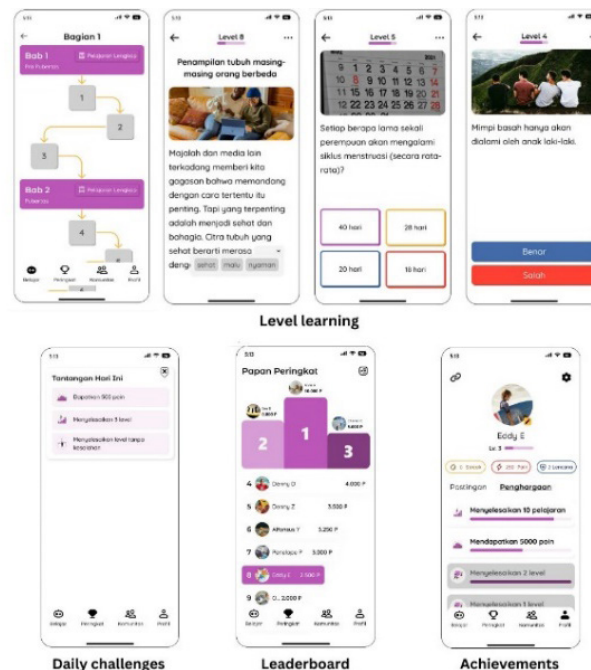


Image 11 Gamification Principles Implementation.

Gamification in this application is implemented through level learning, points, daily challenges, leaderboards, achievements. After the user completes the game level, they will get points accumulated as an overall score displayed on the leaderboard. Additionally, there's a daily challenge feature to motivate users to compete and learn. Competition motivates users to excel, while social interaction fosters community and accountability. User testing shows participants enjoy learning through levels and find the inclusion of pictures engaging. However, some parents worry that leaderboards could encourage excessive competitiveness in children.

Teenaging has been adapted to the results of studies and research from children and parents in Indonesia to be more relevant and in accordance with the target users. Some other advantages of Teenaging are a comprehensive layout with structured content, accessible via cellphone and internet, educating children and parents on puberty and sexuality through gamified learning, and embrace design principle of familiarity in design elements. Nevertheless, this product still has weaknesses. Some users may still be unfamiliar with the application, as it relies on individual experience with gaming or online learning. Consequently, users who haven't encountered a similar product may require some time to adapt.

Table 1 Simple Usability Testing.

User	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total
A	4	2	4	4	4	4	4	2	4	4	60
B	4	4	2	4	3	2	4	4	2	3	45
C	5	1	5	1	5	1	5	1	5	2	97.5
D	4	2	5	4	4	1	5	1	1	2	72.5
E	4	2	4	3	4	2	5	2	5	2	77.5
F	3	2	1	1	5	1	5	1	5	2	80
Average Score											72

The author then conducted Usability Testing with Simple Usability Scale (SUS) by asking 10 questions and participants will answer on a scale of 1-5. With captions a scale of 1 indicates strongly disagree and a scale of 5 indicates strongly agree. SUS is done after participants take the second UAT Test. The average value of the result obtained is 72 which has reached the Good and Acceptable scale.

CONCLUSION

The overall study and final product have achieved the design objectives to examine the practices of sexuality and puberty education in Indonesia, analyze children's needs in this area, and design a gamified puberty learning application

for Indonesian children. Based on the primary and secondary research, the design criteria of the product were determined. This product provides education sourced from trusted curriculum (ITGSE), with gamification techniques. It includes a secure discussion platform with anonymity features and offers parental guidance for initiating informative conversations with their children.

The design was initially aimed at students aged 8 to 18. However, it has been refined to focus on students aged 9 to 11 in grades 4 to 6, aligning with research findings on their specific needs in puberty education.

While the current product has its advantages, it also presents limitations and opportunities for further research. UAT revealed several suggestions for enhancing future development: expanding game levels, offering diverse question choices for replay ability, integrating missing gamification elements like characters and engagement loops, enhancing visuals with images or videos, and adding an answer review feature to see correct and incorrect answers. These improvements are expected to enhance the product's quality to see correct and incorrect answers.

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