SEaM mobile card game and animated video for increasing knowledge and attitudes of early marriage prevention

Apriani Susmita Sari[1], Hikmah Lia Basuni[1], Nurannisa Fitria Aprianti[2]
[1]Nursing Science Study Program, STIKes Hamzar East Lombok, Lombok, Indonesia
[2]Midwifery Education Study Program, STIKes Hamzar East Lombok, Lombok, Indonesia

Article Info

ABSTRACT

An international problem that might jeopardize the lives, futures, and well-being of adolescents is early marriage. A couple who marries before the age of eighteen is considered an early marriage. Knowledge and attitudes towards early marriage are among the variables that can impact its incidence. This study aimed to determine the effect of using the SEaM Mobile Card Game and animated videos on increasing the knowledge and attitudes of adolescents about early marriage prevention. The research design is a quasi-experiment with a non-equivalent approach (pre-test and post-test) control group design. The sample amounted to 148 respondents. The instruments used in this study were knowledge questionnaires on early marriage prevention, attitude questionnaires on early marriage prevention and usefulness, ease of use, ease of learning, and satisfaction (USE) questionnaires. The research data were analyzed using Wilcoxon and Mann Whitney with a significance level of $p<0.05$. The results of this study were that there was a significant difference in adolescent knowledge about early marriage prevention in the SEaM Mobile Card Game group and animated videos after education (p=0.013) and there was a significant difference in adolescents' attitudes toward early marriage prevention in the SEaM Mobile Card Game group and animated videos after education (p=0.000).

Corresponding Author:

Apriani Susmita Sari
Nursing Science Study Program, STIKes Hamzar East Lombok
TGH Zainuddin Arsyad St., Mamben Daya, Wanasaba District, East Lombok Regency
Nusa Tenggara Barat, Indonesia, 83658
Email: aprianisusmita442@gmail.com

1.   INTRODUCTION

Early marriage is a global issue that can jeopardize the lives, well-being, and future of adolescents around the world. Annually, around 12 million girls get married before reaching the age of 18. This equates to 23 girls getting married every minute, and nearly 1 girl getting married every three seconds. Currently, there are around 650 million women who are potential brides before reaching the age of 18, with some even getting married before the age of 10. Globally, 1 in 5 women marry before the age of 18 [1].

In Indonesia in 2022, about 19.24 percent of adolescents get married for the first time between the ages of 16 and 18. Approximately 2.26% of adolescents remain involved in marriage before reaching the age of 16. It can be inferred that 21.50% of young individuals do not adhere to the existing norms on the age at which they enter their first marriage [2]. West Nusa Tenggara has seen a steady rise in the prevalence of early marriages, placing it fourth among regions with the highest incidence of this issue. According to data from the Central Statistics Agency, in 2019, 16.09% of women between the ages of 20 and 24 were married before

reaching the age of 18. In 2020, the ratio rose further to 16.61% [3]. The districts with the greatest rates of early marriage in East Lombok Regency in 2022 are Jerowaru, Selong, and Labuhan Haji.

Early marriage refers to a marriage in which either one or both individuals engaged are under the age of 18 [3]. Knowledge and attitudes regarding early marriage can be influential factors in its occurrence. According to a study conducted by Samsi [4], there is a relationship between knowledge and attitudes toward early marriage. Adolescents with little understanding of early marriage are 4,286 times more inclined to engage in early marriage compared to those with a strong understanding of early marriage [5]. The intention for an early marriage was higher among those with positive attitude toward early marriage [6]. Higher positive attitudes towards marriage correspond with higher intention to get married, while negative attitudes and fear/doubt towards marriage correspond with lower intention to get married [7].

Knowledge is the familiarity, knowledge, or comprehension of someone or something, including facts, information, descriptions, or abilities, that is gained from education or experience through observation, learning, or discovery [8]. Attitude is a result of the informational interaction with the environment or to own body. As an attribute of mind, the attitude was defined taking into account the structure of the informational system of the human body and the associated distinctive and specific cognitive centers of consciousness, allowing a fine tuning of the cognitive functions and associated properties. It was shown that attitude is mainly expressible by the cognitive center suggestively defined as Iwant, either if the attitude is manifested in the external environment by vocal, facial mimic, gesture or corporal posture and action, or deliberately stored in memory in a tacit way for latter utilization [9].

Early marriage can have detrimental effects on both the mother and child. Early marriage has significant consequences for mothers, including the disruption of their education [10], economic inequality [10], increased risk of death during childbirth [11], higher likelihood of experiencing physical and sexual violence [11], [12], social isolation [11], [13], higher rates of depression [11], [12], increased risk of cervical cancer [11], and higher susceptibility to sexually transmitted diseases [11], [12], eclampsia [14], [15], puerperal endometritis [15], and systemic infections [15]. The potential consequences for infants include an increased likelihood of being born with low body weight [15], [16], premature birth [11], [15], and severe neonatal disorders [15], which can even lead to child mortality [11], [13], [17], [18]. Another consequence of early marriage is the occurrence of childbearing resulting in stunted growth in children. A few outcomes Studies indicate a notable correlation between early marriage among teens and the prevalence of stunted growth in children [19], [20]. Hence, education has a crucial role in mitigating the occurrence of early marriage among adolescents.

Generation born between 1995 and 2010 is commonly referred to as Generation Z. Generation Z possesses a distinct advantage due to their expertise in the realm of information technology. Consequently, they possess exceptional proficiency in utilizing the internet via restricted media platforms and other social media channels. They engage in activities, engage in play, and acquire knowledge via Android devices, gadgets, computers, and laptops [21]. Adolescents between the ages of 16 and 17 have complete mobility. According to a study, 73% of children utilize their mobile devices to engage in online gaming activities [22]. Smartphones have revolutionized the field of education by serving as a cutting-edge technological tool. Effective instructional media is media that is specifically designed to align with the unique qualities and needs of the intended audience [23].

Game-based learning will be widely used in 21st-century classrooms. To transition to Education 4.0 and Education 5.0, there must be a substantial revolution in traditional classrooms and game-based learning settings [24]. A mobile educational game, also known as Game-Based Mobile Learning (GBML), is an innovative learning method that combines game elements and mobile device mobility to create a more engaging, interactive, and effective learning experience. In GBML, learning content is packaged in the form of games that can be accessed via mobile devices such as smartphones or tablets. Gamification increases student participation, interest, and motivation levels in learning environments and contributes to the collaborative process of learning specifically in distance learning. This game can also increase academic achievement, level of confidence, and students' level of satisfaction with the course [25].

In this study, the media used to disseminate information on the prevention of early marriage are SEaM Mobile Card Game and Animated Videos. The SEaM Mobile Card Game is an educational game that utilizes smartphone technology to play a game based on SEaM (Stop Early Marriage) shaped cards. The Card Game is a straightforward game that utilizes cards as its primary instrument [26]. Animated videos are educational resources that facilitate the learning process by presenting information through dynamic visual representations, such as moving graphics resembling real-life scenarios [27].

Literature reviews revealed there was no prior research that had utilized mobile card games to address the issue of preventing early marriage. Several research employs a substantial number of mobile games to investigate various topics such as stroke [28], diabetes mellitus type 2 [29], children with Attention deficit hyperactivity disorder (ADHD) [30], children with autism [31], and children undergoing a day surgery [32]. In Indonesia, the media used to increase adolescents' knowledge and attitudes towards early marriage is only

videos, leaflets, and web application media. Adolescents prefer educational media that is interactive, easy to understand, ease of use, and ease of learning. Therefore, in this research, efforts were made to increasing knowledge and attitudes of adolescents about early marriage prevention, namely by providing education using innovative educational media adapted to the characteristics of adolescents, namely using SEaM mobile card games and animated videos. This research aims to assess the effect of using SEaM Mobile Card Game and animated video on increasing knowledge and attitudes of adolescents about early marriage prevention. By increasing knowledge and attitudes of adolescents about early marriage prevention, it is hoped that the incidence of early marriage can be reduced.

2. METHOD

2.1. Research design

The research design used in this study was a quasi-experiment with an approach nonequivalent (pre-test and post-test) control group design [33]. The intervention group received education through the utilization of the SEaM Mobile Card Game, while the control group used animated videos. The participants in this study consisted of adolescents between the ages of 15 and 18, or high school students in East Lombok Regency. The respondents were chosen via cluster random selection, which included both public and private schools in the East Lombok area. The sample size in this investigation was determined using an unpaired numerical comparison of two groups with one measurement [34]. A total of 148 participants consented to take part in the study and confirmed their comprehension of the study's objective. Each teacher in each school completed the informed consent as a research subject. Among the 148 subjects, 85 agreed to be part of the intervention group while the remaining 63 agreed to be part of the control group. The intervention group received education via SEaM Mobile Card Game, whereas the control group received information through animated videos. The study only included grade 11 high school students or their equivalent who were already enrolled and actively attending school. These students were required to voluntarily participate in the research by providing informed consent. The exclusion criteria encompass pupils who are absent during the research.

2.2. Instrument

2.2.1. Knowledge questionnaire on the prevention of early marriage

Knowledge questionnaires are compiled by the researchers themselves. The questionnaire consists of multiple-choice questions. The total number of questions on this questionnaire is 15. The evaluation on this questionnaire assigns a value of 1 to the correct answer and a value of 0 to the incorrect answer. The questionnaire has a minimum value of 0 and a maximum value of 15. The correlation between the value of teenage knowledge about early marriage and their knowledge score is that as the knowledge score increases, the adolescents' understanding of early marriage improves.

Prior to implementing this questionnaire, a knowledge questionnaire regarding the prevention of early marriage and an attitude questionnaire on the prevention of early marriage was administered to 30 students at Wanasaba 1 Senior High School for testing purposes. The validity test results for the knowledge questionnaire on preventing early marriage, using the person product moment, indicated that all question items were deemed valid (rcount=0.366-0.770, which is greater than rtable=0.361). The reliability test, using Cronbach's alpha, showed that 15 question items were reliable (0.824).

2.2.2. Attitude questionnaire on the prevention of early marriage

The researchers themselves adopted attitude questionnaires on the prevention of early marriage. This questionnaire comprises 15 statement items presented in the format of a Likert scale, which includes 5 alternative responses ranging from "strongly disagree" to "strongly agree". The weight of the minimum value is assigned a numerical value of 1, while the maximum value is assigned a numerical value of 5. The favorable statement types are categorized as follows: strongly disagree=1, not agree=2, disagree=3, agree=4, and strongly agree=5. The rating scale for unfavorable remarks is as follows: strongly disagree=5, not agree=4, disagree=3, agree=2, and highly agree=1. The questionnaire has a minimum score of 15 and a maximum score of 75. The interpretation of the attitude value regarding the prevention of early marriage is as follows: a score closer to 75 indicates a good attitude towards prevention, whilst a score closer to 15 suggests a more negative attitude. This questionnaire has undergone rigorous testing to ensure its validity and reliability. The validity test results for the attitude questionnaire on the prevention of early marriage, using the Pearson product-moment correlation coefficient, indicated that all question items were deemed valid (with correlation coefficients ranging from 0.472 to 0.908, which were higher than the critical value of 0.361). The reliability test, conducted using Cronbach's alpha, showed that 15 question items were found to be reliable, with a coefficient of 0.959.

2.2.3. USE questionnaire (usefulness, ease of use, ease of learning, satisfaction)

The USE questionnaire, which measures the factors of usefulness, ease of use, ease of learning, and satisfaction, was derived from Sasongko's research conducted in 2022 [35]. This questionnaire is utilized to evaluate the usability, user-friendliness, learnability, and pleasure derived from utilizing the educational medium SEaM Mobile Card Game. The development of the USE questionnaire was initially undertaken by Arnold M. Lund. The USE questionnaire is a tool used to assess the usability of a product or system. The products and services are objectively evaluated based on 30 questions that are categorized into 4 dimensions: usability, simplicity of use, ease of learning, and satisfaction. The completion of this questionnaire involves the utilization of a 7-point Likert scale. Starting from strongly disagreeing to strongly agreeing. Respondents must check between grades 1-7 on the questionnaire sheet [35].

The reliability and validity of the Indonesian version of the USE questionnaire have been evaluated. Test the reliability of this study using Cronbach's Alpha and the product moment test for the validity. When the product moment test yields validity test results (rcount=0.705-0.854>rtable=0.197), it can be concluded that all question items are valid. The results of the reliability test, as determined by Cronbach's Alpha (0.977), indicate that every question item is reliable [35].

2.3. Research procedure

The educational materials on the SeAM Mobile Card Game and animated videos cover various aspects related to early marriage, including understanding its concept, prevention strategies, causes, impact, efforts to prevent it, national strategies, the importance of raising the age of marriage, and the benefits of doing so. The goal is to present accurate and easy-to-understand information to users. After this material is arranged systematically and comprehensively, researchers collaborated with design specialists and utilized computers to develop the design for the SEaM Mobile Card Game and animation video.

The SEaM Mobile Card Game is a card game that falls under the education genre. It is designed with a captivating concept as shwon in Figure 1. This game features audiovisual elements, comprehensive statistical data derived from extensive gameplay, and a visible score display. Participants are required to complete the pretest questionnaire before proceeding to the game stage. Similarly, participants must finish the game before they can move on to the post-test stage. The game instructions for this game are: i) Participants are required to click on the coin picture and then refrain from interacting with it until the round comes to a halt. ii) In the event that the coin image displayed represents a statement, the participant should select the corresponding statement card. iii) Upon selecting the statement card, relevant information regarding materials for early marriage prevention will be displayed. iv) In contrast, if the result is a challenge coin image, the participant will respond to the challenge by asking questions. v) Each accurately answered question was assigned a score of 1, whereas an incorrectly answered question received a score of 0. vi) The game is deemed finished whenever the contestant has responded to 15 challenges and accomplished 15 statements.
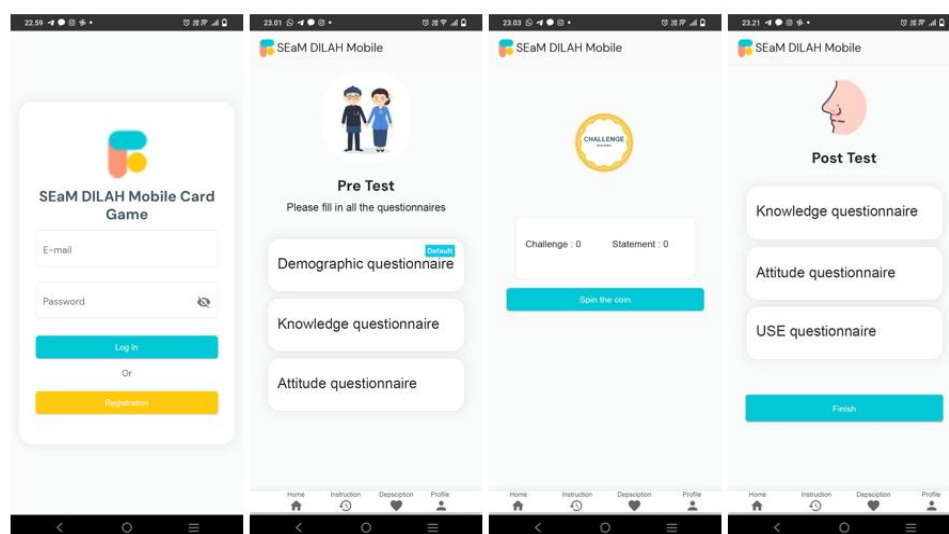

Figure 1. Application content and features

Prior to conducting the data collection process, researchers provided potential respondents with a clear and concise explanation of the research's objectives and methodology. Adolescents who expressed their willingness to participate in the study subsequently provided their informed consent by signing the necessary documents. The execution of research is categorized into two segments, specifically the execution of research in the intervention group and the execution of research in the control group. The implementation of the research is divided into two, namely the implementation of the research in the intervention group and the implementation of the research in the control group. The implementation of research in the intervention group, namely: i) Research involves providing a link to the SEaM Mobile Card Game application to adolescents who are willing to participate as research subjects. ii) Users sign up to create an account on the Game application. iii) Respondents subsequently access the system by entering the designated username and password. iv) Participants thereafter complete a pretest questionnaire, which includes demographic surveys, knowledge questionnaires regarding early marriage prevention, and attitudes towards early marriage prevention. v) Participants are then provided with the chance to engage in gaming activities via the SEaM Mobile Card Game application. vi) After participants have completed their use of the SEaM Mobile Card Game application as an educational tool for early marriage prevention, they are required to complete a post-test questionnaire. This questionnaire includes a knowledge questionnaire on early marriage prevention, an attitude questionnaire towards early marriage prevention, and a USE questionnaire (assessing usefulness, ease of use, ease of learning, and satisfaction). While the implementation of research in the control group, namely; i) Participants complete a pretest questionnaire, which includes demographic surveys, knowledge questionnaires regarding early marriage prevention, and attitudes towards early marriage prevention. ii) Participants acquire knowledge on the prevention of early marriage through the utilization of animated videos. iii) After viewing the animated video, participants complete a post-test questionnaire consisting of a knowledge quiz on early marriage prevention and a questionnaire on attitudes towards early marriage prevention. Subsequently, the participants were provided with pouches as tokens of appreciation for their willingness to partake in the study.

2.4. Data analysis

Univariate analysis is a method of analyzing data that focuses on examining and describing the individual properties of each study variable. These variables include age, gender, religion, father's education, maternal education, living together, and history of information acquisition. Assess the normality of the test data by employing the Kolmogorov-Smirnov test, with a significance level (p-value) greater than 0.05. The statistical analysis employed in this study was a bivariate test conducted by Wilcoxon and Mann-Whitney [36]. The Wilcoxon test is employed to assess disparities in knowledge regarding early marriage prevention before and after the intervention, as well as to analyze differences in adolescents' attitudes towards early marriage prevention before and after the intervention. On the other hand, the Mann Whitney test is utilized to compare the knowledge and attitudes of adolescents regarding early marriage prevention between the intervention group and the control group.

2.5. Ethics declaration

This research was conducted after obtaining ethical approval from the Health Research Ethics Commission of the Faculty of Medicine, University of Mataram on June 19, 2023, under the reference number: 249/UN18. F8/ETIK/2023. This ethical approval also ensures that the research has been designed taking into account ethical research principles such as the principles of informed consent, autonomy, beneficence, non-maleficence, and justice. Prior to data collection, the researcher explained the objectives of the research and the research procedures.

3. RESULTS AND DISCUSSION
3.1. Results
3.1.1. Characteristics of research respondents

Table 1 depicts the respondents' characteristics, including age, sex, religion, father's education, mother's education, father's occupation, mother's occupation, and cohabitation, which were similar in both groups. The statistical analysis indicated that there was no significant difference between the groups (p>0.05). The majority of the participants were 16 years old and identified as Muslim. The majority of the fathers and mothers had completed secondary education. Most of the fathers were self-employed, while most of the mothers did not have employment. Additionally, most of the students resided with their parents.

3.1.2. Comparison of knowledge and attitudes of adolescents about early marriage prevention before and after education in the intervention group and control group

Table 2 depicts that there is a notable disparity in adolescent knowledge of early marriage prevention before and after receiving education through the SEaM Mobile Card Game (p=0.000). Additionally, there is a significant difference in adolescent knowledge about early marriage prevention between before and after education using animated videos (p=0.000). Furthermore, there is a significant difference in adolescents' attitudes towards early marriage prevention before and after being educated with the SEaM Mobile Card Game (p=0.000). Lastly, there are significant differences in adolescents' attitudes towards early marriage prevention between before and after education using animated videos (p=0.011).

Table 1. Frequency distribution of respondent characteristics in the intervention and control groups

Characteristics of respondents	Intervention f	Intervention %	Control f	Control %	p-value
Age					
15	3	2.0	2	1.4	0.328
16	40	27.0	33	22.3	
17	35	23.6	26	17.6	
18	7	4.7	2	1.4	
Gender					
Man	42	28.4	27	18.2	0.533
Woman	43	29.1	36	24.3	
Religion					
Islam	84	56.8	62	41.9	1.000
Non-Islam	1	0.7	1	0.7	
Father's education					
Primary school	11	7.4	7	4.7	0.829
Secondary school	52	35.1	37	25.0	
University	22	14.9	19	12.8	
Mother's education					
Primary school	15	10.1	9	6.1	0.748
Secondary school	51	34.5	37	25.0	
University	19	12.8	17	11.5	
Father's work					
Not working	1	0.7	1	0.7	0.857
Self-employed	33	22.3	23	15.5	
Farmer	7	4.7	5	3.4	
Civil Servant	20	13.5	17	11.5	
Etc.	24	16.2	17	11.5	
Mother's work					
Not working	29	19.6	21	14.2	0.912
Self-employed	22	14.9	16	10.8	
Farmer	4	2.7	3	2.0	
Civil servant	11	7.4	9	6.1	
Etc.	19	12.8	14	9.5	
Living together					
Parents	82	55.4	62	41.9	0.637
Not a parent	3	2.0	1	0.7	

Table 2. Comparison of knowledge and attitudes of adolescents about early marriage prevention before and after education in the intervention group and control groups

Variable	Group	Before intervention Median (Min-Max)	After intervention Median (Min-Max)	p-value
Knowledge	Intervention (n=85)	8 (2-12)	12 (5-15)	0.000
	Control (n=63)	9 (2-13)	11 (4-15)	0.000
Attitude	Intervention (n=85)	63 (51-74)	65 (55-75)	0.000
	Control (n=63)	65 (49-75)	66 (50-75)	0.011

3.1.3. Comparison of knowledge and attitudes of adolescents about early marriage prevention after education in the intervention group and control groups

Table 3 presents the results indicating that there is a statistically significant difference in adolescents' knowledge regarding early marriage prevention in both groups (p=0.013) after being given education. Similar to the knowledge aspect, the attitude aspect is also the same, there is a significant difference in adolescents' attitudes towards early marriage prevention in both groups after being given education (0.000). The results of this study prove that the educational intervention provided is effective in increasing knowledge and adolescent attitudes towards early marriage prevention.

3.1.4. Description of usefulness, ease of use, ease of learning, and satisfaction for SEaM Mobile Card Game

As shown in Figure 2, the usability measurement results of the USE questionnaire indicate that the feasibility value of utility is 92%, the ease-of-use value is 97%, the ease-of-learning value is 91%, and the satisfaction value is 94%. 93% is the average of the aggregate dimensions. These findings suggest that educational media is perceived as highly usable by the target audience.

Table 3. Comparison of differences in knowledge and attitudes of adolescents about early marriage prevention in the intervention group and the control groups after education

Variable	Group	Median (Min-Max)	p-value
Knowledge	Intervention (n=85)	4 (-1-11)	0.013
	Control (n=63)	3 (-2-9)	
Attitude	Intervention (n=85)	3 (-4-12)	0.000
	Control (n=63)	1 (-7-12)	
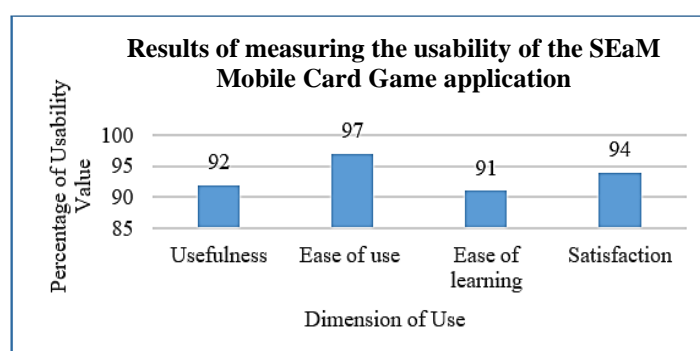
Figure 2. Graph of usability results of SEaM mobile card game application

3.2. Discussion

3.2.1. The effect of SEaM Mobile Card Game on adolescents' knowledge and attitudes about preventing early marriage

Adolescents' knowledge and attitudes about the prevention of early marriage undergo substantial changes before and after receiving education through the SEaM Mobile Card Game. The findings are corroborated by a study conducted by Al-Mugheed et al. [37], which demonstrates that the utilization of Game-based Virtual Reality Phone Applications and Online Education can enhance students' understanding and attitudes toward precautionary measures. This finding is further corroborated by Mulidah et al. study, which demonstrates that game applications can exert a substantial influence on the knowledge and attitudes of adolescents in the prevention of stunting [38]. Similarly, the findings of a study conducted by Mukund et al. [39] demonstrated that Digital Game-Based Courses have a substantial impact on enhancing knowledge and improving social-emotional competence, empathy, and compassion in adolescents [39]. According to Byusa et al. research findings, educational games enhance students' conceptual understanding of chemistry and increase their motivation to learn and have fun while making sense of the learned content [40]. Activity- and game-based learning environments have a substantial impact on the learning experience by stimulating interest and increasing the attention span and concentration of learners [24].

Utilizing mobile game-based learning has been shown to have a good effect on enhancing academic performance and student motivation [41], [42]. In 2021, Criollo-C et al. [43] identified several benefits of mobile learning, including enhanced retention, improved performance, student engagement, motivation, and autonomy, experiential learning, self-directed learning, active participation, facilitation of coordination, cooperation, and collaboration, affordability and portability, as well as easy and engaging learning experiences that lead to achievement and enjoyment. The educational value derived from learning-based mobile games is primarily focused on using play to motivate learning. It goes beyond mere playful elements and emphasizes the design of non-playful learning activities as "games". This approach treats the process and outcomes of learning with the same spirit and attitude as play [44].

Mobile games have gaming features. Game features refer to the visual and interactive aspects incorporated into video games. In the realm of educational games, the characteristics closely resemble those of

other games, with the primary distinction lying in the instructional material they offer. The element serves as a visual stimulus in the game, enhancing student interest and engagement, hence making the learning process more captivating. Auditory and visual stimuli are crucial factors that directly impact the mood and emotions of learners during the learning process [45]. The SEaM Mobile Card Game includes audio-visual elements, game duration data, gameplay challenges and prompts, and scoring. The student's express contentment with the attributes of the game. This is demonstrated by the numerical value assigned to the dimension of satisfaction. The USE questionnaire achieved a satisfaction score of 94%, indicating that respondents are highly content with the game's features, as they effectively and comprehensively deliver information services on early marriage prevention.

3.2.2. Effects of Animated Videos on adolescents' knowledge and attitudes about early marriage prevention

Adolescents' knowledge and attitudes about the prevention of early marriage show notable disparities before and after receiving education through animated videos. This finding is corroborated by Sudirman et al. [46] research, which shows that the use of animated videos in instructional media can increase knowledge about ESI Triage and student satisfaction. These findings are corroborated by Barteit et al. [47] research, which demonstrates that animated story-based (SAS) movies effectively enhance knowledge of the COVID-19 vaccine. Short animated videos in educational media have the potential to enhance understanding of the health effects of air pollution, modify attitudes and beliefs, and enhance the ability of health professional students and practitioners to identify and counsel patients at risk, regardless of their profession, level of training, or initial knowledge level [48].

The findings of a study conducted by Bashin et al. in 2020 demonstrated that utilizing video-based education methods might enhance children's understanding and attitudes toward attention deficit hyperactivity disorder (ADHD) [49]. This finding is further corroborated by the findings of a study conducted by Karimian et al. demonstrated that the use of video-based multimedia can greatly enhance participants' understanding, attitudes, and proficiency in doing a breast self-examination [50]. The findings of Nagarajan et al. study indicates that the Video-assisted Teaching Program is effective in enhancing knowledge and attitudes towards electroconvulsive therapy (ECT) procedures among caretakers of individuals with significant mental disorders [51]. The impact of audiovisual media on adolescents is beneficial in terms of knowledge enhancement and the reduction of hazardous smoking attitudes [52]. Participants can acquire knowledge about newborn care and nurses can utilize educational videos to enhance health education efforts [53]. The mother's confidence and understanding of specific newborn subjects can be enhanced by utilizing concise movies [54]. Health education efficiently utilizes audio-visual tools to enhance information regarding the prevention of osteoporosis in older women [55].

Video could depict the movement of an item along with accompanying sound, including background sound. This factor enhances the level of intrigue in the video. Students exhibit a greater level of attentiveness towards visuals or things that are in motion compared to those that are static or immobile. Animation can be employed to enhance sensory perception, as opposed to written content, so capturing students' attention and fostering greater engagement compared to reading. The presence of attention and interest in students indicates their acquisition of knowledge and heightened drive [56]. Videos can enhance knowledge retention by allowing you flexibility in stopping and pausing multiple playbacks. Recordings can be replayed subsequent to the conclusion of the class. Video-based educational material significantly enhances the learning process across all courses, particularly those that involve intricate concepts and need a heightened level of creativity. If learners are engaged with the videos they see, they may readily adjust and retain information effectively. Videos are advantageous for teachers who employ traditional classroom teaching approaches. Digital video enables remote learning by connecting students and teachers from different parts of the world [57].

3.2.3. Usefulness, ease of use, ease of learning, and satisfaction for SEaM Mobile Card Game

The study revealed that the average ratings for characteristics of usefulness, ease of use, ease of learning, and satisfaction were 6.4, 6.8, 6.4, and 6.6, respectively. The respondents' average rating on a scale of 6.5 was calculated. In the category of usefulness, Games have a benefit value of 92%. In terms of usability, the game receives a score of 97% which indicates that it can be managed with great ease. In the ease of learning part, a score of 91% was achieved, indicating that the game display is highly effective and consistently designed, enabling respondents to readily comprehend and navigate through it. Regarding contentment on the side Achieving a score of 94% indicates a high level of satisfaction among respondents. This is attributed to the game's features, which effectively and comprehensively give information services on preventing early marriage. The mean overall dimension is 93%. Thus, it can be inferred that the SEaM Mobile Card Game is highly appropriate for students to utilize as an instructional tool to deter early marriage.

This finding is corroborated by Jannah et al. [58] research, which demonstrated the usability percentage of the Google Classroom application using the USE questionnaire. The results indicated a feasible

level of ease of use and a highly feasible level of ease of learning, satisfaction, and usefulness. This finding is further corroborated by the research conducted by Arifin and Maharani in 2021, indicating that the average value of the usefulness metric is 85%. The ease of learning parameter is rated at 82%, the Ease of Use at 80%, and the lowest rating is for satisfaction at 79%. These findings indicate that Eden Farm's application is commendable. The usability of the Eden Farm application was assessed and classified as "Very Feasible" with a usability value of 84.18% [59].

4. CONCLUSION

The findings of this study indicate a substantial increase in adolescents' knowledge and attitudes towards preventing early marriage following their education through the SEaM Mobile Card Game and animated videos. There is a continuing need to enhance knowledge and attitudes about the prevention of early marriage in adolescents. One way to enhance the knowledge and attitudes of adolescents regarding the prevention of early marriage is through the utilization of more efficient educational media.

REFERENCES

[1]   Unicef, *Evidence Review: Child Marriage Interventions and Research From 2020 to 2022*. New York: Unicef. [Online]. Available on: https://www.unicef.org/documents/evidence-review-child-marriage-interventions-and-research-2020-2022

[2]   Central Statistics Agency, "Indonesia Youth Statistics 2022," Central Statistics Agency, Jakarta, 2022. [Online]. Available on: https://www.bps.go.id/publication/2022/12/27/6791d20b0b4cadae9de70a4d/statistik-pemuda-indonesia-2022.html

[3]   Ministry of Women's Empowerment and Child Protection, "Profile of Indonesia Children 2021," Ministry of Women's Empowerment and Child Protection, Jakarta, 2021. [Online]. Available on: https://kemenpppa.go.id/page/view/MzgyNw==

[4]   N. Samsi, "Factors influencing the incidence of early marriage among adolescent girls in Lembah Melintang District," *Journal Kesehatan Global*, vol. 3, no. 2, pp. 55–61, Mei 2020, doi: 10.33085/jkg.v3i2.4624.

[5]   W. Angraini, B. A. Pratiwi, H. Febriawati, R. Yanuarti, dan Oktarianita, "Factors affecting the occurrence of early marriage," *Journal Biometrika dan Kependududukan*, vol. 8, no. 2, pp. 183–191, 2019, doi: 10.20473/jbk.v8i2.2019.183-191.

[6]   D. Abdurahman, N. Assefa, and Y. Berhane, "Adolescent girls' early marriage intention and its determinants in eastern Ethiopia: A Social Norms Perspective," *SAGE Open*, vol. 13, no. 2, pp. 1–11, 2023, doi: 10.1177/21582440231182352.

[7]   D. Suryadi, M. Permata Sari, and R. Michiko, "The attitudes and intention of marriage among young adults in Greater Jakarta: a Descriptive Study," *International Journal of Application on Social Science and Humanities*, vol. 1, pp. 174–179, 2023, doi: 10.24912/ijassh.v1i4.28961.

[8]   N. Sfetcu, "The knowledge," *Nicolae Sfetcu*, 2022, doi: 10.13140/RG.2.2.11276.59528.

[9]   F. Gaiseanu, "Attitude as an expressible info-operational reaction to a perceived/purposed object/objective," *International Journal on Neuropsychology and Behavioural Sciences (IJNBS)*, vol. 1, no. 1, pp. 12–16, 2020, doi: 10.51626/ijnbs.2020.01.00002.

[10]   V. Sagalova, S. Nanama, N. M. Zagre, and S. Vollmer, "Long-term consequences of early marriage and maternity in West and Central Africa: Wealth, education, and fertility," *Journal of Global Health*, vol. 11, pp. 1–8, 2021, doi: 10.7189/jogh.11.13004.

[11]   M. Irani and R. L. Roudsari, "Reproductive and sexual health consequences of child marriage: a review of literature," *Journal of Midwifery and Reproductive Health*, vol. 7, no. 1, pp. 1491–1497, 2019, doi: 10.22038/jmrh.2018.31627.1342.

[12]   M. R. Kabir, S. Ghosh, and A. Shawly, "Causes of early marriage and its effect on reproductive health of young mothers in Bangladesh," *American Journal of Applied Sciences*, vol. 16, no. 9, pp. 289–297, 2019, doi: 10.3844/ajassp.2019.289.297.

[13]   M. Moyazzem Hossain, F. Abdulla, R. Banik, S. Yeasmin, and A. Rahman, "Child marriage and its association with morbidity and mortality of under-5 years old children in Bangladesh," *PLoS One*, vol. 17, no. 2 February, pp. 1–14, 2022, doi: 10.1371/journal.pone.0262927.

[14]   H. Fouly, A. K. Hassan, A. Abdelaziz, and Y. E. Yousef, "Factors of Early marriage and its consequences on reproductive health from teenage mothers' perspectives and their families," *Lupine Online Journal of Nursing & Health Care*, pp. 301–309, 2021, doi: 10.32474/LOJNHC.2021.03.000158.

[15]   World Health Organization (WHO), "Adolescent pregnancy," 2023. https://www.who.int/news-room/fact-sheets/detail/adolescent-pregnancy (accessed November 8, 2023).

[16]   M. Azinar *et al.*, "Early marriage in women and the risk of low birth weight," *Unnes Journal of Public Health*, vol. 11, no. 1, pp. 75–81, 2022, doi: 10.15294/ujph.v11i1.51231.

[17]   S. Shonazarova dan B. Eshchanov, "The determinants of early marriage and under-five child mortality in Afghanistan," *Munich Personal RePEc Archive*, no. 107684, pp. 1–29, 2020, doi: 10.13140/RG.2.2.29902.18249.

[18]   O. Dadras, M. Hazratzai, and F. Dadras, "The association of child marriage with morbidities and mortality among children under 5 years in Afghanistan: findings from a national survey," *BMC Public Health*, vol. 23, no. 1, pp. 1–9, 2023, doi: 10.1186/s12889-023-14977-5.

[19]   H. S. Kasjono, A. Wijanarko, R. Amelia, D. Fadillah, W. Wijanarko, and Sutaryono, "Impact of early marriage on childhood stunting," *Proceedings of the 1st International Conference on Science, Health, Economics, Education and Technology (ICoSHEET 2019)*, vol. 27, no. January 2018, pp. 172–174, 2020, doi: 10.2991/ahsr.k.200723.043.

[20]   N. Y. Susilawati, "Analysis of early marriage and other factors on stunting incidence in the work area of prabugantungan," *International Journal of Health Science. Vol*, vol. 3, no. 1, pp. 96–103, 2023, doi: 10.55606/ijhs.v3i1.1211.

[21]   A. Basuki, "Education system for generation Z (Gen Z)," *Jurnasl Lingkar Widyaiswara*, vol. 7, no. 01, pp. 43–55, 2020.

[22] Ofcom, *Children and parents: media use and attitudes report 2022*. London: Ofcom, 2022. [Online]. Available on: https://www.ofcom.org.uk/__data/assets/pdf_file/0024/234609/childrens-media-use-and-attitudes-report-2022.pdf

[23] Kustyarini, S. Utami, and E. Koesmijati, "The effectiveness of interactive learning media based on edutainment in writing skills for text procedure," *KnE Social Sciences*, 2020, vol. 2020, pp. 565–575. doi: 10.18502/kss.v4i12.7631.

[24] A. Z. Bhat, I. Ahmed, L. Kameswari, and M. S. Khan, "A game based innovative teaching and learning environment to enhance progression and performance of students," *SHS Web Conferences*, vol. 156, pp. 01001, 2023, doi: 10.1051/shsconf/202315601001.

[25] O. S. Kaya and E. Ercag, "The impact of applying challenge-based gamification program on students' learning outcomes: Academic achievement, motivation and flow," *Education and Information Technologies*, vol. 28, no. 8, pp. 10053–10078, 2023, doi: 10.1007/s10639-023-11585-z.

[26] K. Susanti, "Alternative learning using card games in children," (in Indonesian), *El Banar : Jurnal Pendidikan dan Pengajaran*, vol. 4, no. 1, pp. 36–41, 2021, doi: 10.54125/elbanar.v4i1.79.

[27] J. Julia, *Development of digital-based music learning media for elementary school*. Jawa Barat: CV. Caraka Khatulistiwa, 2021.

[28] F. Abdou, M. Abd Elbaky, and N. Ahmed, "Effect of using mobile games on patients with acute stroke during cognitive rehabilitation at the intensive care unit," *Alexandria Scientific Nursing Journal*, vol. 25, no. 3, pp. 13–25, 2023, doi: 10.21608/asalexu.2023.318352.

[29] C. Höchsmann *et al.*, "Novel smartphone game improves physical activity behavior in type 2 diabetes," *American Journal of Preventive Medicine*, vol. 57, no. 1, pp. 41–50, 2019, doi: 10.1016/j.amepre.2019.02.017.

[30] H. Jiang, R. Natarajan, Y. K. Shuy, L. Rong, M. W. Zhang, and R. Vallabhajosyula, "The use of mobile games in the management of patients with attention deficit hyperactive disorder: a scoping review," *Frontiers in Psychiatry*, vol. 13, no. March, pp. 1–12, 2022, doi: 10.3389/fpsyt.2022.792402.

[31] Y. Penev *et al.*, "A mobile game platform for improving social communication in children with autism: a feasibility study," *Applied Clinical Informatics*, vol. 12, no. 5, pp. 1030–1040, 2021, doi: 10.1055/s-0041-1736626.

[32] A. Rantala *et al.*, "A gamified mobile health intervention for children in day surgery care: Protocol for a randomized controlled trial," *Nursing Open*, vol. 9, no. 2, pp. 1465–1476, 2022, doi: 10.1002/nop2.1143.

[33] M. P. Christopher J. Miller, Shawna N. Smith, "Experimental and quasi-experimental designs in implementation research," *Psychiatry Research*, vol. 268, no. 5, pp. 876–884, 2021, doi: 10.1016/j.psychres.2019.06.027.

[34] M. S. Dahlan, *Sample Size in Medical and Health Research*. Jakarta: Epidemiologi Indonesia, 2019.

[35] A. Sasongko, W. E. Jayanti, and D. Risdiansyah, "USE Questionnaire to measure the usability of the e-tadkzirah information system," (in Indonesian), *Jurnal Khatulistiwa*, vol. 8, no. 2, pp. 80–87, 2020, doi: 10.31294/jki.v8i2.9135.

[36] R. Meléndez, R. Giraldo, and V. Leiva, "Sign, wilcoxon and mann-whitney tests for functional data: An approach based on random projections," *Mathematics*, vol. 9, no. 1, pp. 1–11, 2021, doi: 10.3390/math9010044.

[37] K. AL-Mugheed *et al.*, "Effectiveness of game-based virtual reality phone application and online education on knowledge, attitude and compliance of standard precautions among nursing students," *PLoS One*, vol. 17, no. 11 November, pp. 1–13, 2022, doi: 10.1371/journal.pone.0275130.

[38] S. Mulidah, A. Asrin, A. Fitriyani, W. Subagyo, and S. Sanjaya, "The gemas application toward knowledge and attitude in preventing stunting of teenagers," *Malaysian Journal of Medicine and Health Sciences*, vol. 18, pp. 70–75, 2022.

[39] V. Mukund, M. Sharma, A. Srivastva, R. Sharma, M. Farber, and N. C. Singh, "Effects of a digital game-based course in building adolescents' knowledge and social-emotional competencies," *Games for Health Journal*, vol. 11, no. 1, pp. 18–29, 2022, doi: 10.1089/g4h.2021.0138.

[40] E. Byusa, E. Kampire, and A. R. Mwesigye, "Game-based learning approach on students' motivation and understanding of chemistry concepts: A systematic review of literature," *Heliyon*, vol. 8, no. 5, pp. 1–10, 2022, doi: 10.1016/j.heliyon.2022.e09541.

[41] B. T. Demir, S. Eşme, D. Patat, and B. Bilecenoğlu, "The effect of mobile applied anatomy learning on students' academic success, cognitive loads, and attitudes," *Medical Science Educator*, vol. 33, no. 3, pp. 711–718, 2023, doi: 10.1007/s40670-023-01787-y.

[42] R. Camacho-Sánchez, A. Rillo-Albert, and P. Lavega-Burgués, "Gamified digital game-based learning as a pedagogical strategy: student academic performance and motivation," *Applied Sciences (Switzerland)*, vol. 12, no. 21, pp. 1–16, 2022, doi: 10.3390/app122111214.

[43] S. Criollo-C, A. Guerrero-Arias, Á. Jaramillo-Alcázar, and S. Luján-Mora, "Mobile learning technologies for education: Benefits and pending issues," *Applied Sciences (Switzerland)*, vol. 11, no. 9, pp. 1–17, 2021, doi: 10.3390/app11094111.

[44] Y. Li, Z. Xu, Y. Hao, P. Xiao, and J. Liu, "Psychosocial impacts of mobile game on K12 students and trend exploration for future educational mobile games," *Frontiers in Education*, vol. 7, no. April, pp. 1–10, 2022, doi: 10.3389/feduc.2022.843090.

[45] S. A. Ishak, U. A. Hasran, and R. Din, "Media education through digital games: a review on design and factors influencing learning performance," *Education Sciences*, vol. 13, no. 2, pp. 1–20, 2023, doi: 10.3390/educsci13020102.

[46] A. A. Sudirman, Kumboyono, and Suryanto, "The effect of animated video learning on esi triage knowledge and student satisfaction of Nursing Polytechnic Health Ministry of Health Makassar," *Jurnal Health Sains*, vol. 5, no. 6, pp. 361–371, 2024, doi: 10.46799/jhs.v5i6.1292.

[47] S. Barteit *et al.*, "The effect of a short, animated story-based video on COVID-19 vaccine hesitancy: A study protocol for an online randomized controlled trial," *Frontiers in Public Health*, vol. 10, pp. 1–14, 2022, doi: 10.3389/fpubh.2022.939227.

[48] B. M. Doheny, J. J. Inglis, K. A. Boll, S. Lunos, and V. L. Surapaneni, "Short animated video increases knowledge and perceived comfort in clinical counseling on inequitable health impacts of air pollution among interprofessional health learners and clinicians," *BMC Medical Education*, pp. 1–12, 2023, doi: 10.1186/s12909-023-04785-1.

[49] V. Bhasin, P. Srinivasan, U. J. Deaver, and J. Sarin, "Effect of video based teaching on knowledge and attitude regarding ADHD of children among primary school teachers," *Applied Nursing Research*, vol. 11, no. 7, pp. 1037–1044, 2020, doi: 10.37506/mlu.v20i3.1427.

[50] Z. Karimian, R. Zare, N. Zarifsanaiey, and N. Salehi, "The effect of video-based multimedia training on knowledge, attitude, and performance in breast self-examination," *BMC Womens Health*, vol. 22, no. 1, pp. 1–14, 2022, doi: 10.1186/s12905-022-01877-w.

[51] P. Nagarajan, G. Balachandar, V. Menon, and B. Saravanan, "Effect of a video-assisted teaching program about ect on knowledge and attitude of caregivers of patients with major mental illness," *Indian Journal of Psychological Medicine*, vol. 43, no. 1, pp. 45–50, 2021, doi: 10.1177/0253717620938038.

[52] S. Siregar, K. Rochadi, and L. T. Maas, "The effect of audio-visual media on adolescents' knowledge and attitude toward smoking dangerous at secondary high school 2 Halongonan Subdistrict, Indonesia," *International Journal of Nursing and Health Services (IJNHS)*, vol. 2, no. 3, pp. 164–171, 2019, doi: 10.35654/ijnhs.v2i3.147.

[53] L. B. de Sousa *et al.*, "Effect of educational video on newborn care for the knowledge of pregnant and postpartum women and their families," *Revista Brasileira de Enfermagem*, vol. 75, no. Suppl 2, pp. 1–7, 2022, doi: 10.1590/0034-7167-2020-1371.

[54]   R. Arinitwe, A. Willson, S. Batenhorst, P. T. Cartledge, and P. T. Cartledge, "Using a global health media project video to increase knowledge and confidence in the mothers of admitted neonates in Rwanda: A prospective interventional study," *Journal of Tropical Pediatrics*, vol. 66, no. 2, hal. 136–143, 2020, doi: 10.1093/tropej/fmz042.

[55]   I. Daryani, F. Suciana, and E. Rusmingsih, "Effect of health education using audiovisual on knowledge of osteoporosis prevention in elderly," *Journal of Physics: Conference Series*, vol. 1179, no. 1, pp. 1–5, 2019, doi: 10.1088/1742-6596/1179/1/012141.

[56]   N. Rashid, N. Khanum, and F. R. Khan, "The effect of animation as a teaching tool on students' learning – an experimental study," *Media Literacy and Academic Research*, vol. 7, no. 1, pp. 129–144, 2024, doi: 10.34135/10.34135/mlar-24-01-07.

[57]   K. Paavizhi, P. Palanisamy, and A. Saravanakumar, "Effectiveness of video assisted learning module," *International Journal of Control and Automation*, vol. 12, no. 6, pp. 268–275, 2019.

[58]   S. N. Jannah, A. Sobandi, and S. Suwatno, "The measurement of usability using USE questionnaire on the Google Classroom Application as E-learning Media (A Case study: SMK Negeri 1 Bandung)," *Teknodika*, vol. 18, no. 2, pp. 94–105, 2020, doi: 10.20961/teknodika.v18i2.42486.

[59]   S. Arifin and L. Maharani, "Assessing user experience of a mobile application using usability questionnaire method," *Applied Information System and Management (AISM)*, vol. 4, no. 1, pp. 1–10, 2021, doi: 10.15408/aism.v4i1.20265.

BIOGRAPHIES OF AUTHORS

Apriani Susmita Sari is a lecturer at the Nursing Science Study Program, STIKes Hamzar East Lombok, West Nusa Tenggara, Indonesia. Her research interests are maternity nursing, pediatric nursing and transcultural nursing. She has conducted research and published several articles in Indonesian and International journals. She is also a reviewer of research and community service journals. She can be contacted at email: aprianisusmita442@gmail.com.

Hikmah Lia Basuni is a lecturer at the Nursing Science Study Program, STIKes Hamzar East Lombok, West Nusa Tenggara, Indonesia. Her research interests are emergency and maternity. She has conducted research and published several articles in Indonesian journals. She is also a book writer. She can be contacted at email: hikmahliabasuni@gmail.com.

Nurannisa Fitria Aprianti is a lecturer at the Midwifery Education Study Program, STIKes Hamzar East Lombok, West Nusa Tenggara, Indonesia. Her research interests are reproductive health, puerperium, and public health. She has conducted research and published several articles in Indonesian journals. She is also a book writer. She can be contacted at email: nurannisafitriaaprianti@gmail.com.