Diffusion of Educational Digital Innovation: Implementing The OKY App for Menstrual Education in Junior High Schools

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ABSTRACT

Background: *Menstruation is a natural phenomenon that occurs in all women. However, it can result in various physical and psychological issues, including elevated stress levels. Inadequate management of menstrual hygiene has been demonstrated to result in reproductive health complications. Recently, the popularity of menstrual tracking applications such as the OKY App has increased, with these applications assisting women in the monitoring of their menstrual cycles. However, it is evident that a significant proportion of adolescents, including those enrolled at State Junior High School (SMPN) 30 Surabaya, have not yet adopted this application. The objective of this study was to analyze the relationship between relative advantage, compatibility, complexity, trialability, observability, and knowledge with the decision and implementation of using the OKY App at SMPN 30 Surabaya.*

Method: *The present research employed a quantitative methodology, adopting a cross-sectional approach and an explanatory research design. The population under study comprised students in 7th and 8th grade at SMPN 30 Surabaya. A simple random sampling technique was used to select 70 respondents. The data was collected via a questionnaire that encompassed a range of variables, including relative advantage, compatibility, complexity, trialability, observability, knowledge, decision, and implementation.*

Result: *The findings indicated that relative advantage exhibited no correlation with the decision-making process concerning the utilization of the OKY App. Complexity was related to the decision to use the app but not to its implementation. Therefore, this variable needs to be considered to ensure the app is more easily accepted by potential users. In conclusion, compatibility, trialability, observability, and knowledge are significantly related to both the decision and implementation of using the OKY App. Relative advantage has no impact on either decision or implementation, while complexity only influences the decision-making process but not the actual use of the app. The findings emphasize the significance of addressing user perceptions and understanding in order to enhance the adoption and sustained utilization of menstrual health technology.*

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INTRODUCTION

Adolescence is defined as a transitional phase from childhood to adulthood, with a varying age range. According to the World Health Organization (WHO), the age range is set at 10–19 years old. The Indonesian Ministry of Health sets the age range at 10–18 years old, while the National Population and Family Planning Board (BKKBN) defines it as 10–24 years old and unmarried individuals. Adolescents are a global focus due to their role in achieving the Sustainable Development Goals (SDGs) 2030. The large number of adolescents, both globally and nationally, poses both a potential and a challenge, particularly in the context of health. In Indonesia, the population of individuals aged between 15 and 24 years is estimated to exceed 44 million, with the

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city of Surabaya alone contributing more than 500,000 adolescents to this demographic.(1)

Adolescents undergo significant physical, psychological, and intellectual development. However, it is important to note that adolescents often engage in challenges without giving them due consideration, which can have adverse consequences for their health, particularly with regard to their reproductive health.(2) Health issues among adolescents are diverse and include infectious diseases, non-communicable diseases, mental health, injury risks, and others. Other issues include malnutrition, reproductive health issues, early marriage, mental health, substance abuse, sexual abuse, and violence.(3)

Adolescent girls and women in particular, are more prone to reproductive tract infections (RTIs) than men. This is due to the anatomical differences that render them more susceptible to bacterial exposure. Therefore, women need to be more careful in maintaining hygiene in their genital area to prevent reproductive tract infections. (4) The The World Health Organization (WHO) has observed that reproductive tract infections (RTIs) are more prevalent in adolescents (35–42%) and young adults (27–33%) worldwide, with prevalence rates of candidiasis (25–50%), bacterial vaginosis (20–40%), and trichomoniasis (5-15%).

Menstruation is a natural biological process, yet a paucity of understanding about it continues to be a problem among adolescents. Menstrual disorders are often considered trivial, yet they are capable of exerting long-term effects if not treated appropriately. Inadequate menstrual hygiene practices have been demonstrated to result in a number of health issues, including vaginal discharge and other infections. It is therefore imperative that adolescents cultivate and refine their knowledge, attitudes, and behaviors from an early age in order to ensure the maintenance of optimal reproductive organ hygiene.(5)

It is evident that the Sustainable Development Goals (SDGs) relating to gender equality and women's empowerment are at risk of being hindered by unattended menstrual hygiene. This is due to the fact that unattended menstrual hygiene has a direct impact on reproductive health, education, and employment.(6) Inadequate maintenance of feminine hygiene has been demonstrated to have deleterious effects on health, with the potential to result in a range of health complications, including reproductive tract infections, vaginal infections, vaginal discharge, and other reproductive system diseases.(7) Data showed that over 30% of adolescent girls in Indonesia have experienced vaginal discharge. As indicated by statistical data reports from 2019, there were 2.9 million adolescent girls aged 15–24 in East Java, and 68% of them experienced pathological vaginal discharge.(8) Without adequate knowledge during menstruation, mistakes in menstrual hygiene practices can occur. If this persists over a long period, it can have adverse effects on reproductive health.(9)

The Adolescent Reproductive Health Information and Counseling Center (PIK-KRR) program, initiated by BKKBN, is an educational initiative focused on reproductive health issues. The purpose of establishing PIK-KRR is to assist adolescents with knowledge, awareness, attitudes, and behaviors for a healthy reproductive life. Despite being available at thousands of locations, the utilization of this program remains limited. The factors that act as inhibitors include a paucity of facilities, unfriendly attitudes among healthcare workers, and a lack of knowledge and understanding among adolescents about the importance of this service.(10) Therefore, a more innovative approach is required that is relevant to the present needs of adolescents.

The advent of technological advances, notably the prevalence of mobile devices, has engendered a multitude of opportunities for the digital propagation of health-related information. The adoption and acceptance of a technology by a community are contingent upon its perceived complexity and perceived risk, which are known to have a negative impact on technology adoption.(11) One example is the OKY app, a menstrual education application developed and designed by UNICEF in line with the characteristics of adolescents. The application has been developed to enhance adolescents' knowledge and understanding of reproductive health, with a particular emphasis on menstruation. The OKY App features four accessible functions: Diary, Encyclopedia, Quiz and Tips, and Settings. The OKY App can be downloaded via the Google Play Store and subsequently utilized without using mobile data.(12)

The efficacy of information delivery through digital media is contingent upon its ability to capture the audience's attention and convey the intended message in a clear and effective manner. The effectiveness of media is not determined by its sophistication; rather, it is determined by its ability to increase knowledge.(13) One way to measure the effectiveness of media is to use the theory of innovation diffusion. The theory of innovation diffusion(14) serves as a reference in measuring the success of the spread of innovations such as the OKY app. The adoption rate of innovations is determined by several factors, including relative advantage, compatibility, complexity, trialability, and observability. Preceding studies have demonstrated that compatibility and trialability have the greatest influence on the decision and implementation of application use. It is anticipated that, with the implementation of an effective innovation

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diffusion strategy, the OKY App will facilitate enhanced comprehension and adherence to reproductive health practices among adolescents.

Reproductive health issues, particularly during menstruation, are of particular concern in adolescent girls and must be given due consideration. Menstruation is a normal biological condition, but it can cause concern if not accompanied by sufficient understanding. A preliminary study conducted at State Junior High School (SMPN) 30 Surabaya showed that many female students encountered menstrual-related issues, including dysmenorrhea and vaginal discharge. These ailments were hypothesized to be attributable to deficiencies in information and knowledge concerning menstrual hygiene management. This assertion is further substantiated by data indicating that a significant proportion of female students encounter vaginal discharge, particularly those with limited knowledge of personal hygiene practices. Furthermore, the school and local health center also do not have specific programs or awareness campaigns related to menstrual hygiene management. In response to this issue, an innovation such as the digital-based menstrual tracker application (OKY Application) have been developed with the aim of preventing reproductive health problems caused by poor personal hygiene during menstruation. Consequently, the researchers are interested in analyzing the diffusion and acceptance of the OKY Application innovation at SMPN 30 Surabaya through an innovation diffusion approach.

METHOD

Design and Participants

This present study adopted a quantitative study, emploting a cross-sectional approach and utilizing explanatory research methods. The population of this study comprised 300 students in grades 7 and 8 at State Junior High School (SMPN) 30 Surabaya. The sample in this study consisted of female students in grades 7 and 8 at SMPN 30 Surabaya who had been exposed to the OKY application. The sample size calculation was conducted using the Lemeshow formula, yielding a minimum sample size of 60 in this study. The determination and selection of the sample were conducted by obtaining informed consent from all respondents, with the sample selected using random sampling techniques from grade 7 and 8 students at SMPN 30 Surabaya who had been exposed to the OKY Application. The study was conducted at SMPN 30 Surabaya over a period of three months, commencing in March and concluding in May 2024.

Variables and Data Collection

The dependent variable in this study was the decision and implementation to adopt the Menstrual Tracker Application (OKY Application). The decision variable represents the respondents' final outcome regarding the acceptance of the OKY Application innovation, measured using a questionnaire consisting of 5 questions employing a Likert scale assessment method with a score of 1 for “correct” and 0 for “incorrect,” which was then categorized into two categories: High = >2.5% and Low = <2.5%. Meanwhile, the implementation variable was the application of the OKY application by respondents, measured using a questionnaire consisting of 5 questions using a Likert scale assessment method with a score of 1 for correct and 0 for incorrect, which was then categorized into 2 categories, namely High = >2.5% and Low = <2.5%. Meanwhile, the confirmation variable was the use of the OKY application by respondents, measured using a questionnaire consisting of 5 questions using a Likert scale assessment method with a score of 1 for correct and 0 for incorrect, which was then categorized into 2 categories, namely High = >1.5 and Low = <1.5. To test the validity and reliability of the questionnaire, a validity and reliability test was conducted on 40 female students consisting of 37 questionnaire items, which were a combination of 5 variables of the diffusion of innovation theory, namely relative advantage, compatibility, complexity, trialability, observability, knowledge, decision, implementation, and confirmation. The results of the study showed that the questionnaire had a correlation coefficient of $r > 0.300$ and a Cronbach's alpha value of > 0.600, indicating that the questionnaire was valid and reliable. The independent variables in this study included Age, Father's Job Type, Father's Salary, Mother's Job Type, Mother's Salary, Internet Purchase Allocation, Daily Allowance, Relative Advantage, Compatibility, Complexity, Trialability, Observability, and Effectiveness.

Data Analysis

Statistical analysis was performed using IBM SPSS 24. Demographic variables were presented using descriptive statistics. The present study employed the chi-square test to ascertain the relationship between innovation characteristics and decisions and implementation of the OKY application. This present study employed data processing with statistical data processing software to obtain the p-value. In the event that the t value is found to be greater than the t table value or p is found to be less than α, the null hypothesis (H0) is rejected, and the result is deemed not to be significant. The present study was approved by the Health Research Ethics Committee of the Faculty of Dentistry, Airlangga University (approval number 0233/HRECC.FODM/III/2024). In the course of the study, the identities of all respondents were removed from the dataset.

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RESULT AND DISCUSSION

The number of female students who participated in this study was 70. The characteristics of the respondents in this study included age, father's occupation, father's salary, mother's occupation, mother's salary, internet quota usage, and daily allowance. The frequency distribution results for the characteristics of the respondents can be seen in Table 1.

This study is an application of the theory of innovation diffusion, which encompasses relative advantage, trialability, compatibility, complexity, observability, and knowledge. In this context, relative advantage refers to the extent to which an innovation is considered better than existing ideas or practices, which can be measured in terms of economics, social prestige, convenience, and satisfaction. Trialability describes the extent to which an innovation can be tested before being fully adopted. Compatibility refers to the extent to which an innovation is considered consistent with the values, past experiences, and needs of the adopter. Complexity is a measure of the difficulty in comprehending and utilizing an innovation; the easier it is to understand, the faster it will be adopted. Observability refers to the extent to which the results of an innovation can be observed by others, thus impacting the adoption decisions. The role of innovation knowledge in the diffusion process has been well demonstrated. Empirical evidence has shown that the more information individuals have about an innovation, the more likely they are to adopt it. The findings of the study indicated that trialability, complexity, and observability have a positive influence on the decision to adopt e-wallet applications in Bengkulu City. In contrast, relative advantage and compatibility do not emerge as significant factors in the decision-making process.(15)

Table 1. Respondent characteristics

Respondent characteristics	n	%
Age		
12	3	4.28
13	22	31.4
14	33	47.14
15	12	17.14
Father's Occupation		
Not Employed	3	4.29
Farmer/ Laborer	2	2.86
Private Employee	28	40
Civil servants, Military, Police officers	4	5.71
Others	33	47.14
Father's salary		
Under the minimum wage	33	47.14
Minimum wage	29	41.43
Above minimum wage	8	11.43
Mother's Occupation		
Housewife	24	34.28
Private Employee	16	22.86
Others	30	42.86
Mother's Salary		
Under the minimum wage	33	47.14
Minimum wage	29	41.43
Above minimum wage	8	11.43
Internet Quota Usage		
Purchase Internet Quota	31	44.29
Use Wifi	39	55.71
Daily Allowance		
Below Average	11	15.72
Average	54	77.14
Above Average	5	7.14
Total	**70**	**100**

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Table 2. Relationship with the Decision to Use the OKY Application

Variable	Decision						P -value	Contingency coefficient
	High		Low		Total			
	n	%	n	%	N	%		
Relative Advantage								
Good	59	84.3	9	12.9	68	97.1	0.143	0.172
Fair	1	1.4	1	1.4	2	2.9		
Compatibility								
Good	50	71.4	4	5.7	54	77.1		
Fair	9	12.9	4	5.7	13	18.6	0.003	0.378
Poor	1	1.4	2	2.9	3	4.3		
Complexity								
Good	53	75.7	4	5.7	57	81.4		
Fair	7	10.0	2	2.9	9	12.9	0.000	0.527
Poor	0	0	4	5.7	4	5.7		
Triability								
Good	57	81.4	3	4.3	60	85.7		
Fair	2	2.9	4	5.7	6	8.6	0.000	0.546
Poor	1	1.4	3	4.3	4	5.7		
Observability								
Good	57	81.4	1	1.4	58	82.9		
Fair	2	2.9	8	11.4	10	14.2	0.000	0.625
Poor	1	1.4	1	1.4	2	2.9		
Knowledge								
Good	58	82.9	1	1.4	59	84.3	0.000	0.640
Fair	2	2.9	9	12.9	11	15.7		

Table 3. Relationship with the Implementation of the OKY Application

Variable	Implementation						P-value	Contingency coefficient
	High		Low		Total			
	n	%	n	%	N	%		
Relative Advantage								
Good	61	87.1	7	10.0	68	97.1	0.082	0.204
Fair	1	1.4	1	1.4	2	2.9		
Compatibility								
Good	52	74.3	2	2.9	54	77.1		
Fair	9	12.9	4	5.7	13	18.6	0.000	0.442
Poor	1	1.4	2	2.9	3	4.3		
Complexity								
Good	52	74.3	5	7.1	57	81.4		
Fair	7	10.0	2	2.9	9	12.9	0.339	0.173
Poor	3	4.3	1	1.4	4	5.7		
Triability								
Good	57	81.4	3	4.3	60	85.7		
Fair	2	2.9	4	5.7	6	8.6	0.000	0.483
Poor	3	4.3	1	1.4	4	5.7		
Observability								
Good	57	81.4	1	1.4	58	82.9		
Fair	3	4.3	7	10.0	10	14.3	0.000	0.601
Poor	2	2.9	0	0	2	2.9		
Knowledge								
Good	57	81.4	2	2.9	59	84.3	0.000	0.505
Fair	5	7.1	6	8.6	11	15.7		

Relative advantage refers to an advantage that is perceived to be superior to that of previous innovations. The use of the OKY application provides several advantages for its users. A notable benefit is that users can access and obtain information related to menstruation and puberty without having to use data. In addition, users can also share their complaints through the help contact available in the application. Based on the results of the chi-

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square test using SPSS, the p-value exceeds the established significance level. This finding suggests that there is no significant relationship between relative advantage and the decision to use the OKY App. This study is supported by research conducted which stated that relative advantage has a negative and insignificant effect on customers' intention to adopt mobile banking. This phenomenon can be attributed to the necessity of internet data for the successful download of the OKY application, a requirement that is not always met due to the prevalence of internet data constraints among students.(16) Relative advantage not only influences the decision-making process but also the subsequent implementation stage of using the OKY app. The implementation stage is the process where an individual's innovation decision is accepted and applied. Based on the results of the chi-square test using SPSS, which showed a p-value greater than the significant value, it can be concluded that relative advantage has no significant relationship with the implementation of the OKY App. This research findings are consistent with those of a previous study which concluded that relative advantage does not influence the acceptance and utilization of OVO.(17)

The Triability variable refers to the extent to which an innovation can be tested on a limited time scale before being fully adopted. The OKY application provides users with the opportunity to engage in conversation with tutors through its chat feature, thereby enabling them to familiarize themselves with the application's functionality prior to its regular utilization. Based on the results of the chi-square test using SPSS, which showed a p-value smaller than the significant value, it can be concluded that there is a significant relationship between triability and the decision to use the OKY app. This research aligns with the study conducted which indicated that triability has a significant influence on the adoption of cloud-based ERP systems.(18) This study is also in line with research conducted which stated that triability significantly influences farmers' decisions to adopt Crop-Livestock Technology.(19) This indicates that the opportunity to experiment with innovations before adoption can enhance users' confidance and enthusiasm for new technologies. This occurs because the introduction of the OKY app is carried out through a socialization method, which involves providing tutors to download and use the OKY app. Triability is one of the stages that can influence the implementation of an innovation. The more an innovation can be tested, the faster users will implement it. Based on the results of the chi-square test using SPSS, the p-value is smaller than the significant value, indicating a significant relationship between triability and the implementation of the OKY Application. Triability exerts a significant positive effect on the adoption of mobile payments. In the aforementioned study, the researchers posited that mobile payments have become sufficiently optimal, enabling users to take advantage of the opportunity to try new innovations.(11)

The compatibility variable is indicative of the extent to which an innovation is considered compatible with the values, past experiences, and needs of its potential adopters. The results of the chi-square test, implemented using SPSS, indicated that the p-value was less than the significance level.This finding indicating a substantial relationship between Compatibility and the decision to use the OKY Application. This is because the OKY Application is considered compatible with the values, norms, and needs of the adopters. The results of this study are supported by research conducted which stated that there is a correlation between compatibility and consumer decisions to adopt mobile shopping applications.(20) In addition, a study also supports this finding, showing that compatibility has a significant effect on user satisfaction in adopting mobile commerce in Pakistan. Following the decision by the students to adopt the OKY application, its implementation will commence.(21) At this stage, the decision is made regarding the continued utilization of the OKY application by the respondents. Based on the results of the chi-square test using SPSS, the p-value is less than the significant value, indicating a significant relationship between compatibility and the implementation of the OKY app. This present findings are consistent with research conducted which indicated that there is a significant influence between compatibility and the adoption of mobile banking apps.(22)

The complexity variable refers to the degree to which an innovation is considered relatively difficult to understand and use. Based on the results of the chi-square test using SPSS, a p-value smaller than the significance value was obtained, indicating a significant relationship between Complexity and the decision to use the OKY Application. This study is also supported by research conducted which stated that Complexity influences the decision to adopt e-wallet applications.(15) Adolescents with a high level of curiosity tend to always want to try new things, which naturally requires effective and efficient information tools. One effective way is to use digital media such as digital applications that can be accessed via smartphones. However, upon further analysis, the chi-square test results indicated that the p-value exceeded the established significance level. This finding suggests that the complexity of the system does not have a substantial impact on the effectiveness of the implementation of the OKY App. This research is supported a study that found complexity to have negative impact on the utilization of telemedicine applications.(23) This phenomenon transpires

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due to students' perception of the features in the OKY App as being challenging to utilize.

The observability variable refers to the extent to which others can see the results of an innovation. The more evident the advantages of adopting an innovation are, the more probable it is that others will also adopt it. Based on the results of the chi-square test using SPSS, the p-value is smaller than the significance value. This finding suggests a substantial relationship between observability and the decision to utilize the OKY application. This assertion is further substantiated by the findings of research conducted which determined that observability has a significant influence on the intention to adopt mobile banking.(16) This occurs because the usefulness of the OKY Application can be seen by the surrounding environment, thereby influencing the surrounding environment to adopt the OKY Application. After deciding to adopt the OKY Application, each individual will see the benefits of using the Application and apply it in their daily lives. This occurs because the observability of the innovation or OKY App successfully influences users. Through friends and the environment who suggest using and spreading the advantages of using the OKY App. Based on the results of the chi-square test using SPSS, the p-value is less than the significant value. This finding suggests a substantial relationship between observability and the implementation of the OKY App. This phenomenon occurs because the surrounding environment is capable of observing the usefulness of the OKY application, thereby encouraging the adoption of the application. Following the determination to adopt the OKY application, its proponents are poised to demonstrate its practical benefits and to encourage its integration into their daily routines.

The Knowledge variable refers to the extent to which individuals understand and are aware of an innovation. At the knowledge stage, individuals do not yet have knowledge related to new innovations. Based on the results of the chi-square test using SPSS, the p-value is smaller than the significance value, so it can be concluded that there is a significant relationship between knowledge and the implementation of the OKY application. This present study is supported by previous research which indicated that there is a relationship between knowledge and innovation adoption. Based on the results of the chi-square test using SPSS, the p-value is smaller than the significance level. This finding suggests that there is a statistically significant relationship between knowledge and implementation and the utilization of the OKY Application. Knowledge significantly influences the use of the Knowledge Management System (KMS).(24)(25)

The confirmation stage is the phase in which individuals reinforce their previous decision to adopt an innovation. At this stage, a person may choose to maintain their decision or withdraw it if they obtain new information that contradicts their initial beliefs. Based on the research results, the majority of respondents, specifically 52 female students or 74.28%, continue to use the OKY application, indicating a high level of usage. Conversely, 18 female students, constituting 25.72% of the sample, were classified as belonging to the low category. This finding suggests that a proportion users may be reconsidering their decision to adopt the app.

Table 4. Confirmation

Confirmation	n	%
High	52	74.28
Low	18	25.72
Total	70	100

CONCLUSION

The respondents of the study were comprised of students in grades seven and eight at State Junior High School (SMPN) 30 Surabaya. The total number of respondents was 70, with the majority being 14 years of age. The majority of respondents' fathers were employed in other occupations, with 30 individuals falling into this category. A similar trend was observed among the majority of mothers' occupations, with 30 people falling into this category. The majority of the respondents' parents' income was below the minimum wage. The majority of respondents indicated that they utilize Wi-Fi monthly, and the majority of respondents reported bringing pocket money amounting to Rp 10,000.- per day. The implementation of the OKY application was found to be contingent upon compatibility, triability, observability, and knowledge. This finding was supported by a correlational analysis, which revealed a relationship between these factors and the decision to use the OKY application. A correlation has been identified between complexity and the decision to utilize the OKY App; however, no such correlation has been observed between complexity and the implementation of the OKY App. Nevertheless, a relationship between relative advantage and the decision and implementation of using OKY Apps has not been demonstrated.

Conflict of Interest

No potential conflicts of interest relevant to this article were reported

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