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EVALUATION OF THE IMPLEMENTATION OF PUBERTY EDUCATION AND MENSTRUAL HYGIENE MANAGEMENT USING THE OKY APPLICATION

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Abstract

Indonesia has a large adolescent population (15.8% aged 10–19 years), making them a strategic group in reproductive health programs. However, knowledge and practices related to puberty and menstrual hygiene management (MHM) remain limited. To address this issue, UNICEF and PKBI introduced OKY, an interactive digital application designed to provide adolescent-friendly information on menstruation and puberty. This study aimed to evaluate the implementation of puberty and MHM education through the Oky application using the Context, Input, Process, Product(CIPP) evaluation model, focusing on program relevance, implementation support, processes, and perceived outcomes among adolescents. A qualitative case study was conducted in two vocational schools in Jakarta: SMK Negeri 50 Jakarta, which has an active PIK-R program, and SMK Muara Indonesia, where the PIK-R program is no longer active. Data were collected through in-depth interviews, focus group discussions with students, and document review. Findings showed that the program was relevant to adolescents' need for accessible reproductive health information. Collaboration between PKBI and schools generally supported implementation, although institutional support varied between schools. SMK Negeri 50 Jakarta benefited from PIK-R in fostering openness regarding reproductive health, while SMK Muara Indonesia faced challenges related to limited staff, facilities, and coordination. Participants reported improvements in knowledge, attitudes, and practices related to puberty and MHM, with more prominent changes observed in SMK Negeri 50 Jakarta. In conclusion, Oky is application demonstrated potential as a supportive digital medium for puberty and MHM education. Strengthening teacher capacity, monitoring systems, parental involvement, and cross-sectoral support remains important for program sustainability.

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INTRODUCTION

Adolescents are an important group in reproductive health programs as they undergo significant physical, psychological, and social changes during puberty (WHO, 2019; Ministry of Health, 2017). One of the main issues among adolescent girls is menstruation and menstrual hygiene management (MHM). However, many adolescents still face stigma, lack of knowledge, and poor hygiene practices, which increase the risk of reproductive tract infections and negatively affect their quality of life and education (Mulyaningsih & Kurniati, 2018; Sahiledengle et al., 2022). Research in Indonesia also shows that the majority of adolescents have low knowledge and poor menstrual hygiene practices (Simanjuntak & Siagian, 2020; Nyamin, 2020).

Reproductive tract infections caused by poor menstrual hygiene practices can lead to long-term complications, including fertility problems. WHO (2021) reported that more than one million new sexually transmitted infections occur every day, partly related to poor hygiene practices. A study in

Jakarta also revealed a high prevalence of urinary tract infections among adolescent girls (Yuliana, 2020; Djaguna et al., 2023). Furthermore, various studies in Asia and Africa have documented that pad leakage and menstrual stigma cause many schoolgirls to miss classes during their periods (Mahon & Fernandes, 2010; Chinyama et al., 2019).

To address these problems, the Indonesian government has provided education through school health programs (UKS), adolescent health services, and healthy school environment development (Ministry of Health, 2017). However, challenges remain. On the other hand, the high digital penetration among Indonesian adolescents—more than 95% of young people access the internet (BPS, 2024; APJII, 2024)—creates opportunities for the use of app-based educational media. UNICEF launched the OKY application, a mobile app that helps adolescents track their menstrual cycles while providing interactive educational information (UNICEF, 2020; UNICEF, 2023). PKBI, as UNICEF's main partner, plays a direct role in implementing this application in schools across several provinces, including Jakarta.

Monitoring results by PKBI conducted from November 2022 to June 2023 to assess the extent of app use among adolescents, particularly high school girls, showed an increase in users but also revealed challenges such as limited internet quotas, school-level resistance, and low student participation. Previous studies have demonstrated the usefulness of the CIPP evaluation model in assessing adolescent health and educational programs. A study evaluating the Adolescent-Friendly Health Service Program (PKPR) in Bandung using the CIPP model found that the program was generally aligned with adolescents' needs, supported by adequate human resources and facilities, and implemented regularly, although several aspects still required improvement. Another study evaluating the Genre Ceria program in Jakarta also applied the CIPP model to assess reproductive health education programs in schools. These studies indicate that the CIPP model can provide a comprehensive understanding of program relevance, resource adequacy, implementation processes, and program outcomes. However, studies evaluating digital puberty and menstrual hygiene management education through mobile applications using the CIPP model in Indonesia remain limited (Dewi et al., 2020; Purnamasari, 2021). Therefore, this study applies the CIPP model (Context, Input, Process, Product) (Stufflebeam, 1965) to assess program needs, resources, implementation, and outcomes related to puberty and menstrual hygiene management education through the OKY application.The study focused on two schools: SMK Negeri 50 Jakarta, which has an active PIK-R program, and SMK Muara Indonesia, which no longer has a PIK-R program. This selection enables a richer analysis of puberty and MHM education implementation through the OKY application. The study aims to evaluate the program in terms of context, input, process, and product, as well as its contribution to adolescents' knowledge, attitudes, and practices related to menstrual hygiene.

METHOD

This study employed a qualitative approach with a case study design to evaluate the implementation of puberty and menstrual hygiene management (MHM) education through the OKY application. The evaluation model used was CIPP (Context, Input, Process, Product), as it allows for a comprehensive assessment of programs, ranging from the background needs to the achieved outcomes (Stufflebeam & Zhang, 2017). A qualitative design was chosen to enable an in-depth exploration of the experiences, perspectives, and attitudes of informants regarding program implementation (Indrawati, 2018).

The study was conducted in April–May 2025 at PKBI National, PKBI Jakarta, SMK Negeri 50 Jakarta, and SMK Muara Indonesia. These sites were selected based on PKBI's direct involvement as the program implementer and the contrasting characteristics of the schools—SMK Negeri 50 having an active PIK-R program, while SMK Muara Indonesia did not.

Informants were selected purposively based on the principles of appropriateness and adequacy, considering their relevance, involvement, and knowledge regarding the implementation of the OKY program. A total of 60 informants participated in the study, consisting of 3 key informants (1 PKBI National program manager and 2 school principals), 5 main informants (1 PKBI Jakarta program manager, 2 PKBI educators, and 2 accompanying teachers), and 52 supporting informants (50 students

and 2 parents). The inclusion criteria for students were: (1) actively enrolled as students at SMK Negeri 50 Jakarta or SMK Muara Indonesia, (2) having participated in puberty and menstrual hygiene management education through the OKY program, and (3) willingness to participate in the study. Parents included in the study were parents of students participating in the program, while teachers, school principals, PKBI educators, and program managers were selected based on their direct involvement in program implementation. Exclusion criteria included participants who were unavailable during the data collection period, declined participation, or were not directly involved in the implementation of the OKY program. Student participants in FGDs were grouped into male adolescents, grade XI female adolescents, and grade XII female adolescents to capture variations in experiences and understanding based on gender and educational level.

Data collection techniques included in-depth interviews, focus group discussions (FGDs), and document review. Interviews were conducted with program managers, school principals, teachers, and parents, while FGDs involved students from both schools. Data collection was conducted until sufficient information was obtained to comprehensively describe the implementation of the program.

The research instruments consisted of interview and FGD guides, which were pilot-tested on a limited scale before use. The pilot test led to several revisions, including simplifying question wording for easier comprehension by students and merging overlapping questions.

To ensure data validity, the study applied source triangulation and method triangulation. Source triangulation was conducted by comparing information across informants, while method triangulation combined findings from interviews, FGDs, and document reviews.To ensure trustworthiness, the study applied credibility, dependability, and confirmability strategies. Credibility was strengthened through source triangulation and method triangulation by comparing information obtained from different informants, including program managers, school principals, teachers, students, and parents, as well as from in-depth interviews, FGDs, and document reviews. Dependability was supported by the use of interview guidelines, consistent data collection procedures, and documentation of the research process throughout the study. Confirmability was ensured by comparing findings across data sources and maintaining field notes and interview records to minimize researcher bias. The triangulation process confirmed the consistency of findings regarding the role of the OKY application in supporting adolescents' knowledge and understanding of puberty and menstrual hygiene management (MHM).process confirmed the consistency of findings regarding the benefits of the OKY application in improving adolescents' knowledge about puberty and MHM.

Data processing involved verbatim transcription of interviews and FGDs, followed by thematic content analysis. The analysis process included repeated reading of transcripts to gain familiarity with the data, initial coding of meaningful statements, categorization of codes into themes and subthemes, and matrix development to classify findings according to the Context, Input, Process, and Product (CIPP) framework. Coding and interpretation were conducted by the principal researcher and discussed with academic supervisors to ensure consistency and clarity of interpretation. Data analysis followed the stages of data understanding, reduction, presentation, and interpretation (Tolley, 2016; Martha & Kresno, 2017). All findings were interpreted within the CIPP framework to assess program context, input, process, and product.

Ethical aspects were maintained by ensuring the confidentiality of informants' identities and using the data solely for research purposes. This study received approval from the Ethics Committee of the Faculty of Public Health, Universitas Indonesia (Ket-163/UN2.F10.D11/PPM.00.02/2025).

RESULT

This study evaluated the implementation of puberty and menstrual hygiene management (MHM) education through the OKY application using the CIPP model.

Context Evaluation

The context evaluation aimed to assess the needs, problems, and background underlying the implementation of puberty and MHM education through the OKY application, including the program's relevance to the school setting and adolescents as beneficiaries.

The findings indicated that the program was designed to address adolescents' needs for accurate, accessible, and stigma-free information on puberty and reproductive health. A PKBI program manager emphasized that the lack of information and services in schools was the primary reason for the intervention: *"Sebenernya pertama adalah terkait minimnya informasi dan juga layanan terkait manajemen menstruasi di sekolah."* (IK-1). [*"The first issue is the lack of information and services related to menstrual management in schools."].*

At SMK Negeri 50 Jakarta, program acceptance was mainly driven by the fact that the majority of students were female (80%) and the presence of PIK-R, which was already accustomed to discussing adolescent health issues. The school principal highlighted this support: *"Mayoritas kita 80% itu wanita… banyak momen tertentu yang harus kita ketahui, contoh tadi menstruasi."* (IK-2). [*"The majority, 80% of our students, are female… there are many important moments we must address, such as menstruation"*]. The existence of PIK-R made integration easier, as a supporting teacher noted: *"Yang namanya ada kegiatan PIK remaja berarti kita butuh untuk cari wawasan mengenai kesehatan remaja."* (IU-2). [*"Having PIK-R activities means we need to seek broader knowledge about adolescent health"].*

Conversely, at SMK Muara Indonesia, acceptance was more driven by limited student understanding and actual cases of school-age pregnancy due to ignorance. The principal stated: *"Ternyata memang itu yang dibutuhkan anak-anak… seumuran mereka masa pubertas… mereka masih buta sekali, sama sekali enggak tahu alat reproduksi itu apa."* (IK-3). [*"It turned out that this is exactly what the students need… at their pubertal age, they are still blind to it, they don't even know what reproductive organs are"].* A teacher added that early education is crucial: *"Pada saat mereka mendapatkan menstruasi, apa yang mereka harus lakukan… ternyata edukasi di awal itu hal yang paling penting."* (IU-4) . [*"When they first menstruate, they need to know what to do… early education is the most important thing"].*

Overall, the context evaluation confirmed the high need for puberty and MHM information in both schools, but with different levels of readiness: SMK Negeri 50 was better prepared due to PIK-R institutional support, while SMK Muara Indonesia showed greater urgency because of limited baseline understanding and real cases at school.

Input Evaluation

The input evaluation focused on the readiness of supporting elements for implementing puberty and MHM education through the OKY application, including human resources, infrastructure, technology use, funding, and program planning.

The results revealed limited human resources at both PKBI and school levels. PKBI only had a small team and therefore relied on educators, peer educators, and youth champions to expand outreach: *"…kita keterbatasan banget... akhirnya kami membutuhkan perpanjangan tangan dari beberapa mitra dan stakeholder."* (IK-1). [*"…we are very limited… so we rely on extended support from partners and stakeholders"].* At the school level, counseling teachers (BK) were very limited and had not received special training, making PKBI's presence crucial. The SMK Negeri 50 principal stated: *"Edukator dari PKBI, guru BK terbatas."* (IK-2). [*"We rely on PKBI educators, since our counseling teachers are limited"].* Meanwhile, at SMK Muara Indonesia, the program depended mainly on the counseling teacher who continued existing collaboration: *"Guru BK melanjutkan kerja sama yang sudah ada."* (IK-4) . [*"The counseling teacher continues the existing collaboration"]*

In terms of facilities, SMK Negeri 50 was relatively better prepared with a PIK-R room and internet access, while SMK Muara Indonesia relied on an auditorium/mosque and Wi-Fi that was often unstable: *"Kalau internet kita free Wi-Fi… tapi kadang-kadang suka enggak kebagian, lemot gitu."*

(IK-3). [*"We have free Wi-Fi… but sometimes it is overloaded and slow"].* PKBI addressed these limitations by providing board games, leaflets, and an offline-accessible app.

Technology use via OKY was considered relevant for digital-native adolescents, although challenges arose from limited data packages and devices. PKBI mitigated this by sharing the app via Bluetooth or Share-it: *"Mitigasinya dengan share-it dan bluetooth."* (IK-1). [*"We mitigated this by using Share-it and Bluetooth"].*

In terms of funding, the program was primarily supported by UNICEF (2022–2024), although sustainability remained uncertain. PKBI attempted to integrate OKY with other programs: *"Kami mencoba mengkolaborasikan sistem dari beberapa kegiatan, termasuk OKY."* (IK-1). [*"We try to integrate OKY with other program activities"].* Schools contributed modestly through BOS funds, e.g., during school admissions (PPDB).

Program planning was developed centrally and then adapted locally. At SMK Negeri 50, the school actively aligned schedules with BK/PIK-R activities: *"Biasanya mereka dari PKBI bilang mau datang, lalu kita selarasi dengan kondisi sekolah."* (IK-2). [*"Usually PKBI informs us, and then we align with school conditions"].* By contrast, SMK Muara Indonesia was more passive, only following PKBI's schedule: *"Kita hanya tahu PKBI mau adakan program ini… tapi tidak terlibat langsung dalam perencanaan."* (IK-3). [*"We just know PKBI will hold the program… but we are not directly involved in planning"].*

Overall, the input evaluation indicated that the program was sufficiently ready due to PKBI and school support, despite challenges with human resources, digital infrastructure, sustainable funding, and limited school involvement in planning. Institutional support from PIK-R made inputs at SMK Negeri 50 relatively stronger than those at SMK Muara Indonesia.

Process Evaluation

The process evaluation focused on program implementation, monitoring, and evaluation, covering human resource performance, use of facilities/technology, field challenges, and monitoring mechanisms.

The findings showed that implementation involved PKBI National, PKBI Jakarta, educators, and accompanying teachers. Educators were recruited flexibly, mainly youth volunteers who had been trained: *"Paling apa namanya list di grup remaja aja gitu... yang udah terkapasitasi sih."* (IU-1). [*"Mostly we recruited from the youth group list… those already capacitated"].* Teachers at both schools acted only as companions without special training, although PKBI had trained teachers in other regions: *"Kami pernah melatih guru, seperti di Riau… tapi kalau di Jakarta, memang belum semua."* (IK-1) . [*"We trained teachers in Riau, but in Jakarta, not all have been trained"].*

Regarding technology use, students at SMK Negeri 50 were relatively more active in using the OKY app: *"Download mereka download saat itu... mereka bisa memantau terus..."* (IK-2). [*"They downloaded it on the spot and continued to monitor their cycles"].* However, at SMK Muara Indonesia, usage did not continue: *"Setelah mereka sudah tahu fase menstruasinya, ya udah... mereka enggak meneruskan gitu."* (IU-4). [*"Once they knew their menstrual phases, they didn't continue using it"].* Educators found the app useful in breaking the taboo: *"Aplikasi ini jadi sarana yang ramah, personal, dan inovatif."* (IU-2). [*"This app became a friendly, personal, and innovative medium"].*

Main challenges included ineffective coordination among implementers: *"Kadang enggak efektif koordinasinya. Jadi kalau sudah enggak efektif tuh enggak nyambung."* (IK-1). [*"Sometimes coordination is ineffective, and when that happens, things don't connect"].* Other challenges were students' embarrassment discussing menstruation, limited internet, and lack of devices, requiring printed alternatives.

Monitoring was carried out entirely by PKBI through narrative reports, post-activity reflections, and digital feedback. However, schools were not involved in monitoring, making evaluation more focused on processes (outputs) rather than long-term outcomes.

Overall, the process evaluation showed that the program was well-received by students at both schools, with enthusiastic responses. However, weak coordination, lack of teacher training, and low sustainability of app use remained challenges. SMK Negeri 50 was relatively more adaptive due to PIK-R support, while SMK Muara Indonesia required more intensive assistance.

Product Evaluation

The product evaluation assessed the extent to which the program's goals were achieved in terms of knowledge, attitudes, behaviors, and satisfaction.

On knowledge, students demonstrated improved understanding of puberty and menstrual hygiene. Female students recognized the importance of changing pads, washing them before disposal, and risks of infection if hygiene was neglected. One student noted: *"Sebelumnya cuma sekedar tau… sekarang jadi lebih rajin ganti pembalut."* (IPS-15). [*"Before, I just knew it casually… now I change pads more regularly"].* Education also debunked misconceptions, such as the belief that menstruation only occurs in certain religions (IPS-42). The presence of PIK-R at SMK Negeri 50 supported baseline knowledge, while at SMK Muara Indonesia improvements were more evident post-education.

On attitudes, female students became more caring and open in discussing menstruation, though mainly with peers or mothers. Male students also grew more empathetic, shifting from seeing it as taboo to being inclusive: *"Sekarang kita merasa bahwa menstruasi juga urusan laki-laki... karena kita bakal punya istri, anak perempuan, dan harus tahu."* (IPS-3). [*"Now we feel menstruation is also a men's concern… because we will have wives, daughters, and must understand it"].*

On behaviors, female students became more disciplined in menstrual hygiene, such as proper pad disposal, while also supporting peers by covering leaks with jackets (IPS-44). Male students participated as well: *"Pernah sih, kaya waktu itu tembus terus saya lepas jaket buat nutupin."* (IPS-3). [*"Once, when a girl leaked, I gave her my jacket to cover it"].*

On satisfaction, students found the app useful, particularly the menstrual calendar feature: *"...jadi lebih kayak prepare dulu sebelum datang bulan."* (IPS-42). [*"...it helps us prepare before menstruation starts"].* Satisfaction scores ranged from 8 to 10, and teachers observed strong enthusiasm: *"Kalau semua kegiatan PKBI masuk mereka senang-senang aja."* (IU-3). *"Whenever PKBI activities are conducted, the students are always happy"].*

Overall, education through OKY improved students' knowledge, attitudes, behaviors, and satisfaction. Outcomes were stronger at SMK Negeri 50 due to PIK-R support, while at SMK Muara Indonesia, improvements were still significant despite limited baseline understanding.

DISCUSSION

This study has several limitations that should be considered when interpreting its findings. First, there is a potential recall bias since informants were asked to recall educational activities that had taken place several months earlier, which may have affected data accuracy. Second, the assessment of adolescents' knowledge, attitudes, and behaviors relied solely on focus group discussions (FGDs), which are limited in capturing individual understanding in depth and tend to produce conformity among participants. Lastly, there were technical constraints in documentation and field observation, as the educational sessions had already ended before the research was conducted, forcing the researcher to rely on secondary data and informants' accounts.

Context Evaluation

The context evaluation showed that the OKY program addressed adolescents' unmet needs for accessible and stigma-free puberty and menstrual health information. Informants from both schools emphasized that adolescents still had limited understanding of puberty, menstruation, and reproductive health, while discussions on these topics were often considered sensitive or taboo. A PKBI program manager explained that the intervention was initiated because of the lack of information and menstrual health services available in schools. Differences between schools indicated that institutional readiness strongly influenced program acceptance. SMK Negeri 50 Jakarta, supported by an active PIK-R,

demonstrated greater openness toward reproductive health discussions and was more prepared to integrate the program into school activities. In contrast, SMK Muara Indonesia showed more urgent educational needs due to limited baseline knowledge and reports of adolescent pregnancy cases among students. These findings suggest that school-based reproductive health programs are more easily integrated when institutional support systems and adolescent health forums are already established.

Input Evaluation

The input evaluation identified institutional readiness, human resource capacity, infrastructure support, technology utilization, funding sustainability, and collaborative planning as key factors influencing the implementation of puberty and menstrual hygiene management (MHM) education through the OKY application. Across both schools, limited human resources emerged as a major challenge. PKBI National operated with a limited core team and therefore relied on PKBI regional offices, educators, peer educators, and youth champions to support implementation. In practice, PKBI educators and accompanying teachers functioned as important facilitators of adolescent reproductive health education, particularly in schools with limited counseling capacity. Previous studies have shown that peer-based and community-supported health education can improve adolescents' engagement and acceptance of reproductive health information (Hatami et al., 2015). However, the findings also indicated that training and competency standardization for teachers and facilitators remained limited, potentially affecting consistency in program delivery.

Differences in institutional support between schools also influenced program readiness. SMK Negeri 50 Jakarta was relatively more prepared due to the presence of PIK-R, better facilities, and stronger institutional openness toward reproductive health education. In contrast, SMK Muara Indonesia experienced greater limitations in internet access, facilities, and school support. Although PKBI attempted to overcome these barriers through offline educational media and alternative file-sharing methods, technological limitations continued to affect adolescents' engagement with the application. These findings are consistent with previous studies emphasizing that digital health interventions require adequate infrastructure and institutional support to function effectively (Borges et al., 2023).

From a technological perspective, the OKY application was generally perceived as relevant and accessible for adolescents because it provided private and interactive access to information related to puberty and menstruation. Features such as menstrual calendars, quizzes, and educational content supported independent learning. However, several students perceived the application design as less attractive, indicating that sustainability of digital engagement depends not only on educational content but also on user-friendly and adolescent-appropriate design (Domin et al., 2022).

Funding sustainability also emerged as a critical issue. The program relied heavily on UNICEF funding, while school contributions remained limited to operational support. This dependency raised concerns regarding long-term sustainability after external funding ended. In addition, schools were involved mainly in scheduling activities rather than in program design or decision-making, which limited school ownership of the program. Overall, the findings suggest that successful implementation of digital puberty and MHM education requires not only digital technology, but also strengthened educator capacity, youth-friendly infrastructure, sustainable financing, and stronger collaboration between schools and health education providers.

Process Evaluation

The process evaluation demonstrated that the implementation of puberty and menstrual hygiene management (MHM) education through the OKY application depended heavily on collaboration among PKBI National, regional PKBI offices, educators, accompanying teachers, and youth volunteers. Flexible recruitment and collaboration strategies enabled the program to adapt to different school contexts. In practice, PKBI educators functioned as the primary facilitators of adolescent reproductive health education, particularly in schools with limited counseling and reproductive health resources. However, teacher involvement remained limited to technical assistance during activities, with minimal participation in follow-up education or integration into routine school programs. This limitation reduced program continuity and institutional ownership, despite recommendations that reproductive health

education should be integrated into school systems and supported by trained educators (UNESCO, 2018).

Differences in school support also influenced the continuity of application use. Students at SMK Negeri 50 Jakarta, supported by an active PIK-R environment, demonstrated more sustained engagement with the OKY application. In contrast, students at SMK Muara Indonesia tended to discontinue use after the initial education sessions. These findings suggest that digital reproductive health interventions require continuous facilitation and supportive social environments to maintain adolescent engagement over time. Educators also perceived the OKY application as a more approachable and less stigmatizing medium for discussing menstruation and puberty, particularly because the application allowed adolescents to access information privately and interactively.

Several implementation barriers emerged during the process evaluation. Limited internet access, insufficient device storage, unstable connectivity, and weak coordination among implementers affected program delivery and adolescents' use of the application. In addition, reliance on short-term external funding and limited local institutional commitment reduced the sustainability of program activities. These findings indicate that technological readiness alone is insufficient without consistent institutional support and coordination mechanisms.

In terms of monitoring and evaluation, PKBI conducted monitoring through activity reports, reflections, and application analytics. However, school involvement in monitoring remained minimal, resulting in limited institutional follow-up after program implementation. Evaluation activities mainly focused on participant feedback and short-term responses rather than long-term behavioral outcomes. This limitation reduced the ability to assess sustained behavioral change related to puberty and menstrual hygiene management. Overall, the process evaluation suggests that the sustainability of the OKY program depends not only on digital innovation, but also on continuous teacher engagement, stronger cross-sector collaboration, institutional monitoring, and long-term support systems within schools.

Product Evaluation

The findings demonstrate that puberty and MHM education through the OKY application effectively improved adolescents' knowledge about puberty, hygienic practices, and dispelled menstrual myths. Female students were able to correctly explain pubertal changes and hygienic practices, while male students began to understand the importance of supporting menstrual issues, consistent with the gender-transformative education approach (UNESCO, 2018). This increase in literacy aligns with Cunningham et al. (2024), who highlighted the effectiveness of mobile applications in improving menstrual health literacy. The presence of PIK-R at SMK Negeri 50 Jakarta enhanced students' initial readiness to absorb the material, consistent with Hindin et al. (2019), who emphasized the importance of access to credible school-based information in enhancing adolescent knowledge. However, in schools without PIK-R, OKY still effectively bridged information gaps, as Chandra-Mouli et al. (2015) stressed the importance of contextual interventions in improving reproductive health literacy.

In terms of attitudes, female students showed greater concern for menstrual hygiene, while male students shifted from feelings of disgust to empathy and support. This reflects the OKY app's success in addressing affective dimensions, consistent with Ajzen's (1991) Theory of Planned Behavior. Sivakami et al. (2019) in India also found that menstrual education improved girls' learning comfort and confidence, while Tellier et al. (2021) emphasized the importance of involving boys in building more supportive social norms. Nonetheless, social stigma still caused some adolescents to feel awkward discussing menstruation with certain figures, indicating the need for repeated education and family support (Mekie et al., 2020).

Behavioral changes were also identified, particularly among female students who became more consistent in maintaining menstrual hygiene by regularly changing pads, rinsing them before disposal, and supporting peers. At SMK Negeri 50 Jakarta, these behaviors were more consistent due to PIK-R's structural support, consistent with Social Cognitive Theory (Bandura, 1986), which highlights the importance of social reinforcement. At SMK Muara Indonesia, behavioral changes were still observed despite the absence of PIK-R, with school counselors playing a crucial role as facilitators. Male students

also began to demonstrate supportive behaviors, such as helping female peers when facing menstrual issues. This transformation reinforces the role of gender-transformative education, as discussed by Sommer et al. (2015). Parental support, especially from mothers, was also important in strengthening positive behaviors (Mekie et al., 2020; Rima, 2020).

Regarding satisfaction, both female and male students considered the OKY app useful and easy to understand, particularly the menstrual calendar and puberty information features. An average satisfaction score of 8–10/10 indicates high acceptance, supporting UNICEF (2023) and Handayani (2022), who found mobile learning effective in adolescent health education. Teachers and parents also expressed appreciation, although technical issues such as login difficulties and underutilization of features remained challenges, as Lee & Cho (2021) noted that user experience significantly affects the sustainability of adolescent health apps.

Overall, the product evaluation confirms that the OKY application successfully improved knowledge, fostered positive attitudes, encouraged healthy behavioral changes, and achieved high levels of satisfaction. However, to ensure sustainability, the program must be reinforced through teacher facilitation, parental involvement, and repeated education to ensure broader and long-term impact.

CONCLUSION

The research This study highlights that the implementation of puberty and menstrual hygiene management (MHM) education through the OKY application is influenced not only by the availability of digital educational media, but also by institutional readiness, educator support, and cross-sector collaboration. Schools with supportive adolescent health environments, such as the presence of PIK-R, demonstrated stronger student engagement, more open communication regarding reproductive health, and more sustainable use of the application. In contrast, schools with limited institutional support required more intensive facilitation and guidance throughout program implementation.

The findings also emphasize the important role of PKBI educators and accompanying teachers as adolescent reproductive health facilitators who help adolescents discuss sensitive issues related to puberty and menstruation in a safer and more supportive environment. However, limited teacher capacity, minimal school involvement in monitoring and evaluation, and dependence on external funding remain important barriers to program sustainability. These conditions indicate that digital reproductive health education cannot rely solely on technology-based interventions, but requires continuous support from schools, families, health educators, and related institutions.

In addition, policy support is essential to strengthen the integration of puberty and reproductive health education into school systems through sustainable funding, teacher capacity development, and cross-sector coordination between education and health sectors. Overall, the OKY application demonstrated potential as a supportive digital medium for improving adolescents' reproductive health literacy, encouraging more positive attitudes toward menstruation, and promoting healthier menstrual hygiene practices among adolescents.

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