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Utilization of Puberty Reproductive Health Digital Pocket Book for Deaf Students during the Covid-19 Pandemic

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ABSTRACT

Aims Technology can facilitate the limitations of health literacy for children with special needs. Therefore a design is needed that is adapted to the limitations of children with special needs, especially deaf children. This study aimed to develop reproductive health reading materials on puberty for deaf students based on digital pocketbooks.

Materials & Methods The present study is a design and development research with qualitative and quantitative approaches (mixed method) with ADDIE steps. This study involved 15 deaf children in SMALB class X to XII who were selected using a purposive sampling method. Data were collected through in-depth interviews. This study was conducted during the Covid-19 pandemic, so surveys and other research activities were online. The qualitative results were analyzed using content analysis, and quantitative results were analyzed using the Wilcoxon test.

Findings Most students said they had never been invited to discuss what changes would occur when they entered puberty. The knowledge of deaf students significantly increased after receiving reproductive health promotion intervention using digital pocketbooks (p=0.001).

Conclusion Parents and deaf students need comprehensive reproductive health literacy adapted by focusing on digital-based text and images to be widely accessible.

Keywords Reproductive Health; Puberty; Learning; Education; Student; Covid-19

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Introduction

The Covid-19 pandemic has rapidly encouraged the use of technology in various aspects of life, especially for access to information and education. Technology can facilitate the limitations of health literacy for children with special needs. Therefore a design is needed that is adapted to the limitations of children with special needs, especially deaf children [1, 2], like learning programs and activities, namely paying attention to preparing students with the skills to make the best decisions for themselves, one of which is related to reproductive health.

Adolescence is a phase where children begin to experience puberty. Lack of reproductive health information may contribute negative impact on adolescents. Teenagers will look for information on their own through the internet or other sources that cannot be justified. It will have an impact on adolescents' misconceptions regarding their reproductive health [3].

The ability to take care of children with special needs is very important, especially regarding health and personal hygiene, so they look normal and do not show extreme weakness or disability. Reproductive health is one of the important things that children with special needs should know in a special needs school (SLB/SMPLB/SMALB) as prospective parent. They need to understand themselves in terms of reproductive health correctly. Therefore, it has to be introduced to them properly [4]. Unfortunately, students with hearing loss have not met the need for reproductive health information pleasingly in several regions of Indonesia [5]. Other studies in Indonesia state that students are satisfied with learning through e-books, both from the media and material aspects. Students also are motivated to dig up information from e-books because the learning is done independently and supported by pictures and animations [6].

In general, technology-based approaches and the use of digital media in educational interventions are associated with helping to develop research, collaboration, critical, creativity, and communication skills [7, 8]. Many studies suggest that the use of practical activities with digital media, whereby students engage in planning, collaboration, and production, is an effective learning strategy [9–11]. There is an increasing tendency to use technology in RSHE, such as videos, computer activities, text messaging, and games [12]. Young people have been found to value the use of technology, for example, in online safety interventions, because it fits their media culture and provides fun [13].

Books as learning media should facilitate and attract students' interest in mastering learning materials. Utilizing smartphone technology with features for making Android-based applications can help educators find out the smartphone's practical and interesting functions [14, 15].

The digital pocketbook in this study was developed based on science, technology, engineering, and mathematics (STEM). Digital pocketbooks are usually in PDF format, but it is more sophisticated and interesting when assisted with an android Appy Pie application [16]. Appy Pie is a website that presents templates for creating android applications easily and attractively. It does not require special skills in computer programming, so it is easy to operate on smartphones [17]. The advantage of Appy Pie is that it can include learning materials in text, links, images, videos, and interactive quizzes [18]. However, the weakness of this learning media can only be implemented by installing it on Android, as well as the limitations of the material discussed [19]. Using android pocketbooks as learning media has been widely practiced, especially in education. However, it is still rarely done for children student with special needs.

Children, students, and adults with disabilities have the right to be educated about the natural functions of their bodies and their sexuality. To fully protect and understand themselves, they need and have the right to expect appropriate and timely sexual health education as part of their efforts to become self-determined individuals [20, 21]. Therefore, the present study aimed to develop reproductive health reading materials on puberty for deaf students based on digital pocketbooks.

Materials and Methods

The method used in this research is design and development research (Research and Development) with qualitative and quantitative approaches (mixed method) with the stages of the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) step flow, starting with problem analysis, background analysis, and literature analysis, then entering the determination stage.

The study population was deaf students in the Special High School (SHS) of Prof. Dr. Sri Soedewi MasjchunSofwan, SH Jambi. This study involved 15 deaf children in SMALB class X to XII who were selected using a purposive sampling method. The deaf children in this study met the inclusion criteria: children in grades X and XII who had never been involved in the same research before and could use an Android cell phone. In contrast, children who did

not get permission from their parents were not included in the study.

The product design was an e-book for reproductive health about puberty. The next stage was a formative assessment by conducting product validation and testing activities, starting with a self-evaluation of the product by a self-evaluation by the researcher regarding visible and possible errors. The evaluation results were revised and followed in the expert assessment stage, which theoretically evaluates the material, design, and technical quality. The results of the expert evaluation were revised by the team, focusing on the effectiveness or impact of using the product, its appeal, and its application from the user's perspective. Before the product is tested at the field test level, the team's assessment results were used as revision material.

The first stage of this research was needs analysis. The author used the interview method using a structured list of questions for students and parents. The Covid-19 pandemic impacted the research process. Some parent interviews were conducted by telephone, while student interviews were carried out directly and gradually accompanied by deaf teaching teachers. Data were collected through in-depth interviews. The results obtained were analyzed using a descriptive method of content (content analysis).

The research team first looked at design research from secondary data sources, then combined it with preliminary exploratory research on multimedia design to develop contextual research, observation, interviews, experiential sampling methods, sourcebooks, and previous research. The designer reframed the problem through initial ideas, experimentation, and review to arrive at the right solution. The research team proposed to collect the needs analysis results and input from partner researchers and design the initial reproductive health pocketbook for further evaluation by experts after receiving expert judgment. An expert assessment instrument focuses on two domains, namely the content domain, to assess the feasibility of media materials, and the developed acceptability domain, to assess the level of user acceptance (deaf students) of the multimedia to be developed.

After a one-on-one assessment, the researcher discussed involving experts to identify problems, analyze the causes of problems, determine ways to solve problems and brainstorm among experts in designing models or products needed by deaf students. The inputs were considered and adjusted to the available resources for later revision of the digital pocketbook media.

The last step of this development research was evaluating the development of learning media to see the effectiveness of the use of learning media by measuring data on student learning outcomes. In this evaluation stage, the pretest and posttest results were compared to see whether student learning outcomes using the developed learning media can increase students' knowledge and understanding of reproductive health. The Digital Pocket Book on Reproductive Health for Deaf Students was accessed at https://litmas.poltekkesjambi.ac.id/book/.

Design principles were applied to create a pocketbook that was easy for deaf students to use. Visual design is created by arranging components so important points in the material are not missed. The components in designing pocketbooks were considered, including 1) Color: bright colors were used in this pocketbook to create a feeling of happiness. The three main colors are pink, blue, and white. These three colors increase the sense of visual interest. 2) Icons: according to research by early adopters, deaf children already had experience using smartphones. The icons used in this pocketbook used sign language to make it easier for users and a personal approach. 3) Dimensions: all components of the pocketbook were designed not too small. By using the digital function, the user can adjust the dimensions comfortably. It is because deaf children find it difficult to interpret too much information. Its size also limits the collection of information on a single screen.

The research data were analyzed using the Wilcoxon test in SPSS 16.0 software. P-value <0.05 was considered significant.

Findings

Needs analysis

The frequency of information regarding digital media access and the results of the needs analysis obtained from interviews with deaf students are shown in Tables 1 and 2.

Most students said they had never been invited to discuss what changes would occur when they entered puberty. The female students stated that they were only taught to use sanitary napkins and how to take a shower after menstruation, especially those who were Muslim. The male students who are Muslim are only taught how to take a “compulsory” bath without ever being invited to discuss what they experience and feel during the changes in puberty.

Expert design and assessment (expert judgement)

The recapitulation of expert assessment results based on two domains, namely the content and

acceptability domains, are seen in Table 3. All aspects assessed by the three experts received an average value of 3.94 digital pocketbooks.

Table 1) Frequency distribution of information regarding digital media access for deaf students

Statement	N	%
Learning experience using multimedia		
Once	15	100
Never	0	0
The experience of being asked/discussed about changes in puberty by parents/teachers		
Once	0	0
Never	15	100
Experience accessing the Internet to find health information		
Once	12	80
Never	3	20
Sources of information about changes in puberty (more than 1 answer)		
Parent	13	87
Teacher	3	20
Friend	15	100
Family	11	73
Health worker	0	0
Electronic media	15	100

Table 2) Results of analysis of digital media needs for promotion of reproductive health in puberty for deaf students

Analysis results	Students		Parents	
	N	%	N	%
Health information needs				
Need	15	100	5	100
Not need	0	0	0	0
Target of promotion				
Students only	9	60	0	0
Parent/companion only	1	6,66	0	0
Students and parents/companion	5	33,33	5	100
Expected health promotion media				
Digital pocketbook	7	46.66	3	60
Flip chart	0	0	0	0
Video	5	33.33	3	60
Interactive multimedia	3	20	0	0
Attractive digital promotion media (more than 1 answer)				
Clear writing	15	100	5	100
Interesting pictures	15	100	5	100
Easy access	7	46.66	5	100
Information submitted	15	100	5	100
Information needed about puberty				
Changes at puberty	9	60	4	80
How to keep the reproductive organs clean	6	40	1	20

Development evaluation

Changes in the level of knowledge of male and female students before and after receiving reproductive health promotion intervention using digital pocket book media are shown in Table 4.

All male and female respondents experienced an increase in knowledge after receiving reproductive health promotion intervention using digital pocketbooks, and it was proven that digital pocketbooks had an significant effect (p=0.001).

Table 3) Average score of content domain experts and acceptance domains

Assessment aspect	Experts		
	Teacher 1	Teacher 2	Teacher 3
Content domain			
Guide and information	4.00	4.00	4.50
Multimedia content	3.75	3.92	4.08
Evaluation	4.00	4.00	4.00
Mean	4.03		
Accepted domain			
Guide and information	3.33	4.00	4.00
Multimedia content	3.69	3.69	3.92
Evaluation	3.50	4.00	4.00
Design and media facilities	3.25	4.00	4.25
Pedagogy effect	4.20	4.00	4.00
Mean	3.86		
Total mean	3.94		

Table 4) The effectiveness of reproductive health digital handbook for male and female students

Knowledge	Median (Min-Max)	P*
Male students		
Before intervention	3 (2-4)	0.001
After intervention	7 (5-8)	
Female students		
Before intervention	6.50 (5-8)	0.001
After intervention	9 (8-10)	

*Wilcoxon test

Discussion

The trial results of using digital reproductive health pocketbooks showed no barriers for students to access books through their respective gadgets. The material and use of animation in pocketbooks attracted students' attention and helped deaf students understand that media development could be further developed using multimedia technology. Interactive learning can overcome the limitations of deaf students.

Reproductive health education needs to be initiated through the family, which has the main role in educational guidance. However, obstacles often occur in teaching because people still consider it taboo and shy to talk about sensitive things such as sex. Following the rapid technological developments, if the taboo culture is still deeply rooted in the family and even in society causes children to seek

information out of curiosity, which is a factor in teaching errors. What sources do children read? Cultural taboos should be eliminated in the reproductive health counseling process, where families are worried that free sex will occur in children. This wrong assumption needs to be supported by an open mind from the family to accept all the material [3, 22, 23].

The learning concept of deaf students mostly comes from visuals (pictures/videos) or can be seen in real terms. The existence of visual media, sign language, text, and role-playing for deaf and mute students will make it easier for deaf students to understand video methods and sign language lessons more effectively to increase their knowledge of deaf children about health. Interactive multimedia effectively provides reproductive health information and is worthy of being used as a learning medium. In addition to the media, reproductive health education for adolescents must be provided continuously and gradually, adjusted to their needs and age and their ability to capture [24, 25].

This study further reinforces previous findings, which reported that learning media using Android-based construct regarding the introduction of numbers 1 to 100 and calculations 1 to 20 for mentally disabled children in grade V elementary school is feasible to use, with the average results of the questionnaire assessment with an approval level of 42.5 [26]. It is also in line with research reporting that Android tablet-based Communication Board media affects student attractiveness [27]. Android-based mathematics learning media can also increase the concentration and interest in learning mentally disabled students [28].

The literature study conducted by the research found no media for promoting reproductive health for deaf adolescents issued by the Ministry of Health or government agencies. Promotional media currently need innovations to promote reproductive health by considering more attractive media and the existence of information technology that will expand the scope of targets for health promotion.

The learning media is designed and adapted to the limitations of deaf students by maximizing their sense of sight, not only focusing on the material's content but also considering the visuals and dimensions of the media used. Learning media should also be accompanied by an explanation from the teacher or assistant for deaf students [29-32].

Seven factors must be considered when developing services for children who are deaf or hard of hearing, namely: 1) The level of hearing difficulties, 2) language proficiency, 3) communication approach strategy, 4) availability of information technology media, 5) family support, 6) choice of communication access and, 7) additional factors that can influence such as economic and social status.

The study results indicate that deaf students can use internet technology and digital literacy sources. This result is in line with the research of Utami *et al*. [33], who conducted research at Padang State University. The results showed that deaf students could learn using the blended learning model. Some of the factors discussed in this study are the characteristics of students and the examination of the required context, consisting of the ability to use ICT tools, the ability to use the internet, and learning needs. The expectations of deaf students towards the blended learning model are classroom teachings using visual media and more varied online teaching, such as videos with subtitles and sign language. Another research also states that the solution to overcome the limitations while increasing knowledge of reproductive health in persons with hearing loss is to develop media that use more animation [34].

Limitations

Since this study was done on students who are deaf, there is a possibility of misinterpretation of what the researcher expects from the questions given during the needs analysis stage. Several emphasis sentences are limited to students' understanding of sign language; moreover, they are still young in education, and some terms may need help. When parents or accompanying teachers try to use other, more straightforward sentences, it may change the more significant meaning. To overcome this condition, the researcher asked parents or accompanying teachers to repeat each question item slowly and reassuringly repeat the students' answers.

Suggestions

- Future studies should conduct RCT in the population of this study in two groups to compare the potential of this pocketbook.
- The prevailing culture in Indonesia and several other countries in Asia can also be an essential factor to be assessed as controlling for biased results, where the topic of reproductive health is still taboo to discuss.

Conclusion

The development of digital literacy for reproductive health education for deaf students is a basic need for students and parents or student companions. Using technology for digital literacy can decrease the limitations of deaf students.

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References

1- Hu X, Chiu MM, Leung WMV, Yelland N. Technology integration for young children during COVID-19: Towards future online teaching. Br J Educ Technol. 2021;52(4):1513–37.

2- Morgan H. Best practices for implementing remote learning during a pandemic. Clear House J Educ Strateg Issues Ideas. 2020;93(3):135–41.

3- Amirudin. Pelaksanaan Pembelajaran Kesehatan Reproduksi Untuk Siswa Tunanetra Kelas VI Di SLB A Yaketunis Yogyakarta. J Widia Ortodidaktika. 2016;5(6):613–23. [Indonesian]

4- Mprah WK. Sexual and reproductive health needs assessment with deaf people in Ghana: Methodological challenges and ethical concerns. Afr J Disabil. 2013;2(1):55.5- Suariyani NLP, Kurniati DPY, Widyanthini DN, Artha LPW. Reproductive health services for adolescents with hearing impairment in Indonesia: Expectations and reality. J Prev Med Public Health. 2020;53(6):487. 6- Rusinga O. Perceptions of deaf youth about their vulnerability to sexual and reproductive health problems in Masvingo District, Zimbabwe. Afr J Reprod Health. 2012;16(2):271-82.

7- Lawlor J, Conneely C, Oldham E, Marshall K, Tangney B. Bridge21: teamwork, technology and learning. A pragmatic model for effective twenty-first-century team-based learning. Technol Pedagogy Educ. 2018;27(2):211–32.

8- McDougall J, Potter J. Digital media learning in the third space. Media Pract Educ. 2018;20(1):1-11.

9- Kumi-Kyereme A. Sexual and reproductive health services utilisation amongst in-school young people with disabilities in Ghana. Afr J Disabil. 2021;10:671.

10- Mprah WK. Sources and use of sexual and reproductive health information among deaf people in Ghana. Indonesian J Disabil Stud. 2014;1(1):1-11.

11- Fatchurahman M, Adella H, Setiawan MA. Development of animation learning media based on local wisdom to improve student learning outcomes in elementary schools. Int J Instruct. 2022;15(1):55-72.

12- Garzón-Orjuela N, Samacá-Samacá D, Moreno-Chaparro J, Ballesteros-Cabrera MDP, Eslava-Schmalbach J. Effectiveness of sex education interventions in adolescents: An overview. Compr Child Adolesc Nurs. 2021;44(1):15–48.

13- Hartikainen H, Iivari N, Kinnula M. Children's design recommendations for online safety education. Int J Child Comput Interact. 2019;22:100146.

14- Afriansyah EA, Madio SS, Sumartini TS, Mardiani D, Nurulhaq C, Sritresna T, et al. View of Jotform application training for making questionnaire and attendance forms. J Pekemas. 2020;3(2):26–32.

15- Muyaroah S, Fajartia M. Pengembangan media pembelajaran berbasis Android dengan menggunakan aplikasi Adobe Flash CS 6 pada mata pelajaran biologi. Innov J Curricul Educational Technol. 2017;6(2):22–6. [Indonesian]

16- Mariya S, Ananda A, Anwar S, Erianjoni E, Montesori M. Mobile learning-based pocketbook development in educational field practice in increasing the competency of professional teachers. Int J Educ Dynam. 2022;5(1):131-7.

17- Rihandoko A. Pengembangan media mobile learning appypie android berbasis pemahaman konsep peserta didik kelas XI pada mata pelajaran biologi di tingkat SMA/MA [Dissertation]. Lampung: UIN Raden Intan Lampung; 2018. [Indonesian]

18- Chusni MM, Zakwandi R, Ariandini S, Aulia MR, Nurfauzan MF, Azmi T. Appy Pie Untuk Edukasi; Rancang Bangun Media Pembelajaran Berbasis Android. 2018.

19- Najuah N, Sidiq R, Lukitoyo PS. The development electronic module of history using ADDIE model. Int J Educ Res Soc Sci. 2021;2(6):1658-63.

20- Travers J, Tincani M, Whitby PS, Boutot EA. Alignment of sexuality education with self-determination for people with significant disabilities: a review of research and future directions. Educ Train Autism Dev Disabil. 2014;49(2):232–47.

21- Treacy AC, Taylor SS, Abernathy TV. Sexual health education for individuals with disabilities: A call to action. Am J Sexual Educ. 2018;13(1):65–93.

22- Prabowo AP. Sosialisasi Orangtua mengenai Pendidikan Seksual Pasca Pubertas pada Anak Tunagrahita. J Skripsi Universitas Airlangga Komunitas. 2017;6(1):60-81. [Indonesian]

23- Miswanto. Pentingnya Pendidikan dan Seks Ualitas pada Remaja. J Studi Pemuda. 2014;3(2):111–22. [Indonesian]

24- Suarsana IM, Mahayukti GA, Sudarma IK, Pujawan AA. The effect of interactive mathematics learning media toward mathematical conceptual understanding on probability of hearing-impaired students. J Phys Conf Ser. 2019;1165(1):012021.

25- Hakim ML. Multimedia Interaktif Bagi Siswa Berkebutuhan Khusus. Al-Aulad: Journal of Islamic Primary Education. 2020;3(1):48–55. [Indonesian]

26- Saputra VH, Febriyanto E. Media Pembelajaran Berbasis Multimedia Untuk Anak Tuna Grahita. Mathema J Pendidikan Matematika. 2019;1(1):15–23. [Indonesian]

27- Setyawan DI, Tolle H, Kharisma AP. Perancangan aplikasi Communication Board berbasis android tablet sebagai media pembelajaran dan komunikasi bagi anak tuna rungu. J Pengembangan Teknologi Informasi Dan Ilmu Komputer E-Issn. 2018;2933–43. [Indonesian]

28- Utami WZS. Pengembangan media pembelajaran matematika untuk meningkatkan konsentrasi dan minat belajar siswa tuna grahita. J Teknologi Pendidikan. 2017;2(1):76–87. [Indonesian]

29- Aisanjaya R. Rancang Bangun Aplikasi Guru Virtual Sebagai Media Bantu Pembelajaran Bahasa Isyarat Dengan Media Animasi [Dissertation]. Indonesia: Universitas Komputer; 2019. [Indonesian]

30- Hanurawan F. The role of psychology in special needs education. J ICSAR. 2017;1(2):180–4.

31- WitaHarahap L, Surya E. Development of learning media in mathematics for students with special needs. Int J Sci Basic Appl Res. 2017;33(3):1-12.

32- Surmayanti, Sudirman, Andi Asrina. Rancangan Multimedia Pembelajaran Interaktif Pendidikan Kesehatan Reproduksi Remaja Pada Tunarungu Di SLB Minasa Baji Bantimurung Kabupaten Maros. J Ilmiah Kesehatan Diagnosis. 2017;11(5):480–3. [Indonesian]

33- Utami I, Budi S, Nurhastuti N. A need analysis of blended learning model for deaf students in higher education. Edumatic J Pendidikan Informatika. 2020;4(2):112–9.

34- Riza LS, Firdaus DS, Junaeti E, Hidayat T, Abdullah AG, Nandiyanto AB, et al. A concept and implementation of instructional interactive multimedia for deaf students based on inquiry-based learning model. J Engin Sci Technol. 2018;13(7):2016-35.