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Android Application for Determining Growth and Development of Children Aged 0-5 Years using The Denver II Test

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ABSTRACT
Health services in the form of information technology are needed to advance health services. Applications for child development are very necessary during the pandemic because of the limitations of direct visits by health workers to residents' homes, so an android application is needed as a screening method to determine child growth and development so that it can detect developmental delays in children from an early age. This study uses the Denver II test to design an android application to determine the growth and development of children aged 0-5 years. The design of the application system starts with observations and interviews, after which the process of designing and making an offline-based android application programming system is carried out. This application has been tested pretest and posttest on 30 mothers who have children aged 0-5 years. The Wilcoxon test carried out these results with a 0.000 <0.005, so there is a difference between the pretest and posttest knowledge results. The conclusion is that parents can use this application to monitor the growth and development of children aged 0-5 years.

Keywords*: Android applications; Growth Development; Denver Test*

ABSTRAK
Pelayanan kesehatan dalam bentuk teknologi informasi sangat dibutuhkan guna kemajuan pelayanan kesehatan. Aplikasi tumbuh kembang anak sangat diperlukan dalam masa pendemi karena keterbatasan dilakukan kunjungan langsung petugas kesehatan ke rumah warga, sehingga perlu aplikasi Android sebagai suatu alat metode skrining untuk penentu tumbuh kembang anak, sehingga dapat mendeteksi keterlambatan perkembangan pada anak sejak usia dini. Penelitian ini bertujuan untuk merancang aplikasi android untuk penentuan tumbuh kembang anak usia 0–5 tahun dengan menggunakan tes denver II. Metode yang digunakan adalah perancangan system aplikasi yang dimulai dari observasi dan wawancara setelah itu dilakukan proses perancangan dan pembuatan sistem pemograman aplikasi android berbasis ofline. Hasil dari penelitian ini berupa aplikasi android yang telah diaplikasikan ke dalam Matakuliah Denver Development Screening Test (DDST). Aplikasi ini telah dilakukan uji pretest dan posttest pada 30 orang ibu yang telah memiliki anak usia 0-5 tahun. Hasil tersebut dilakukan uji Wilcoxon yang bernilai 0.000 < 0.005, maka ada perbedaan antara hasil pengetahuan pretest dan posttest. Kesimpulannya adalah penggunaan aplikasi ini dapat digunakan oleh orangtua dalam memantau tumbuh kembang anak usia 0-5 tahun.

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Kata Kunci: Aplikasi Android; Tumbuh Kembang Anak; Tes Denver

INTRODUCTION

Impaired growth and development are serious problems for both developed and developing countries. Growth can be seen from weight, height, and head circumference, while development can be seen from motor, social and emotional, language, and cognitive abilities. Every child will go through a process of growth and development according to their age stages, but many factors influence it, such as providing appropriate and balanced nutrition that will help optimal growth and stimulation of parents and the environment in child development, in this case, the ability to speak in toddlers is very dependent of how often parents train and stimulate children to communicate (Ministry of Health RI, 2016; Sugeng, HM, Tarigan R, 2019)

The incidence of developmental delays, in general, occurs in around 10% of children worldwide (Ashar, 2010). RI Ministry of Health in (Widati, 2012) reported that 0.4 million (16%) Indonesian toddlers experienced developmental disorders of fine and gross motor, hearing loss, intelligence, and speech delays. The World Health Organization (WHO) reports that 5-25% of preschool-age children suffer from minor brain dysfunction, including fine motor development disorders such as waving hands, drawing, writing, eating, drinking, and constructing puzzles (Widiati, 2012). Meanwhile, according to (Kay-Lambkin, globally, it is reported that children who experience disorders in the form of anxiety are around 9%, easily emotional 11-15%, and behavioral disorders 9-15%. WHO data for 2018 shows that the prevalence of malnutrition is 7.3%, overweight is 5.9 and stunting is 21.9% (WHO, 2019).

The impact that can occur if the fulfillment of 1000 HPK (First Day of Birth) nutrition is not fulfilled is that there will be disturbances in the development and growth of the child. Often parents do not realize when their child is experiencing delays, and parents need to know the stages of growth and development of children. Assessment of development in children is very important so that if suspicion of deviation is found, stimulation and early intervention can be carried out immediately before abnormalities occur. Early detection can be carried out every three months in children aged 0−12 months and every six months in children aged 12−72 months and is carried out at all levels of health services (Sugeng, HM, Tarigan R, 2019). Screening needs to be done to detect early problems in

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child development using the Denver II screening test with several aspects to be assessed, namely fine motor, gross motor, language, and personal social aspects, in the test using a paper form that contains the test items, and the implementation manual. Using DDST II manually using paper is less effective because it has weaknesses such as being easily damaged, lost, torn, and left behind. Modifying the Denver Development Screening Test II or DDST II forms is necessary (Kurniawan, 2016).

In the era of progress in technology and information, the design of an Android-based child development monitoring application is very important as a screening method tool or application for determining child growth and development so that it can detect developmental delays in children from an early age anytime and anywhere. This Android application for child growth and development is offline, so parents can use the application anytime and anywhere to monitor child growth and development. The advantage of this application compared to other applications is monitoring that focuses on child growth which can be seen in the growth table, which refers to the Regulation of the Minister of Health of the Republic of Indonesia regarding Child Anthropometry (standard weight and height for children according to age) and this application also focuses on the development of children who are monitored according to standard development monitoring tools, namely the Denver Development Screening Test / DDST II, and has a menu of growth and development counseling which becomes solution if there is a delay in child growth and development.

METHOD

Android application programming and display

1. Android Application System Design and Programming

Android is an operating system for mobile phones based on Linux, which includes an operating system, middleware, and applications. Android provides an open platform for developers to create their applications (Safaat H, 2011). Before starting to design an android application for detecting child growth and development, a needs analysis is carried out, as well as the design and manufacture of the android first. Analysis of needs related to information about child growth and development that is

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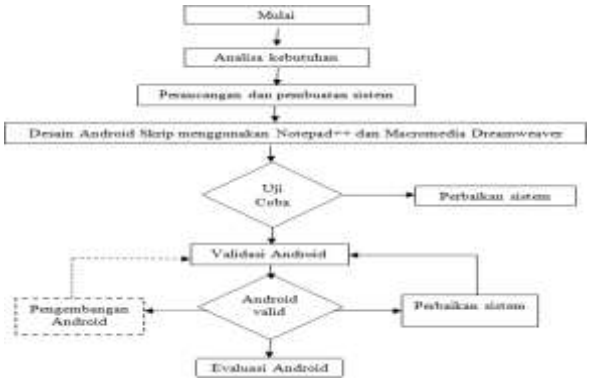
needed by health workers, educators, and the community so that an android application is needed to facilitate it.

Android application for detecting child growth and development as an offline android-based information system application that can be connected without an internet network which is useful for making it easier for system users (health workers, health students, educators, and the general public) to access data and information about child development. Some software that supports the Microsoft Windows 10 operating system version 1607 build 15014, Android OS. V6.1.1 (Marshmallow), SK, JDK. Some of the hardware includes the Dell Inspiration 143421 laptop and Xiaomi Redmi 9T Android.

This research starts with needs analysis by conducting observations and interviews. After that, the process of designing and building the system is carried out. In making the system, this website uses Macromedia Dreamweaver as an application and uses the PHP programming language to design the website. After the system has been created, the system testing process is carried out. At the trial stage, if the website application is deemed invalid, then a repair process is carried out again, and if it is deemed correct, the website is published so that everyone can access it.

Picture 1. Android Programming Flow



2. Unified Modeling Language (UML) diagrams

The Unified Modeling Language diagram is a visualization, specification, construction, and documentation language. Using UML can facilitate the creation of models for all types of software applications. Applications can run on any hardware, operating system, and network and are written in any programming language—the module to be made includes use case diagrams. Use case diagrams to describe the expected functionality of a system. What is emphasized is "what" the system does, not "how.". The use Case Diagram for this system shows that there is an actor, namely, a user, who performs three activities, namely selecting the development menu and the growth menu. The development menu contains mother and child identification input, current and appropriate baby age,

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developmental tests, and normal/delayed child development output. The growth menu includes mother and child identity input, current child's weight and height input, gender and age, growth table, and normal/late child growth output. The following is an image of a use case diagram.

Picture 2. Case Diagram of the Application

Sample and Location of Research

Data collection began by assigning midwifery students to apply monitoring of child growth and development with an android application, then students chosed parents who met the inclusion criteria (having children aged 0-5 years, having an android mobile phone) in this research. Furthermore, parents were asked to sign the consent form to become respondents and then given an explanation of the methods and research procedures. The location was carried out at STIKES Salewangang Maros. Implementation time during the period May – July 2021.

Analysis Data

The data used were analyzed bivariate to find a relationship between the pretest and post-test results regarding knowledge of using the android application for child growth and development on the results of monitoring growth and development aged 0-5 years. Data analysis using the Wilcoxon Sign Rank Test statistic was carried out to see the effect between the observed and expected frequencies and processed by a computer using the SPSS formula with a 0.05.

RESULTS AND DISCUSSION

The results of this study are in the form of an android application for determining the growth and development of children aged 0–5 years using the Denver II test, as well as the implementation or results of using the application by students of the stikes salewangang Maros DIII Midwifery study program. This application contains instruments that include testing childgrowth, child development, and counseling for growth and development delays. The design used in this study is an Android-based application that is installed on a cell phone. Implementation of the use of this application is:

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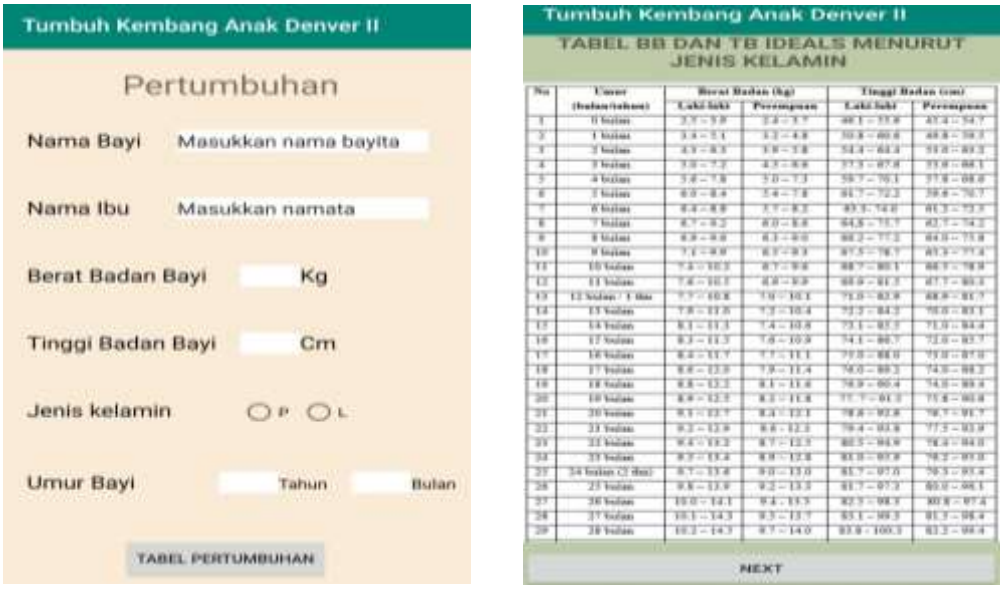
1. How to use the application

Before installing the application, the user must have the raw material from the application with the .apk extension as follows. Furthermore, double-click on the install file and wait until the installation process is complete. There are five menus available in this application, namely:

Picture 3. Main Menu

MAIN MENU: The front page (Home) of the android application for determining the growth and development of children aged 0–5 years using the Denver II test displays four: the growth menu, the development menu, the growth and development counseling, and the ownership menu (Ivantoni R, 2015).



Picture 4. Growth Menu

GROWTH MENU: The growth menu contains a form that describes the condition of the toddler who wants to be monitored, and there is a growth table for children 0-5 years which contains the ideal weight and height for girls and boys according to PERMENKES RI No. 2 of 2020 Concerning Children's Anthropometry Standards (Ministry of Health of the Republic of Indonesia, 2020).

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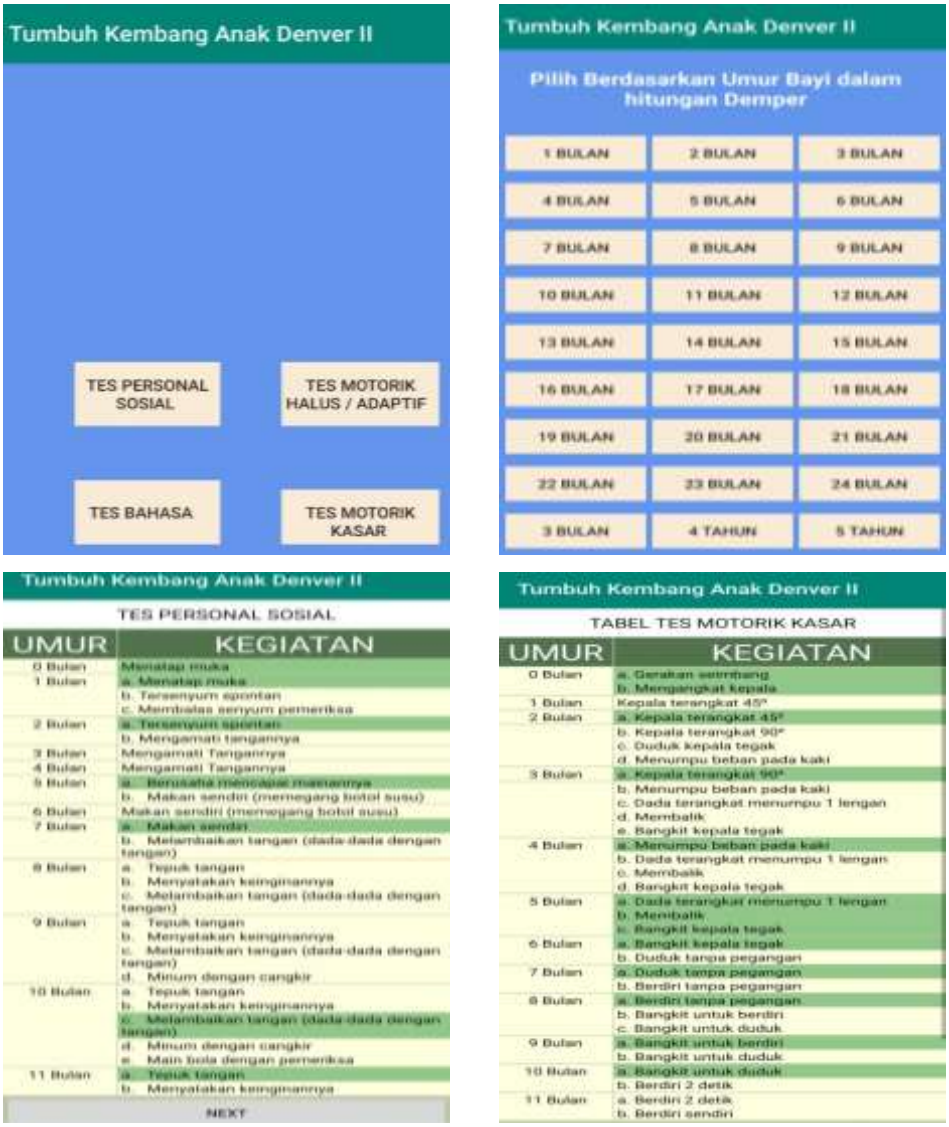

Picture 5. Progress Test Menu: some child development tests and age menu, social personal test; and rough motor test menu

PROGRESS MENU: The development menu contains a form that describes the condition of the toddler who wants to be monitored, and there are four developmental test menus, namely, social, personal tests, fine motor tests, language tests, and gross motor tests that will be carried out by children 0-5 years. The test results on the development menu determine the child's ability to be good or experience delays; marked when the child can carry out the test according to the instructions in the application, the child is categorized as good or normal, but when the child cannot carry out the test, the child is categorized as having a delay (Kurniawan, 2016; Suwariyah, 2013; Venny Lovina, 2015).

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Picture 6. Growth and Development Conselling Menu

GROWTH AND DEVELOPMENT CONSELLING MENU: The application contains two menus, namely the growth and development counseling menus. Counseling menu regarding growth and development health education both in children with good or normal categories in general and specifically in children with categories experiencing growth and development delays (Soetjiningsih, 1995, 2012; Soetjiningsih, IG.N., 2015; Sulistyawati, 2014)

Picture 7. Ownership Menu

OWNERSHIP MENU (ABOUT US): A menu can be the identity of the owner of the Android application for determining the growth and development of children aged 0–5 years using the Denver II test.

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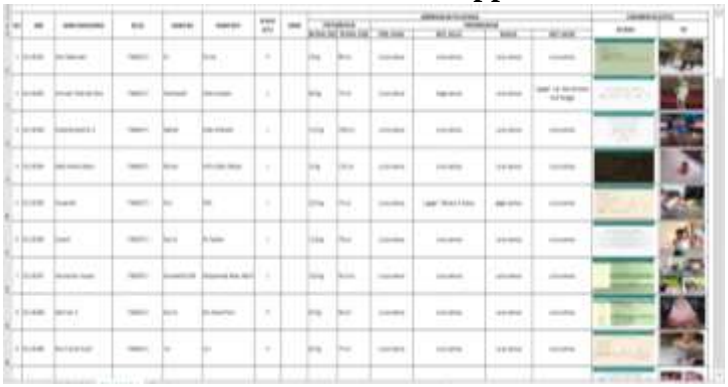
2. Implementation of The Application

Picture 8. Application documentation and developmental tests (from left to the rigt): social personal test – brushing teeth with additional assistance, fine motor test - scribbling on paper, rough motor test - standing up, language test - turning around when called

They were using the Denver II test to implement the application or the results of using the android application for determining the growth and development of children aged 0-5 years. This application has been implemented in the Denver Development Screening Test (DDST) course, and midwifery students at STIKES Salewangang Maros use it to find mothers with children aged 0-5 years technically and have an Android mobile phone in the environment where they live. Students do a pre-test with the mother related to child growth and development by dividing the questionnaires and the material according to the contents of the application. After that, students describe the application and use of the application on the mother. Next, the mother takes a Monitoring Test for her child's growth and development with the application and is still assisted by students.

3. Examination results of the use of the android application



Picture 9. socialization and the results of using the application

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The results of the Wilcoxon test on Negative Ranks show a value of 0 on N, Mean Rank, and Sum Of Ranks, which means there is no decrease in value from the pre-test to the post-test score. Positive Ranks show 24 mothers who have increased their pre-test to post-test scores. Tiens showed that as many as six mothers had the same nuke in the pre-test and post-test. Based on the statistical test obtained by Asymp. Sig. (2-tailed) use the Wilcoxon test that these results are 0.000 <0.005, which means there is a difference between the results of knowledge for the pre-test and post-test, so it can also be concluded that there is an effect of using the android application on child growth and development on the results of monitoring growth and development aged 0-5 years.

The application of android applications for growth and development following research (Mariza Devega, 2018; Nia Saurina, 2015; Feby Purnamasari, 2022; Nisa KarimaThe successful use of the Android application in monitoring the growth and development of children can be categorized as an excellent tool and can be used by parents to detect early development of children and can be used at home or in health facilities, so there is a need for socialization of the Android application for child growth and development.

CONCLUSION

The results of this study are in the form of an android application for determining the growth and development of children aged 0–5 years using the Denver II test. The application contains a growth menu, a development menu, and a counseling menu for growth and development delays. The application that determines growth and development is offline-based so that it can be used at any time, but previously the master application was installed on an Android cellphone. This application has been used by midwifery students at the Salewangang Maros College of Health. It has become a tool for determining the growth and development of children aged 0-5 years.

REFERENCES

Elyza Gustri. (2017). The application determines the type of game for the development of children aged 0-6 years. . Technoin, 22(2), 10–14.

Feby Purnamasari. (2022). Implementation of The Application for Monitoring the Growth of Children Through the Android Application in Bonto Biraeng Village, Bonto Matene Village. Proceedings of the National Community Service Seminar: Community Care, 2(1), 15–22.

Feby Purnamasari. (2022b). The Effect of Using the Android Application on the Growth of Children on the Results of Monitoring the Growth of Children Aged 0-5 years in Bonto Biraeng Village. National Health Symposium, 36–40.

Hamdi G., K. (2011). Building An Android – Based Application "Psychotes Learning" Using App Inventor. Dasi

DOI: 10.32668/jitek.v10ii.1032

Journal, 12(4). STMIK AMIKOM Yogyakarta.

Ivantoni R. (2015). Application for Determining the Level of Growth and Development of Children Using the Denver II Test. (SNIMed) VI., Seminar Nas Medical Inform.

Indonesian Ministry of Health. (2016). Infodatin Data and Information Center of the Ministry of Health of the Republic of Indonesia Situation of Short Toddlers.

Kay-Lambkin, F., Kemp, E., Stafford, K., & Hazell, T. (2007). Mental health promotion and early intervention in early childhood and primary school settings: A review. The Journal of Student Wellbeing, 1(1), 31-56.

Kurniawan, R., MI, & JH (2016). Denverdevelopment Screening Test Based Child Development Monitoring System (DDST / Denver II). Technoin, 2(4), 05–14.

Mariza Devega, FW (2018). Utilizing Baby Care Android Applications as A Solution in Recording The Growth of Children Dynamisa- Journal of Community Service, 2(1), 32–37.

Minister of Health of the Republic of Indonesia. (2020). PERMENKES RI No 2 of 2020 Concerning Children's Anthropometry Standards. In: PERMENKES RI No 2 of 2020 Concerning Children's Anthropometry Standards.

Nia Saurina. (2015). Application for Early Detection of Growth and Development for Children Aged Zero to Six Years Based on Android. Journal of Buana Informatics, 7(1), 65–74.

Nisa Karima, NAVIGTPSM (nd). Optimization of the Android-based Growth and Development Detection Application at the Simpur Bandar Lampung Health Center during the COVID-19 Pandemic. Journal of Community Service Ruwa Jurai, 103–106.

Safaat H, Nasruddin. (2011). Android-Based Smartphone and Tablet PC Application Programming. Informatics, Bandung.

Sanitasari RD (2017). Andreswari D., Purwandari EP, Android Based Growth Monitoring System for Children 0-5 Years Old (Case Study: Beringin Raya Public Health Center, Bengkulu City). Recursive Journal, 5(1).

Soetjiningsih. (2012). Child Development and Problems in Textbook I of Child and Adolescent Development. . Sagungseto.

Soetjiningsih, IG.N., G. (2015). The Spirit of Child Development Edition 3. EGC.

Sugeng, HM, Tarigan R, SNM (2019). Description of Children's Growth and Development in the Golden Period Age 0-24 Months at Posyandu in Jatinangor District. Journal of Health Systems, 4(2), 96–101.

Sulistyawati, A. (2014). Child Development Detection. Salem Medika.

Suwariyah. (2013). Infant/Child Development Test Using the Denver

DOI: 10.32668/jitek.v10ii.1032

Developmental Screening Test (DDST). Medical Information Trans.

Venny Lovina. (2015). Expert System for Early Childhood Development Status Classification Using the Naïve Bayes Classifier Method Based on DDST Rules. . J Recursive, 3(2), 03–07.

WHO. (2019). World Health Statistics of 2019.

Widati, A. (2012). Effect of Play Therapy: Origami on Fine Motoric and Cognitive Development in Preschool Children (4-5 Years). Journal of Nerscommunity, 3(6).

DOI: 10.32668/jitek.v10ii.1032