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Development of Sport Kids Application as an Effort to Increase Physical Activity of Elementary School Children

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Abstract

The increasing use of digital devices among children has led to decreased physical activity and increased sedentary lifestyles, posing serious health risks. This study aims to develop the Sport Kids application as an innovative digital platform to promote physical activity in elementary school children. Using the ADDIE development model (Analyze, Design, Develop, Implement, Evaluate), the application was created with four main features: nutrition, physical activity, sports, and quizzes. It was designed using Canva and Scratch, then converted to Android format. Validation by media and material experts indicated an average feasibility score of 81%, categorized as very feasible. Implementation was carried out with 29 fourth-grade students over seven days. Physical activity levels were measured using the PAQ-C instrument before and after using the application. The results showed a significant improvement in activity levels. Statistical analysis using a paired sample t-test produced a significance value of 0.000 ($p < 0.05$), confirming that the Sport Kids application effectively increased children's physical activity. This research concludes that digital applications, when properly designed and implemented, can serve as effective tools in promoting active and healthy lifestyles among school-aged children.

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INTRODUCTION

The development of technology in the current digital era has had a major impact on various aspects of life, including children›s education and lifestyle. Generation Z and Alpha grew up in an environment that is very familiar with digital devices, such as gadgets and the internet. According to the Central Statistics Agency (BPS), as many as 33.44% of early childhood in Indonesia have used gadgets, including 52.76% of children aged 5-6 years (Hidayat et al., 2021). These lifestyle changes have led to increasingly sedentary activity patterns, reduced physical activity, and increased health risks.

The dominance of gadget use in children›s daily lives has a significant impact on their energy balance and body health. Children spend more time sitting or lying down while playing gadgets. This has a direct impact on increasing Body Mass Index (BMI) and decreasing physical activity (Nurmasari., 2019). The American Academy of Pediatrics (AAP) recommends limiting screen time for children as a preventive measure against excessive media exposure.

The initial goal of parents giving gadgets to children is so that they can benefit from technology. However, without supervision and clear rules, gadgets actually cause various negative impacts, such as addiction, laziness in activities, and reduced social interaction (Novianti & Garzia, 2020). According to Murtafi›ah et al., (2019)states that the time children spend on physical activity is decreasing, as sedentary activity increases.

A number of previous studies have developed digital technology-based fitness applications, such as the START-UP Sports Training application ‹BeFind› Dharmadi (2022), Healthy Sports Application Anggraini, Desta, Forkas and Ai (2022), and Fit Life (Nizar & Ika, 2024). Although innovative, all of these applications are aimed at adults. Therefore, there needs to be an innovation specifically designed for elementary school children with different characteristics and needs.

Generation Alpha is very quick to adapt to technology. They have high imagination and strong curiosity (Princess & Madiun., 2024). This is an opportunity to develop digital-based educational media that is not only visually appealing but also provides health benefits, such as the Sport Kids application aimed at children aged 6–12 years. This application has interactive features in the form of 3D animation and sports content, physical activity, nutritional information, and interactive quizzes.

According to (A. Putri & Madiun, 2024; Twenge, 2017), Generation Z and Alpha tend to be less active, drink less, and are more online, which can reduce quality of life and physical fitness. The impacts of this passive lifestyle include sleep disorders, chronic fatigue, obesity, heart disease, and diabetes (Denny, 2018). Therefore, the development of digital applications that encourage physical activity becomes very relevant.

Gadgets are basically neutral. Positive or negative effects depend on the content and how they are used. According to Murtafi›ah et al., (2019), gadgets can make it easier for children to learn and communicate, but they can also trigger addiction and decrease the quality of social relationships. Therefore, educational applications such as Sport Kids are a strategic alternative in directing gadget use in a more productive and healthy direction.

Excessive use of gadgets without physical activity can cause various risks, including insulin resistance, impaired brain function, cognitive disorders, and even osteoporosis (Kurniawan, 2015). The World Health Organization (WHO) and the Indonesian Ministry of Health recommend that children do physical activity for at least 30 minutes every day as part of a healthy lifestyle.

Environmental conditions also affect children›s physical activity patterns. According to Ramadhani & Fithroni (2020), shows that children in rural areas are more active because there is a lot of open space available, compared to urban children who have more limited space to move around and spend more time playing indoors using gadgets.

Data from (COMMINFO & UNICEF, 2020), stated that 79.5% of elementary school children in Indonesia have used gadgets. Without adequate control and education, this figure could be a warning signal of decreasing physical activity and increasing health risks.(Kholifatul, 2023). Therefore, it is important for parents and teachers to supervise gadget use and introduce alternative media that are educational and physically active.

By considering these challenges, this study aims to develop the Sport Kids application as an effort to increase physical activity of elementary school students. The development of this application is not only to add variety to physical education learning, but also as a strategy to integrate technology into an active and healthy lifestyle.

The Sport Kids application is designed

according to the characteristics of children, with fun, interactive, and educational content. With an attractive visual display and sports materials that can be done at home, this application is expected to increase children›s motivation to be active. This application also contains an evaluative feature in the form of a quiz to measure students› understanding of the material provided.

The application of digital technology in the form of educational applications such as Sport Kids is an innovative solution that supports the creation of a healthy and fun learning environment. With this application, children can access information about nutrition, do physical activities, and acquire healthy living habits in a fun way.

The novelty of this research lies in the development of a digital-based physical activity application that is specifically designed for elementary school children, not for adults like previous studies. This application combines elements of nutritional education, light physical exercise, and interactivity that are in accordance with the characteristics of Generation Alpha. This makes Sport Kids the first innovation that integrates aspects of health, physical education, and digital media in one educational application for children.

METHOD

This study uses the Research and Development (R&D) method with the ADDIE development model consisting of five stages: Analyze, Design, Develop, Implement, and Evaluate (Waruwu, 2024). The purpose of this method is to develop a product in the form of a Sport Kids application and test its effectiveness in increasing the physical activity of elementary school students.

In the analysis stage, researchers conducted observations and interviews with PE teachers and fourth grade students at Elementary School Children Gudang Kahuripan. The results of the analysis showed that most students use gadgets more than 4 hours per day for passive activities, such as playing games and watching videos. This prompted researchers to design an application that could direct gadget use in a more active direction.

The design stage is carried out by designing the appearance of the application using Canva Design and Scratch. The Sport Kids application consists of four main features: eating, physical activity, sports, and questions. The content is adjusted to the age of children using illustrations and 3D animations to make it more interesting and easy to understand.

In the development stage, the designed application is programmed through Scratch and converted to Android format using Website 2 APK Builder. After the application is completed, validation is carried out by two material experts and one media expert using a Likert-based questionnaire to assess the feasibility of the application's content and appearance.

The implementation phase was carried out on 29 fourth grade students for seven days. The sample was selected using purposive sampling technique, considering students who met the following criteria: (1) actively using digital devices, (2) enrolled in grade IV, and (3) willing to participate in the full implementation process. This approach was chosen to ensure that the participants matched the research objectives and application target users. Students were asked to use the application at home and carry out physical activities according to the application guidelines. Before and after using the application, students filled out the Physical Activity Questionnaire for Children (PAQ-C) questionnaire as a pre-test and post-test to measure changes in physical activity (Kowalski et al., 2004).

In the evaluation stage, the results of the pre-test and post-test were analyzed using SPSS version 26. The normality test was carried out using Shapiro-Wilk, and the hypothesis testing used the Paired Sample T-Test. This study concluded the effectiveness of the application if the significance value (Sig. 2-tailed) < 0.05 (Fadluloh et al., 2024). With this approach, research not only produces products, but also tests their effectiveness scientifically.

RESULTS AND DISCUSSION

The developed Sport Kids application product has gone through a validation process by three experts, consisting of one media expert and two material experts. The validation results show that this application is considered very feasible to use. The media expert gave a score of 65 out of a total of 80 points, with a feasibility percentage of 81%, which is included in the "very feasible" category. Validation by the first material expert obtained a score of 74 out of a total of 105 points (70% - "feasible" category), while the second material expert gave a score of 97 out of 105 points (92% - "very feasible" category). Based on the average of the three assessments, the Sport Kids application obtained a feasibility level of 81%, so it was declared feasible to use as an educational media to increase the physical activity of elemen-

tary school students.

The Sport Kids application developed consists of four main features, namely the "Eating", "Physical Activity", "Sports", and "Questions" features. Each feature is designed with an attractive visual display using animations and colors that suit the characteristics of children aged 6–12 years.

Figure 1. Main Menu Interface of the Sport Kids Application.

Figure 2. Display of the "Eating" Feature with Nutritional Guidance.

Figure 3. Visual Content of the "Physical Activity" Feature.

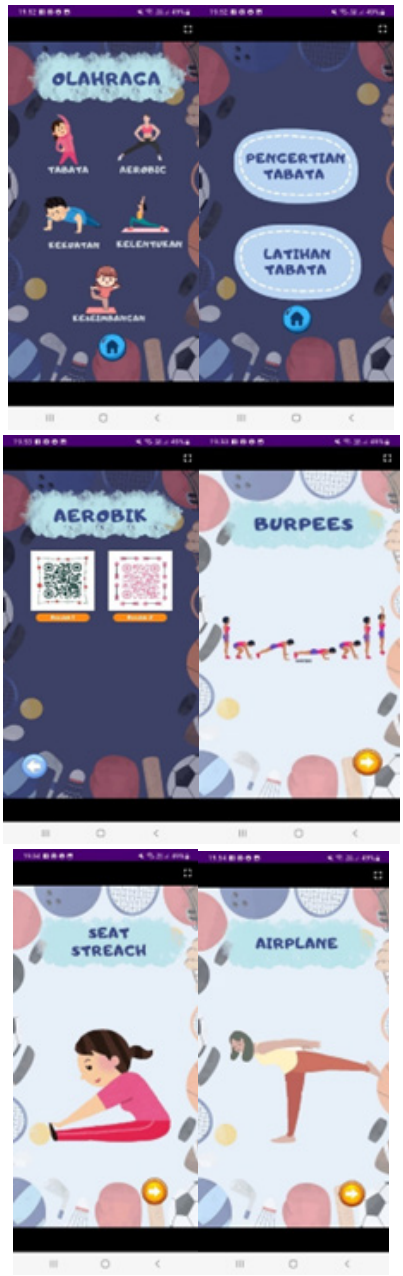

Figure 4. Exercise Modules within the "Sports" Feature.

Figure 5. Example Display of the "Quiz" Feature.

The "Sports" feature includes various exercises such as tabata, aerobics, strength, flexibility, and balance. This application is designed to be independently accessible by children via Android devices, and has been converted from design format to application using Scratch and Website 2 APK Builder.

The SPSS shows the number of respondents (N) is 29. In the Pretest results, the smallest value (Minimum) is 63 and the largest value is 115. The difference between the minimum and maximum values (range) is 52. The total value of the pre-test respondents (Sum Value) is 2,332. The average value (Mean) is 80.41 with a Standard Deviation of 11.849.

Meanwhile, in the Posttest results, the smallest value (Minimum) is 85 and the largest value is 138. The difference between the minimum and maximum values (range) is 53. The total value of post-test respondents (Sum Value) is 3,055. The average value (Mean) is 105.34 with a Standard Deviation of 11.184.

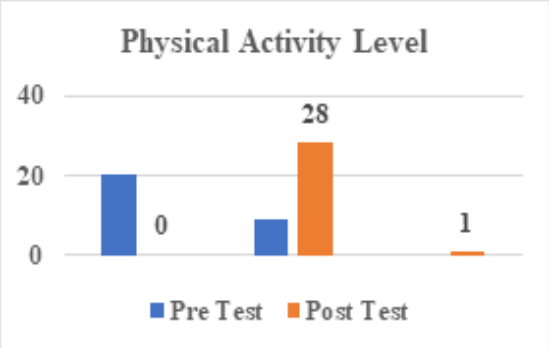

Figure 6. Descriptive test based on category

The **Figure 6** above shows that the level of physical activity in the Pre Test and Post Test has increased. The level of physical activity of children before using the Sport Kids application is lower than the level of physical activity of children after using the Sport Kids application. Before using the application, there were 20 students with low levels of physical activity, 9 students with moderate levels of physical activity and no students with high levels of physical activity. While in the Post Test there were no students with low levels of physical activity, 28 students with moderate physical activity and 1 student with high levels of physical activity.

Descriptive test based on gender, the Pre-Test graph above shows that there are differences in the level of physical activity between boys and girls. Girls with a low level of physical activity category of 14, higher than the level of physical activity of boys as many as 6 children. The level of physical activity category of medium is 6 boys and 3 girls. There is no high level of physical activity in boys or girls.

The Post Test graph above shows that there is no low level of physical activity category between boys and girls. Girls with a moderate level of physical activity category are 17, and boys are 11 children. The high level of physical activity category is 1 boy.

For Pre Test is 0.89, and Post Test value is 0.210. Because the value is more than 0.05, it can be concluded that the Pre Test and Post Test value data are normally distributed.

Paired Sample T-Test Results, based on the Paired Samples Test output table above, it is known that the sig. (2-tailed) value is 0.000 <0.05, so H0 is rejected and Ha is accepted. So it can be concluded that there is a difference in the average between the pre-test and post-test, which means that there is an effect of using the Sport Kids application in increasing the physical activity of elementary school children.

Nowadays children grow up in a digital environment. The rapid use of technology is unavoidable. Many children are addicted to gadgets because of passive content such as videos and games without involving physical activity. In line with research Ramadhani and Fithroni (2020)which states that physical activity plays an important role in the occurrence of obesity in children. The advancement of technology makes children increasingly passive and have a relaxed lifestyle (sedentary lifestyle), children will choose to spend time in front of the television or playing games on the computer or gadgets. For that reason, physical activity is very important to do starting from early childhood, elementary school children, adolescents, adults, to the elderly. Researchers do not prohibit children from using gadgets, but direct children to live an active lifestyle. The Sport Kids application aims to reduce dependence on gadgets and educate them to get used to an active and healthy lifestyle. According to Ramadhani & Fithroni (2020) There are several factors that cause children to have a tendency to play games on gadgets or computers, including technological advances in this era, the emergence of the phenomenon of coffee shops that provide free Wi-Fi, and the lack of education of parents or accompanying teachers at school in dealing with technological advances in the use of gadgets. The Sport Kids application is also a bridge to create a balance between children's health and technological advances.

The Sport Kids application is designed using the Canva design application. The Sport Kids application design is presented with illustra-

tions or images that are adjusted to the characteristics of children. According to Adila, Rara, and Ari (2025)gamber can make abstract concepts more real and concrete. The use of visual media can also help improve students' memory because visual information tends to be easier to remember than verbal information. There are several menus consisting of eating, physical activity, sports and questions. In the menu there is an explanation such as the benefits, effects and examples of food regarding staple foods, side dishes, fruits, vegetables, and drinks. In the menu there is also a menu of the contents of my plate. The contents of my plate are the right portion of food on one plate, so that the body gets enough nutrition and meets the needs of balanced nutrition.

According to the Ministry of Health, understanding and implementing balanced nutrition is very important. During this growth period, the body needs various nutrients to support physical, mental, and emotional development. Balanced nutritional intake helps improve concentration at school, supports physical activity, and prevents various diseases caused by nutritional deficiencies or excesses. The physical activity menu explains the importance of physical activity, the duration of physical activity, and examples of physical activities that can be done at home. The sports menu is divided into 5 types of exercises, namely tabata, aerobics, strength, balance, and flexibility. The most interesting is the question or quiz menu used to find out how far the child understands the material and instructions given in the Sport Kids application. After the Sport Kids application design on the Canva design is complete, the next step is to program or code on the scratch web which is accessed via Google. After the programming is complete, download the file in Sb3 format. The Sb3 file is converted using the Sheepstester web so that the Sb3 file becomes an html format file. Furthermore, to become an application that can be used on a cellphone, the html file is converted using the apk builder.

According to Maulidia and Hudaidah (2023)Expert validation is an assessment process carried out by professionals in a particular field. The Sport Kids application has gone through a validation process by media experts and material experts before being implemented. This validation is carried out to ensure the suitability of the content, appearance, and suitability of the application to the needs of users, especially elementary school students. Based on the assessment results, the media expert gave a feasibility score of 81% which is included in the "very feasible" category. The first material expert gave a score of 70% which is classified as "feasible", while the second material expert gave a score of 92% and is included in the "very feasible" category. The average of the three assessments is 81%, so the Sport Kids application is generally declared very feasible for use. Several inputs from experts were also provided as improvement materials, including illustrations in the application that are less suitable for inclusive schools that have students with special needs (ABK), because ABK tend to prefer real images over illustrations. In addition, it is recommended to add a menu based on activity grouping and improve multiple-choice questions that are considered still confusing. This input is the researcher's concern for application development in the next stage. Results of the Implementation of the Sport Kids Application

After validation was completed, the Sport Kids application was implemented to 29 fourth grade students of Gudang Kahuripan Elementary School, Lembang, West Bandung Regency. In the initial stage, the researcher gave preliminary questions about physical activity habits, then a pre-test was conducted using the Physical Activity Questionnaire for Children (PAQ-C) instrument. The pre-test results showed that most students had low levels of physical activity, with an average score of 80. In detail, there were 20 students with low physical activity, 9 students with moderate physical activity, and no students were in the high category. After seven days of using the application, a post-test was conducted with the same instrument. The results showed a significant increase, with an average score of 105 which was in the moderate physical activity category. In the post-test, 28 students were in the moderate category and 1 student was in the high category, with no students classified as low physical activity. The difference in scores between the pre-test and post-test indicates that there is a positive effect of using the Sport Kids application on increasing the physical activity of elementary school students.

In the research on the Development of Sport Kids Applications as an Effort to Increase Physical Activity of Elementary School Children, there are still several limitations that need to be considered. First, during implementation, the application download process faces technical obstacles because some students' mobile phones do not support the application system, and some students do not have mobile phones at all. Second, the limitations of time, ability, and cost owned by researchers also affect the optimization of the application development and implementation process. Third, several suggestions and inputs

from expert validation results have not been fully realized in the final product due to these limitations.

CONCLUSION

The Sport Kids application was developed in response to the increasing use of gadgets that lead to reduced physical activity among elementary school children. This application features four main components: sports, physical activity, nutrition, and quizzes, all presented through attractive animated visuals and accessible offline. Validation by three experts showed an average feasibility rating of 81%, categorized as very feasible. Implementation over seven days with fourth-grade students demonstrated an increase in physical activity from low to moderate categories, meaning that students who previously had minimal physical movement improved to a level considered sufficient to support health and development. The types of physical activities encouraged by the application include tabata, aerobics, strength training, balance exercises, and flexibility routines—all of which are age-appropriate and can be performed at home. The Paired Sample T-Test yielded a significance value of 0.000 ($p < 0.05$), indicating that the Sport Kids application had a statistically significant effect in increasing the physical activity levels of elementary school children. In conclusion, this study confirms that well-designed digital applications, when tailored to children's needs and integrated with educational content, can effectively promote healthy and active lifestyles in the digital era.

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