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Original Article

Android-based physical fitness software guidance

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Abstract
In recent years, health development in Indonesia is relatively low, and the importance of sport in implementing public policy has been observed. One of the problems is the lack of physical activities to improve physical fitness. It has been reported that only 17% of the Indonesian population has relatively good physical fitness (Fadhlurrohman M, Purnomo E, n.d.). Social development strategies are implemented at various levels. On a large scale, this means that these strategies involve governments, international organizations, and, on a smaller scale, local communities. The initiatives undertaken at the local level are important because their effectiveness is usually higher than national programs (Clark et al., 2012). Another reason supporting this research is that mobile health technologies, especially smartphones (i.e., broadband-enabled phones with the capacity to download apps), are rapidly growing (Knight et al., 2015). **This research aimed** to improve the efficiency of measuring physical fitness based on the software application technology on Android. **Research methods:** This research used a quantitative approach. The developed application has four main features: quotes, articles, videos, and search for sports practitioners. This research uses the research and development ADDIE (analysis, design, development or production, implementation or delivery, and evaluation) model as the research method (Kaye Shelton, Dallas Baptist University & George Saltsman, Abilene Christian University, 2007). This approach is implemented in five stages: (1) analysis, (2) application design, (3) application development, (4) implementation, and (5) evaluation. The sample consisted of 30 participants. A total of 50% of the participants were sports students from the State University of Jakarta, and 50% were from the Local Youth Organization, Ujung Menteng Village, Bekasi; the participants were 18–39 years old. Descriptive analysis was performed using the t-test. The data were collected through observation with a total of 45 questions and interviews. The result is the total number of correct answers on the pre-test 914 (68%) and post-test 1179 (87.3%). **Result.** There is an effect of using the application, as evidenced by the significant difference between the pre-test and post-test values. The objective of this research was to create an application software product to increase knowledge and physical fitness. **Conclusions**. The developed software was validated by a review team consisting of a physiologist, physical fitness expert, and digital experts from State University of Jakarta. The most important motives were general health orientation, life meaning and self-esteem, which are related to health development in Indonesia.
Key Words: Physical fitness knowledge, Physical fitness software, android application, health development

Introduction

In recent years, health development in Indonesia is relatively low (91st place out of 169 countries worldwide). One of the problems is the lack of physical activities to improve physical fitness. It has been reported that only 17% of the Indonesian population has relatively good physical fitness. (Fadhlurrohman M, Purnomo E, n.d.). Indonesian adolescents in today's society are becoming increasingly less active, which contributes to the increasing obesity rate. (Clark et al., 2012) The Agenda 2030 with its 17 Sustainable Development Goals (SDGs) provides the framework that all United Nations (UN) member states have pledged to fulfil. The achievement of this agenda depends on whether humankind is able to maximize synergies and resolve existing trade-offs between SDGs. (Kroll et al., 2019) This study focuses on two issues: SDG number 3 – ensure healthy lives and promote well-being for all at all ages SDG number 4 – ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. (Kroll et al., 2019) Using social data from January 2017, it is determined that Indonesians spend approximately **9 hours a day** looking at a screen. (Fitri Primacakti, Damayanti R. Sjarif, 2019) DKI Jakarta, as the capital city, is the chattiest city in cyberspace because, throughout the day, the activity of Twitter from a Twitter account domiciled in the capital city of Indonesia is the densest, more than Tokyo and New York. (Carley et al., 2015)

Because Indonesian people are more active surfing social media, which amounts to an average of 9 hours per day, this confirms that Indonesian people are less physically active owing to the lack of fitness or fatigue. There are relatively few health problems in Indonesia. In early 2020, Indonesia was hit by the COVID-19

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pandemic. To avoid the outbreak, people must have strong immunity. One of the ways to develop strong immunity is by exercising. For maintaining and increase stamina of healthy adults (18-64 years old), per week World Health Organization (WHO) (World Health Organization, 2020) recommended a minimum exercise 150-300 minutes of moderate physical activity (40-60% HRM) or 75-150 minutes of high-intensity vigorous physical activity (60-85% HRM). (SYAMSUDIN et al., n.d.).

In contrast, the percentage of Indonesian people who are active in sports is approximately 35.7% of the total population in Indonesia, or the equivalent of 92.8 million out of 260 million people. (Ervina et al., 2020) These data show that the active participation of Indonesian people in sports **is still low**. The author surveyed, observed, and interviewed randomized temporary participants on a small scale and found **a significant gap** in physical activity knowledge. From the survey, the author found more than 50% sample with low knowledge about physical activity. This phenomenon contradicted the normal condition for maintaining and increasing stamina, especially in the COVID19 situation.

Therefore, this study aimed to improve measurement efficiency and increase physical fitness knowledge based on the application technology on Android. Specifically, the researchers wanted to answer the following research questions:

1. *What kind of efficiency to increase physical fitness knowledge based on android applications?*
2. *How does knowledge affect physical activity? Why is it essential to know physical activities?*

It was helping out, and anticipated that this research would have meaningful implications and updates on physical activity and technology development for researchers and practitioners in the health care and physical activity sectors. (PARK et al., 2020)(Elavsky, S., McAuley, E., Motl, R. W., Konopack, J. F., Marquez, D. X., Hu, n.d.)

Materials and methods

Participants and design

This research was developed owing to the lack of physical activity knowledge among the Indonesian population. The study sample consisted of 30 participants. A total of 50% of the participants were sports students from the State University of Jakarta, and the other 50% were from the local youth organization in Ujung Menteng Village, Bekasi; study participants were 18–39 years old. The research period was from September 2020 to April 2021. Analysis and model design of the software was performed in September 2020 and required 6 months for finalization. Expert and effectiveness trials on the participants were performed in February 2021 by adjusting the time and place agreed upon by the experts. The participants were asked to respond to a questionnaire about physical activity through the Google Forms system. The questionnaire completion time was approximately 10–15 minutes. The data survey collection process was performed in February 2021.

Instruments

Descriptive analysis was performed using the t-test. The data were collected through a survey containing 45 questions using the Google Forms system as well as interviews and observation. The development was based on the ADDIE model, which is one of the systematic instructional design models. According to ADDIE (Dick, W & Carey, L. 1996), models consist of five steps: (1) analysis, (2) design, (3) development, (4) implementation, and (5) evaluation.

Figure 1. Flow of the search result

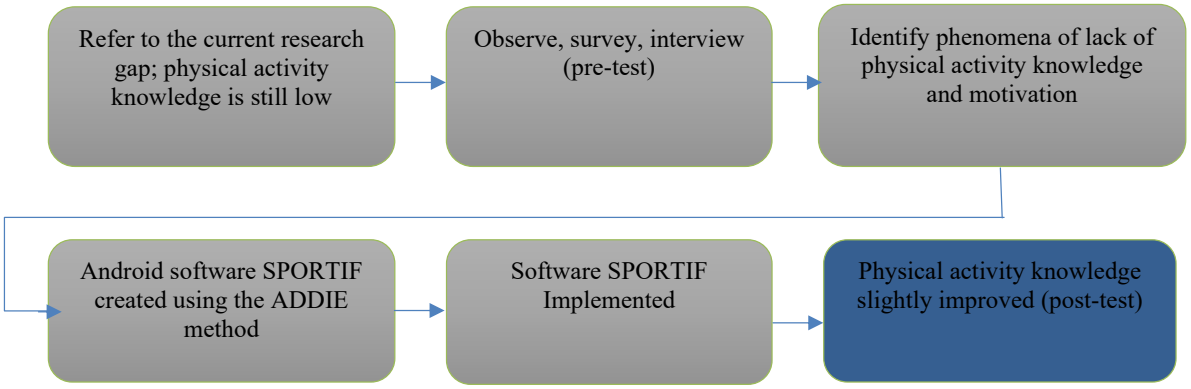

Figure 1.
Figure 2. ADDIE method

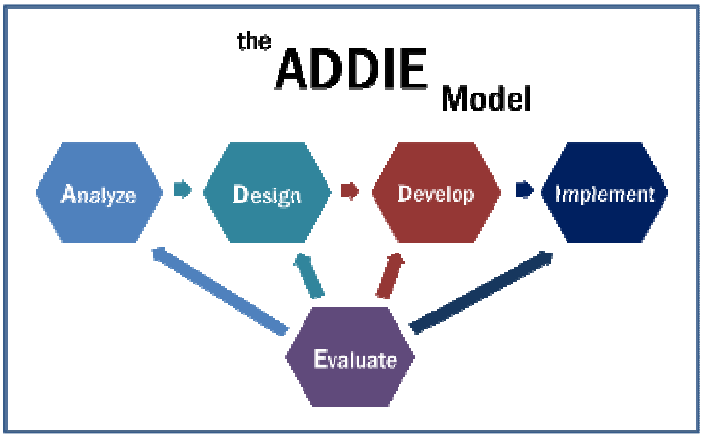

Figure 2.

Analysis needed

During this step, data analysis aims to collect information on what activities are performed at the community youth organization in Ujung Menteng Village. Data collection was compiled by conducting observations and interviews. The data collected at the youth organization in Ujung Menteng Village showed the lack of knowledge and literacy about physical fitness. It was also determined that some members quickly became tired during their activities and were less productive.

Design

During the model design step, the researchers developed an application model design. The design was based on the required features and previously performed analysis. The design was created to suit the overall application description. Figma, Adobe Photoshop, and Android Studio were used to develop the application.

Development

Experts contributed to the research. Tests in the field allowed to check the feasibility of the developed model. Experts from various qualified fields performed the validation. The first experts is a physiologist and sports fitness expert, and the second expert is a digital application expert from the State University of Jakarta. Expert assessment was used to make the initial input for modelling using a justification test in which the indicators were determined together with the experts.

Implementation

The next step is to apply the model to a sample of users (pre-test). Pre-test aims to determine how much this application can improve the knowledge of physical fitness by members of the local youth organization at the Sub-district of Ujung Menteng and by State University of Jakarta sports students.

Evaluation

Evaluation helps to review model performance and then improve the model. Revision of the model is performed until the final result is achieved. The result is the Android-based physical fitness software application product that is suitable for use.

Results

The Android-based physical fitness guide model was developed as an educational facility for users, athletes, sports practitioners, and the general public and presented in a digital platform as an application on a smartphone. The physical fitness guide application can increase insight of the users to apply physical fitness. Educational applications are a solution that can reach users and can be accessed anywhere and anytime. Applications are easy to understand, provide complete information, integrated, and have a small size when installed on a smartphone.

Figure 3. shows the SPORTIF software features (i.e., quotes, informative articles, educational videos and search for fitness practitioners). Various content (e.g., articles and physical fitness videos) can be read, watched, understood, and applied to athletes, sports practitioners/academics, and the general public.

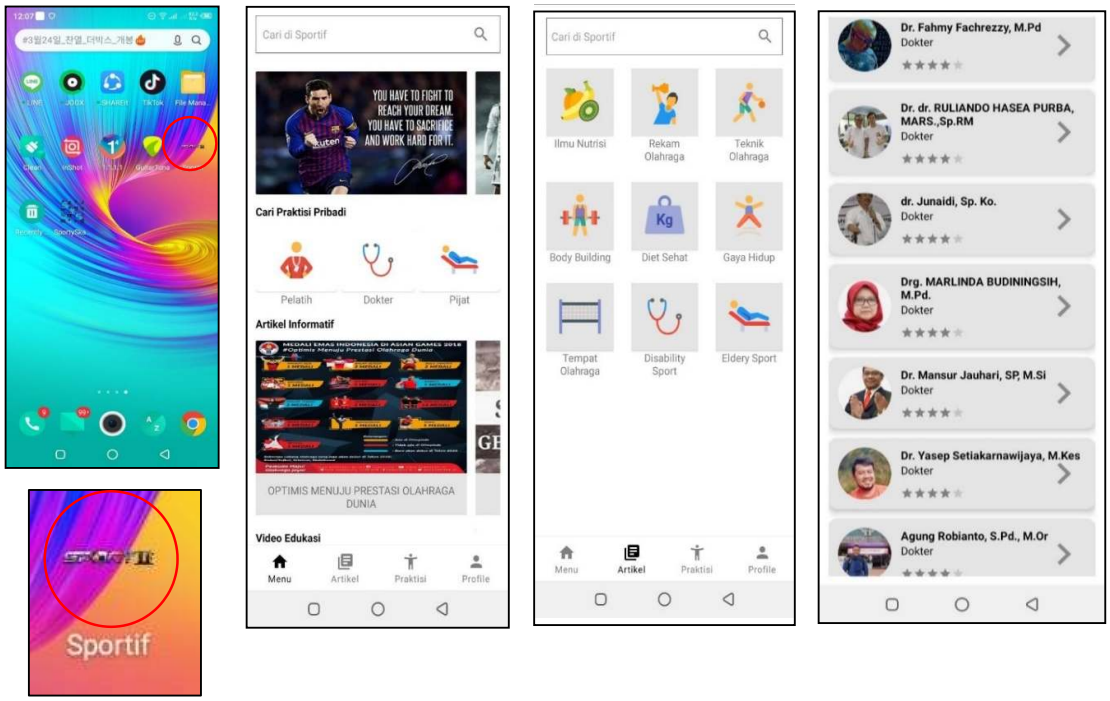

Figure 3. **Figure 3.** SPORTIF software features (quotes, informative articles, educational videos and search for fitness practitioners)

Table 1 shows the experts who contributed to this research. The ability to check the feasibility of the developed model in the field was created. Validation by the expert from various qualified fields was performed. The first expert is a physiologist and sports fitness expert, and the second expert is a digital application expert from the State University of Jakarta.

Table 1. Model feasibility P1: physiologist and sports fitness expert P2: digital software application expert

No.	Feature / Content	Acceptance DesignModel		Description
		P1	P2	
1.	The article about understanding of physical fitness from experts	Yes	Yes	Worth it
2.	Articles about physical fitness components	Yes	Yes	Worth it
3.	Articles about physical fitness benefits	Yes	Yes	Worth it
4.	Articles about type of physical fitness exercise	Yes	Yes	Worth it
5.	Articles about food / nutrition consumption to maintain fitness	Yes	Yes	Worth it
6.	Articles about maintaining fitness during a pandemic	Yes	Yes	Worth it
7.	Articles about diet menu to maintain health and stay fit	Yes	Yes	Worth it
8.	Article about Fitness Exercise Program	Yes	Yes	Worth it
9.	Sports practitioner search feature (coach, doctor, and massage) to consult and maintain fitness	Yes	Yes	Worth it
10.	Kinds about 10 video components of physical fitness	Yes	Yes	Worth it

Table 2 shows the check of model effectiveness to determine how much the Android-based fitness guide model can increase people's knowledge. Model effectiveness is evaluated through small-scale sample trials. A total of 50% (n = 15) of the final sample were from the local youth organization at the Sub-district of Ujung Menteng, and the other 50% (n = 15) were State University of Jakarta sports students. All participants were 18–39 years old. The result of the pre-test recapitulation based on the number of correct answers was 914 = 68%.
Table 3 shows that based on the post-test answers, the number of correct answers slightly improved 1179 = 87.3%.

Table 2. Pre-test descriptive result of respondent (*n* = 30) answers; overall, it has a presentation of 87.3%.

PRE TEST RESULT

No	Right Answer	No	Right Answer
1.	38	16.	31
2.	31	17.	22
3.	35	18.	32
4.	36	19.	22
5.	34	20.	32
6.	34	21.	21
7.	22	22.	23
8.	35	23.	34
9.	35	24.	24
10.	41	25.	36
11.	39	26.	22
12.	33	27.	22
13.	40	28.	17
14.	22	29.	30
15.	41	30.	30
Total		**914**	

POST TEST RESULT

No	Right Answer	No	Right Answer
1.	43	16.	39
2.	36	17.	45
3.	41	18.	41
4.	36	19.	36
5.	40	20.	43
6.	36	21.	40
7.	37	22.	40
8.	38	23.	40
9.	36	24.	41
10.	42	25.	43
11.	40	26.	40
12.	37	27.	39
13.	41	28.	17
14.	44	29.	44
15.	42	30.	42
Total		**1179**	

Table 4 shows that a statistical test was performed using the two-tailed average test method to determine the pre-test and post-test difference.

Variable X = 48.74022989 ;
Variable Y = 24.76896552
Standard deviation X = 6.981420334 ;
Standard deviation Y = 4.976842927
Mean X = 30.46666667 ;
Mean Y = 39.3
Hypothesis
H0: μ1 = μ2; there is no significant average difference between the pre-test and post-test values.
H1: μ1 ≠ μ2; there is a significant average difference between the pre-test and post-test values.

Table 4. Statistical examination using the **two-tailed** average test method

$t = \frac{\bar{x}_1 - \bar{x}_2}{s\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = \frac{30{,}46666667 - 39{,}3}{6{,}062557069\sqrt{\frac{1}{30} + \frac{1}{30}}} = -5{,}643056633$
$s^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} = \frac{(30 - 1)48.74022989 + (30 - 1)\frac{24.76896552}{30 + 30 - 2}}{}$
$= 36{,}754597705$
$s = 6{,}062557069$

Table 5 describes the result indicating a **significant** average difference between the pre-test and post-test values.

Table 5. Statistics examination criteria

Accepted if H0 $-t_{\left(1-\frac{\alpha}{2}\right)n_1+n_2-2} \leq t \leq t_{\left(1-\frac{\alpha}{2}\right)n_1+n_2-2}$.
Rejected if H0 t < −t table or t > t table.
$t_{\left(1-\frac{\alpha}{2}\right)n_1+n_2-2} = t_{\left(1-\frac{0{,}05}{2}\right)30+30-2} = 2{,}00172$.
Because $-5{,}643056633 < -2{,}00172$. H0 rejected

Discussion

Physical activity is a crucial component of health promotion and illness prevention, and physical inactivity has been related to several chronic diseases and associated risk factors. (Warburton et al., 2006) (Melissa C. Kay, Dianna D. Carroll, Susan A. Carlson, 2012) Physical Activity guidelines have been created as a result of the most recent research to teach individuals about what is, in general, a minimal amount of physical activity that may be done to enhance health. (BENNETT et al., 2009) The goal is to improve knowledge, which should be represented in physical activity behavior in the best possible way. In 1975, "Guidelines for Graded Exercise Testing and Exercise Prescription" was published, which set the first physical activity recommendations. (Vaara et al., 2019) But, in this modernization, people lack time to get an easy way to know and improve their physical activity knowledge by journal or textbook. SPORTIF offering an effective way and enhance knowledge of the physical activity. The obtained results indicate that the physical activity knowledge improved after using the SPORTIF software. However, Knowledge itself is impossible to stimulate directly to a behaviour change, but awareness of required behaviour is the most significant reason for determining behaviour change. (Snyder, 2007) This study identified that the physical activity knowledge slightly improved. This study has implications for promotional health campaigns. Focus on the people in the lower educational and economic sectors in Indonesia. The other purpose is to develop an effective strategy to promote more comprehensive messages and easy-to-use related to physical activity guidelines. Campaigns need to straddle a thin line between messages that capture awareness and are informational and motivational. (*Change4Life One Year On London*, 2010) (*Change4Life Three Year Marketing Strategy.*, n.d.) An improved stipulation of information and opportunities for these groups to engage in physical activity was a target of the government campaigns. (*Change4Life Marketing Strategy*, n.d.) (DCMS/Strategy Unit., n.d.) The final result of this research is the product in the form of the Android-based physical fitness guide model. This research indicates that the presented physical fitness guide model is **feasible and effective at increasing knowledge of physical fitness**. The developed physical fitness guide provides some literacy education, motivation, and integration to help people have good physical fitness and not get quickly tired during their daily activities. To realize an increase in physical fitness knowledge and be accompanied by an all-digital age, an Android-based physical fitness guide model is needed to be implemented to increase knowledge of physical fitness in the community.

Conclusions

This study showed that the physical activity knowledge of the participants slightly improved. This study has implications for promotional health campaigns. Focus on the people in the lower educational and economic sectors in Indonesia. The other purpose is to develop an effective strategy to promote more comprehensive messages and easy-to-use related to physical activity guidelines. Campaigns need to straddle a thin line between messages that capture awareness and are informational and motivational. (Williams DM, Matthews C, Rutt C, 2008). Based on the data obtained through needs analysis, expert validation, and application testing, the researchers can conclude that making an Android-based physical fitness guide model can improve people's physical fitness knowledge. The model validated by physiologists, physical fitness experts, and software house. Development systems experts showed that the model was appropriate and could be implemented. In this study, the Android-based physical fitness guide model effectively increased public knowledge. Based on the trial results, there was a significant difference between the pre-test and post-test results. Therefore, the researchers concluded that an Android-based physical fitness guide model can be applied to athletes, practitioners, academics, and the general public.

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