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# Android - Based Sport Board Games for Intellectual Disabilities

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## ABSTRACT

This paper aims to develop suitable digital sport board games based on the android system. The system is used to improve motor performance and the creative behavior of the intellectual disabilities athletes. It also tries to evaluate the athletes' responses in practicing the games through the derived application. The application is adapted from the game card and board games in a mobile presentation from four sports: bocce, basketball, football, and table tennis. By applying the model to the intellectual disabilities athletes in Special Olympics Indonesia (SOINA) Surabaya, this research and development study employs ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model by focusing on expert appraisal and developmental testing steps. The results reveal that the CVR score is 0.97 (reliable), and the proportion is 93 % (excellent). Therefore, coaches and parents may implement this application to support their practices on daily bases.

**Keywords:** *sport board games, intellectual disabilities, motor performance, creative behavior*

## 1. INTRODUCTION

During this pandemic, many community activities are limited, so many people will likely be deprived of movement. Physical inactivity is in the top four causes of global death due to many comorbidities from underactive body conditions [1]. Unfortunately, apart from during a pandemic that requires people to limit their activities, many people do not realize the importance of adequate physical activity [2]. Many studies say that PA provides positive benefits for health [3], [4], [5].

The promotion of physical activity globally has been mandated through physical education (PE) in any aspect of life [6]. There has even been a paradigm shift in PE's function from improving physical fitness to promoting physical activity to achieve daily physical activity [7]. It means that globally there has reached a consensus that physical activity must be habituated since childhood. However, the results of research by Active Healthy Kids Global Alliance states that globally the physical activity of children is in category D (low/poor) [8]. Other research results show that 31.1% of adults in the world are still classified as inactive. Women are more passive than men; as many as 80.3% of adolescents are classified as active. They do moderate to vigorous-

intensity physical activity less than 60 minutes per day [9]. These data are in line with the condition of Indonesia; based on statistical data from the Ministry of Youth and Sports, and it is stated that Indonesian people still tend to be less active [10].

Apart from children and normal people, the problem of low physical activity also affects children with disabilities. Many research results show that people with intellectual disabilities who fall into the Down syndrome category tend to have a high BMI and low physical activity [11]. Besides, in general, people with Down syndrome tend to be overweight and even obese, resulting from inactive living habits [12]. This condition is worrying because it is clear that the consequences of inactivity and obesity are proven to correlate with health-related quality of life [13]. Especially for Indonesia, according to the Central Bureau of Statistics, the number of children with intellectual disabilities in Indonesia is classified as large. At least 48% of the total number of persons with disabilities is suspected of having intellectual disabilities [14]. This condition might be the source of health problems for those with intellectual disabilities.

To provide services to children with special needs, the Ministry of Women Empowerment and Child Protection of the Republic of Indonesia and Handling Children with Special Needs for Companions (Parents, Families, and Communities) explain special treatment characteristics for children with intellectual disabilities so that services are effective [15]. One of the services that must be fulfilled is the physical activity of children with intellectual disabilities. For this reason, there is a need for media to provide these services.

This article will explain an effort to provide physical activity fulfillment services to children with intellectual disabilities in the form of the Interactive Sports Board Games (ISBG) application. The application was developed based on the principle of board games but is realized in an android application for easy use during a pandemic. It is a game with signs played on a board and formed in such a way based on certain rules [16]. Board games are also known as games that provide recreational activities, played in groups, and can lead them to play in a competitive, cooperative, and collaborative way [17]. The form of this game is very free to change as needed. Even many interesting game forms were born from this game modification. Board games have been developed for educational purposes. At least by bringing up learning by utilizing games, it can bring a new learning atmosphere to students. So that students become comfortable in learning and enjoy the recreational process that is presented through board games.

It is no longer new if sports education is a place to educate children to achieve an adequate degree of physical activity and health. Historically, game-based learning and sports activities have been the dominant sports education curriculum design [18]. So, it is not new if sports education is carried out through games and sports activities. However, combining games and sports activities into board games is considered a new thing that needs to be tried to facilitate children in pandemic conditions. The contents of the sport board games that will be developed are interactive board games containing the following materials: (a) interactive basketball board games; (b) Interactive bocce board games; (c) interactive football board games; and (d) interactive table tennis board games.

Based on the explanation above, it can be stated that the purpose of this article is to explain the process of developing the Interactive Sports Board Games (ISBG) application to provide facilities for intellectual disabilities to carry out physical activities. The process description will also be complemented with the results of product validation tests by experts. These results are expected to provide an overview of the feasibility of developing products for use by intellectual disabilities, especially during a pandemic.

## 2. METHOD

Research and development methods are used in carrying out this research. The data analysis used was testing the validity of the product developed. Experts of intellectual disability education and web application were asked to carry out validation to assess product quality from five aspects: material, educational content, writing, interactive services, and product use [19]. They were asked to assess the development product. Then, the content validity ratio (CVR) formula was used to calculate the validity of the product developed. To check the CVR validity count results compared to the critical value of 0.3 [20]. Furthermore, the model quality questionnaire's value was analyzed using proportions to be categorized using standard categories for percentage values. The percentage values will be interpreted into categories using the standard percentage category rules, namely:  $0\% \leq \text{less} \leq 20\%$ ;  $20\% < \text{less} \leq 40\%$ ;  $40\% < \text{enough} \leq 60\%$ ;  $60\% < \text{good} \leq 80\%$ ;  $80\% < \text{excellent} \leq 100\%$  [21].

## 3. RESULT AND DISCUSSION

It can be explained that the results of the CVR analysis in the material aspect show the value of 1, which is declared 'feasible'. In the aspect of educational content, a CVR value of 1 is declared 'feasible'. In the writing aspect, the CVR value of 0.83 is declared 'feasible'. In the interactive service aspect, a CVR value of 1 is 'deemed appropriate'. In the aspect of product use, a CVR value of 1 is declared 'feasible'. Of the five aspects, the average CVR value of 0.97 is declared feasible. The experts' scores were analyzed using the proportion formula resulting in a percentage score of 93%, which is in the 'very good' category.

The method of testing the validity of development products carried out by experts is very suitable in determining product feasibility. The analysis of the expert's assessment results was selected using CVR, which is the degree of content validity that comes from the expert [22], which can be used to determine the validity of the product developed.

Apart from giving a quantitative score, the experts also commented on the quality of their rated products.

Expert-1 commented as follows:

*"In general, the products developed are good."*

Expert-2 commented as follows:

*"The development product for children with intellectual disabilities is an extraordinary breakthrough because there is no product specifically for sports with disabilities like the product that is being developed. However, it would be perfect if the product development can be improved by paying more attention to the content*

*provided for children aged 10-15 years. The segment of the product is an intellectual disability that requires more special treatment in the adaptation of motion (multilateral) according to a predetermined branch content. "*

**Table 1.** Results of Content Validity Ratio (CVR) Analysis from Expert Validation Results

Aspect	Statement	CVR
1. Material	1.1. The available material meets the requirements to be attractive to children with intellectual disabilities.	1.00
	1.2. The material presentation has met the requirements to be able to cultivate the attention of children with intellectual disabilities.	1.00
	1.3. The material has been arranged in the context of lessons related to educational content that is attractive to children with intellectual disabilities.	1.00
	1.4. The visual appearance of the material is sufficient to maximize the attractiveness of children with intellectual disabilities.	1.00
	1.5. Narrative, humor, games, or other forms are sufficient to increase the interest of children with intellectual disabilities.	1.00
	<b>Average aspects of the material</b>	<b>1.00</b>
2. Educational Content	2.1. The content is sufficiently educational for children with intellectual disabilities aged 10-15 years.	1.00
	2.2. The content is quite educational for children with intellectual disabilities.	1.00
	2.3. The existing educational messages allow children with intellectual disabilities to conclude.	1.00
	2.4. The possible content has been presented in a simple way for children with intellectual disabilities.	1.00
	2.5. The existing materials have made concrete things possible for children with intellectual disabilities.	1.00
	<b>Average aspects of Educational Content</b>	<b>1.00</b>
3. Writing	3.1. Writing makes it easy to read by children with intellectual disabilities.	1.00
	3.2. The size of the writing is suitable for children with intellectual disabilities.	0.33
	3.3. The colour of the writing and background is sufficiently contrast to make it easier for children with intellectual disabilities.	1.00
	3.4. The writing layout is quite easy for children with intellectual disabilities.	1.00
	<b>Writing aspect average</b>	<b>0.83</b>
4. Interactive Services	4.1. Interactive services allow children with intellectual disabilities aged 10-15 years to be used.	1.00
	4.2. The control device allows children with intellectual disabilities to be physically controlled.	1.00
	4.3. The navigation icon is clear, consistent, and easily understood by children with intellectual disabilities.	1.00
	4.4. "Hot-spot" placements are easy for children with intellectual disabilities to find and use.	1.00
	<b>Average aspects of Interactive Services</b>	<b>1.00</b>
5. Product Use	5.1. Can help children with intellectual disabilities in determining physical activity targets.	1.00
	5.2. Products can facilitate parents in assisting children with intellectual disabilities in activities.	1.00
	<b>Average Product Usage aspects</b>	<b>1.00</b>
<b>Overall</b>		<b>0.97</b>
<b>Percentage</b>		<b>93%</b>

Based on the content validity results and the expert comments, it can be stated that the product developed could be applied to the athletes with intellectual disabilities in SOINA Surabaya. It could also be said that this application could be applied to other children with intellectual disabilities in broader areas and can be focused on those aged 10-15 years.

Furthermore, those athletes respond positively to the implementation of the Android-based ISBG. This Android-based ISBG fosters both of their motor performance and creative behavior. Moreover, it also shows the improvement of speed in their physical activities, compared to their ordinary practices. They can move faster and become more active in their daily activities.

Additionally, the findings highlight that their attempts to practice using the Android-based ISBG show high integrity and independence. After a couple of practices, they could practice themselves, without the instruction and explanation from the parents. They practice routine at home by following the games and do not need any intensive instruction. Independence somehow also reflects on their daily life in doing their regular activities.

Coaches and parents may implement this application to support their practices on daily bases. The application is ideal for their limitations and triggers them to compete in the real sports environment.

#### 4. CONCLUSION

Physical activity is an essential variable in implementing a healthy lifestyle today for the entire global community, including athletes with intellectual disabilities. The Android-based Interactive Sports Board Games (ISBG) application is a vehicle for providing services for intellectual disabilities to do physical activities, especially in a pandemic. Following product validation results as a result of development, this product is declared suitable for use by people with intellectual disabilities.

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