Development of Vibration Sensor Media for Children with Special Needs at The Faculty of Sports Science, Medan State University

Deni Rahman Marpaung¹, Rima Mediyana Sari¹, Usman Nasution¹, Ade Ros Riza¹, Sinung Nogroho¹ and Fitri Winda Nababan¹

¹Faculty of Sports Science, Medan State University, Indonesia

rahmanmarpaung@gmail.com, soberrssoul@gmail.com, usmanejirizma@gmail.com, adesitepu@gmail.com, sinungnugroho5@gmail.com, fitri.wnababan@gmail.com

Abstract. The purpose of this research is to describe the vibration sensor media as a learning medium for sprint competitions for blind children and to assist teachers and students in learning using vibration sensor media. This research was conducted in several steps, namely: identifying potentials and problems, gathering information, product design, product manufacturing, expert validation, product revision, testing, final production. This vibration sensor media as a learning medium for sprint competitions was first validated by material experts and media experts. Product trials were carried out on blind children in DPD Pertuni Medan with a population of 6 respondents. The small group test was 2 respondents, while the large group test was 6 respondents. This type of data collection used a questionnaire instrument. The results showed that the vibration sensor that has been made for learning sprint competitions was feasible. These results were obtained from the validation results of a) material experts at 92.5% or very feasible; b) media expert of 86.66% or Very feasible; c) small group trial of 92.5% or very feasible; d) large group trial with a result of 95% or very feasible. The vibration sensor media has been declared fit to use as a learning media for vibration sensor media.

1. Introduction

The Directorate of Special Education [1] explains that children with disabilities/children with special needs are individuals who have disabilities in physical, mental, and social functions but have the same rights in life activities, including getting adaptive physical education/sports education.

Adaptive physical education/sports education is a special part of physical education developed to provide programs for individuals with special needs. The development of the physical education program includes:

a. Adjusted physical education (adapted physical education)
   Physical activities are modified to enable individuals with disabilities the opportunity to participate in safety, success and gain satisfaction

b. Cognitive physical education (Remedial Physical Education)
   Modified physical activity to correct postural dysfunction and body mechanics

c. Physical education development
Physical activity refers to a progressive fitness program or large muscle training to increase the physical abilities of the individual to the level of or close to that of his peers. Special physical education in short is a special section in physical education/sports education developed to provide programs for individuals with special needs. Special physical education is part of physical education itself. Adaptive physical education systems are used in learning with comprehensive delivery. This system is used to solve and find problems in the student psychomotor domain.

Sports education that is given to children with special needs is a tool to help them continue their life, both physically and spiritually [2]. Syarifudin [3] states that education is the development of the individual through the learning process as a difference from physical growth. Education is not learning to do but making children know what to do. Besides, Nadisah [4] stated that education is a guide to human growth from birth to adulthood, in a spiritual and physical sense.

Children with special needs should get more attention, especially in the field of sports, especially athletic sports, because they have limitations in some way. Many children with special needs have participated in learning to exercise in athletic sports or have joined the achievement team in athletic sports, especially running numbers. One of the children with special needs who attended the training was a blind child.

Blind is someone who is retarded or has lost the ability to see. According to Putranto[5]children with visual impairment are children who because of something from their vision have suffered injuries or damage, both structural and / or functional, so that their vision does not function properly. Blindness can be interpreted as a state of vision loss which results in a person unable to perceive various stimuli, especially in his sense of sight. Blind children are like other normal children who yearn for a decent life and smooth growth and development. Therefore, children with visual impairments and other children with disabilities need special care to guide them to grow and develop according to what they desire. Recognizing that children with special needs (ABK) are unique individuals. This uniqueness implies that ABK has special characteristics or characteristics that differ from one another, both in terms of abilities, talents, interests, and learning styles.

Blind children have limited vision, so in terms of doing the learning, especially in sports education in athletics (running) or also training in running numbers, someone needs a running guide (guide runner). The duties of the guide runner are as follows: must be able to equalize the steps, equalize the swing, so that it is aligned, which takes time so that the physical education guide or teacher has the same as the blind child.

The guide and teacher said that the obstacles faced were not only in interaction, it took extra patience to teach children with hearing and visual impairments because the interaction between teachers and students used sign language. Other difficulties very often occur not only during learning and training, especially at the most important moment, namely the competition. Children with special needs, especially blind children, find it difficult to determine the direction of the running path, so they need a running guide/guide. Not infrequently the guides also find it difficult to keep up with the child's running speed and interfere with the child's beauty, and this is very disturbing to the child's running speed. So that researchers feel the need for a motion sensor design that makes it easier for children to help determine the running direction for blind children and early running for deaf children.

2. Method
The research design used in this study is research and development. Sugiyono [6], Setyosari [7] states that research and development research methods are research methods used to produce certain products and test the effectiveness of the product. The subjects used in this study were 6 children with special needs. The research procedure used can be seen in the image below:
3. Research Results and Discussion

3.1 Research Results

From the analysis of the needs that have been carried out on 6 children with special needs, in this case, blind children, information was obtained that 100% of blind children carry out any sports learning given by Physical Education teachers, 100% of teachers have provided short distance running learning material to blind children, 83.3% of children blind children felt that the short distance running learning applied by the previous teacher has not been effective and efficient in achieving learning goals, 83.3% of blind children have difficulty receiving instructions from the teacher, 100% of blind children answered that when learning was taking place the teacher had not used modified media to provide instructions. These children, 83.3% of blind children need assistive media to receive effective and efficient instructions to achieve learning perfection.

From the needs analysis carried out, it could be concluded that the idea of this research was that there was a great need for assistive media for learning short distance running for blind children to help provide intrusion so that learning did not run manually anymore (the teacher gave voice instructions, directs with hand movements, and students do independently). With the media for learning, short distance competitions using this remote control could help teachers provide more effective and efficient instructions to achieve learning goals.

3.1.1 Testing of Material and Media Experts. The first test was carried out after the initial design or the design of the media model has been observed, correlated, and declared worthy of being tested by experts, both material experts, and media experts. Evaluation was carried out to improve and perfect the media for short distance competition that has been made.

| No | Rated aspect                                                                 | Score Obtained | Maximum Score | Percentage (%) | Category        |
|----|------------------------------------------------------------------------------|----------------|---------------|----------------|----------------|
| 1  | Product compatibility with the needs of students and teachers                | 19             | 20            | 95%            | Very Worth it  |
| 2  | Suitability of the product with learning objectives                          | 18             | 20            | 90%            | Very Worth it  |
|    |                                                                               | 37             | 40            | 92.5%          | Very Worth it  |
Figure 2. Material Expert Result Data

Table 2. Data on Results of "Vibration Sensor Media for Short Distance Contest for Blind Children"
Tool / Media Expert

| No | Rated aspect | Score Obtained | Maximum Score | Percentage (%) | Category       |
|----|--------------|----------------|---------------|----------------|----------------|
| 1  | Design       | 17             | 20            | 85%            | Very Worth it  |
| 2  | Display      | 16             | 20            | 80%            | Well worth it  |
| 3  | Security     | 19             | 20            | 95%            | Very Worth it  |
|    | Total score  | 52             | 60            | 86.66%         | Very Worth it  |

The data generated from the material expert validator was 92.5% and from the media, expert validator was 86.66%, thus it was stated that the "short distance race vibration sensor media for blind children" made from the aspect of needs received an assessment of the category "very feasible".

3.1.2 Testing of Blind Respondents or Children

3.1.2.1 Small Scale Trial
The results of a questionnaire of respondents or visually impaired regarding "Vibration Sensor Media for Short Distance Contest for Blind Children" showed that for the assessment of the Display aspect of 87.5% which was categorized as "Very Appropriate", the assessment of the aspect of Comfort was 90.5% which was categorized as "Very Appropriate", implementation aspects of 84.3% which were
categorized as "Very Appropriate". The total assessment of the feasibility test of the research "Vibration Sensor Media for Short Distance Contest for Blind Children" according to respondents was 92.5% categorized as "Very Appropriate" which showed that the media was very feasible to be tested on the next stage after product revision.

The data below was a small-scale trial conducted on 2 young blind respondents.

Table 3. Results of Small Scale Trial Questionnaire Conducted on Jalan Sambul, DPD Pertuni North Sumatera

| No | Rated aspect | Score Obtained | Maximum Score | Percentage (%) | Category          |
|----|--------------|----------------|---------------|----------------|-------------------|
| 1  | Display      | 14             | 16            | 87.5%          | Very Worth it     |
| 2  | Comfort      | 29             | 32            | 90.5%          | Very Worth it     |
| 3  | Implementation | 31           | 32            | 96.8%          | Very Worth it     |
|    | Total score  | 74             | 80            | 92.5%          | Very Worth it     |

Figure 4. Small Scale Trial Questionnaire Results

3.1.2.2 Large Scale Trial

The data below was a large-scale trial conducted on 6 young blind respondents.

Table 4. Results of the Large-Scale Trial Questionnaire Conducted at the UNIMED Stadium

| No | Rated aspect | Score Obtained | Maximum Score | Percentage (%) | Category          |
|----|--------------|----------------|---------------|----------------|-------------------|
| 1  | Display      | 43             | 48            | 89.58%         | Very Worth it     |
| 2  | Comfort      | 91             | 96            | 94.79%         | Very Worth it     |
| 3  | Implementation | 94           | 96            | 97.91%         | Very Worth it     |
|    | Total score  | 228            | 240           | 95%            | Very Worth it     |
The results of a questionnaire of respondents or blind children regarding "Vibration Sensor Media for Short Distance Contest for Blind Children" showed that for an assessment of the Display aspect, 85.41% was categorized as "Very Appropriate", an assessment of the Comfort aspect was 98.95% which was categorized as "Very Appropriate", the assessment of aspects of the implementation of 97.91% which were categorized as "Very Appropriate". The total assessment of the feasibility test of the research "Vibration Sensor Media for Short Distance Contest for Blind Children" according to respondents was 95.83% categorized as "Very Appropriate" which showed that the vibration sensor media in short distance competition learning was very feasible to be used as a learning medium for short-distance competitions for blind children.

Based on the data obtained in this study, the data analysis was carried out carefully and thoroughly with the analysis of the data obtained, which resulted in the following things. (a) Based on the records of material experts and media/tools experts, it was decided to make a revision, namely additional improvements to replace the cables on the receiver and reduce the size of the receiver in the right position or on the right arm (b) after many validations and revision stages were carried out In the
validation of this product, it was declared feasible and allowed to carry out the small-scale trial phase on 2 participant respondents from blind children from Pertuni, there were no shortages so it was continued to large-scale trials of 6 respondents from children with visual impairments from Pertuni. (c) based on small-scale and large-scale trials, the test results were in the “Very Eligible” category. The results of the data obtained were interpreted according to predetermined categories. The categories used in this development research were divided into several parts, namely the values 0% - 20% were categorized as very inappropriate, 21% - 40% were categorized as not feasible, 41% - 60% was quite feasible, 61% - 80% were categorized as feasible, and 81-100% were categorized as very feasible.

3.2 Research Discussion
This short distance race vibration sensor media for blind children is designed and produced into an initial product in the form of a short distance race vibration sensor medium for blind children. The manufacturing process goes through research and manufacturing procedures. Through some planning, production, and evaluation. Then the product is made with the help of someone who masters the technique, after the initial product is produced, it needs to be evaluated by experts through expert validation and it needs to be tested on blind children. Furthermore, this research stage is carried out by small-scale trials and large-scale trials.

The quality of “Vibration Sensor Media for Short Distance Contest for Blind Children” was included in the "Very Appropriate" criteria. The statement could be proven from the results of the analysis of the assessment of the two experts, both material experts, and media/tools experts, as well as in small and large scale trial assessments. Blind children felt happy and enthusiastic about this product because respondents were interested in trying to operationalize this product. This product can be distributed to other media. The test results could be described in the following discussion.

3.2.1 Testing of Material Experts
The result of the material expert validator was 92.5%, thus stating that the short-distance race vibration sensor media developed from the aspect of the need for assessment of the category "Very Appropriate”. Which showed that the short distance competition learning media was suitable to use as a learning aid medium for the future.

3.2.2 Testing of Media Experts
The data generated from the media expert validator was 86.66%, thus it was stated that the vibratory sensor media created from the aspect of needs receives an assessment of the "Very Appropriate” category, which showed that the vibration sensor media for short distance competition was suitable for use as a learning medium for the future.

3.2.3 Small Scale Trials
The results of a questionnaire of respondents or blind children regarding "Vibration Sensor Media for Short Distance Contest for Blind Children” showed that for an assessment of the Display aspect of 87.5% which was categorized as "Very Appropriate”, an assessment of the aspect of Comfort was 90.5% which was categorized as "Very Appropriate", Aspects The implementation of 96.8% which was categorized as "Very Appropriate" The total assessment of the feasibility test of the research "Vibration Sensor Media for Short Distance Contest for Blind Children” according to the respondent 92.5% was categorized as "Very Appropriate" which showed that the learning media for this short distance competition was suitable to use as a medium. It was learning ahead.

3.2.4 Large Scale Trials
The results of a questionnaire of respondents or athletes regarding "Vibration Sensor Media for Short Distance Contest for Blind Children” showed that for the assessment of the aspect of Display 85.41%
which was categorized as "Very Appropriate", assessment of the aspect of Comfort was 98.95% which was categorized as "Very Appropriate", assessment of aspects Implementation of 97.91% which is categorized as "Very Appropriate". The total assessment of the feasibility test of the research "Vibration Sensor Media for Short Distance Contest for Blind Children" according to respondents was 95.83% which was categorized as "Very Appropriate" which showed that the vibration sensor media in short distance competition learning was very suitable to use as a learning medium for short-distance competitions for blind children.

Adaptive physical education is education that provides opportunities for students with special needs to be able to actualize physical activities through directed and planned activities in learning programs[8], [9]. We know that children with special needs need help to be able to exercise well, especially in short-distance running competitions. These assistive media are created and developed to help them or children with special needs focus on blind children in fulfilling their needs in sports. According to Tarigan[10]blindness is a visual impairment in the form of blindness or partially.

The design of the tool media in the form of a vibration sensor is very good to use because it does not interfere with their activities in running and so the vibrations generated by the device helps them in determining the direction according to the instructions of their teacher or coach. Using the media as a tool for learning or also to train someone is very important, especially for blind children who experience disturbances in their sense of sight. Kemp and Dayton [11]suggest several research results that show the positive impact of using media as an integral part of classroom learning, or as the main way of direct learning, as follows:

1) Delivery of learning is not rigid
2) Learning can be more interesting
3) Learning media is more interactive
4) Length of study time can be shortened
5) The quality of learning outcomes can be improved if the interaction of words and images as a learning medium can communicate elements of knowledge in a well-organized, specific, and clear manner.

The vibration sensor media for short distance running competitions for blind children was designed and produced as an initial product in the form of a vibration sensor for short distance running competitions for blind children. The manufacturing process went through research and manufacturing procedures. Through some planning, production, and evaluation. Then the product was made with the help of someone who mastered the technique, after the initial product was produced it needed to be evaluated by experts through expert validation and it needed to be tested on children with visual impairments. Furthermore, this research stage was carried out by small-scale trials and large-scale trials.

The quality of "Vibration Sensor Media for Short Distance Contest for Blind Children" was included in the "Very Appropriate" criteria. The statement could be proven from the results of the analysis of the assessment of the two experts, both material experts, and media/equipment experts, as well as in small and large scale trial assessments. Blind children felt happy and enthusiastic about this product because respondents were interested in trying to operationalize the vibration sensor media. This product can be distributed to other media.

4 Conclusion

Learning short distance running competitions using vibration sensor media is more effective and efficient for children with visual impairments and can make it easier for teachers to carry out learning, especially in providing instructional learning for short distance running competitions. Then the vibration sensor media is designed to be able to attract blind children so that they are more motivated during learning.
References

[1] Kemendikbud 2019 *Pedoman Pelaksanaan Belajar Anak Berkebutuhan Khusus* (Jakarta: Balai Pustaka)

[2] Hazal F 2016 *Analisis Kesalitan Dalam Pembelajaran Penjas Pada Anak Berkebutuhan Khusus di Sekolah Yayasan Penyantun Penyandang Cacat (YYPC) Kota Banda Aceh* (Jurnal Penjas Vol. 3)

[3] Syarifudin A 2009 *Olahraga Pendidikan untuk Anak Lemah Ingatan* (Jakarta: Departemen Pendidikan dan Kebudayaan)

[4] Nadiyah 2002 *Pengembangan Kurikulum Pendidikan Jasmani dan Kesehatan* (Bandung: Departemen Pendidikan dan Kebudayaan)

[5] Putranto B 2015 *Tips Menangani Siswa yang Membutuhkan Perhatian Khusus* (Yogyakarta: Penerbit DIVA Press)

[6] Sugiyono 2017 *Metode Penelitian & Pengembangan R&D* (Bandung: Alfabeta)

[7] Setyosari P 2013 *Metode Penelitian Pendidikan dan Pengembangan* (Jakarta: Prenda Media Group)

[8] Rahayu, Trisna and Ega 2016 *Strategi Pembelajaran Pendidikan Jasmani* (Bandung: Alfabeta)

[9] Taryatman A R 2018 *Pengembangan Model Pembelajaran Pendidikan Jasmani Adaptif Bagi Anak Berkebutuhan Khusus* (Jurnal Pendidikan vol 4)

[10] Tarigan B 2000 *Penjas Adaptif* (Jakarta: Departemen Pendidikan dan Kebudayaan)

[11] Kemp J E. and Dayton D K 1985 *Planning and Producing Instructional Media* (Cambridge: Harper & Row Publishers, New York)

Acknowledgements

Our gratitude goes to all who contributed to this research, and the organizers of the publication of this paper.