



Development of Reaction Motion Training Tools for Children with Hearing-Impaired in Central Java Special School in 2019

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Abstract

People with hearing impaired who experience loss of listening ability require physical education which provides opportunities for deaf children to take advantage of physical activities to develop and improve neuromuscular, perceptual, cognitive, and emotional levels. This study used a procedural development model, where the model in this study is descriptive, which is a procedure that outlines the steps that must be followed in producing a product. The research subjects carried out in this study were divided into 2 groups. One group in the trial phase 1 and the second group in the trial phase 2. The results of this study were the results of the validation test by the early-stage material experts got an average percentage of 72.22% good criteria. The results of the validation of the electrical experts got an average percentage of 77.55% good criteria. The results of the second stage of validation by hearing-impaired experts got an average percentage of 90.24% outstanding criteria and the average percentage results by electro experts got 92.5% perfect criteria. The results of the small scale try out of 12 children with hearing-impaired got a percentage score of 64.28%. Category "Appropriate". The results of large-scale trials of 45 students from 3 different special schools got an average percentage score of 91.58 in the "Very Appropriate" category. The results of large-scale trials of teachers got an average percentage of 95.26% very feasible criteria. The conclusion from the skill tool to train reaction skills is excellent and suitable for use by deaf children.

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INTRODUCTION

Education is given to all humans without seeing normal children and children with special needs. Furthermore, educational services do not look educational, emotional, and intellectual. The aim of national education is the development of the potential of students to become human beings who believe and fear the one and only God, noble, healthy, knowledgeable, competent, creative, independent, and responsible (Nurbayani, 2017).

Physical education is an inseparable part of other education. With physical education in schools, the role of education can be pursued to develop individual personalities. Without physical education, the education process in schools will not run in a balanced manner. The real contribution of physical education is to develop students' (psychomotor) skills. The problems (Bhakti & H. Cahyo Yuwono, 2015) about adaptive physical education is an individual program that includes physical fitness, movement fitness, basic movement patterns and skills, skills in water activities, dancing, sports games both individually and in teams designed for people with disabilities (Friskawati, 2014).

Physical education of children with a hearing impairment has problems, such as the lack of development in educational potential as well as obstruction of instructions understanding on physical activities provided by Physical Education teachers. These problems are also influenced by Physical Education learning because it is not supported by the level of creativity and innovation in developing learning models while the facilities and infrastructure are quite adequate. This is the same as what was conveyed by the teaching teacher (Mujianto, 2015). Physical education is a medium way to encourage motoric development, physical abilities, knowledge, and reasoning, appreciation of values (attitudes, mental, emotional, spiritual, and social), as well as habituation to a healthy lifestyle that leads to stimulating growth and development (Ardi, Hartiwan, and Pujianto 2013).

Effective learning is the use of appropriate learning methods and media that related to the subject matter that is being conveyed by a teacher to students. One of them is the use of computers as learning media through multimedia learning. Multimedia learning provides the opportunity to learn more than one learning source from the teacher, but provides opportunities for learning subjects to develop cognitive abilities better (Sukiyandari & Soegiyanto 2014).

Disabled is seen as an acronym for the term "differently-abled" (not a different ability as some people said). So this term comes from English which means "people who have different abilities". According to Zola, the term differently-abled was coined to emphasize "the can-do" aspects of having a disability (Maftuhin 2017). Persons with disabilities are every person who experiences physical, intellectual, mental, and/or sensory limitations for a long period of time who is interacting with the environment can experience obstacles and difficulties to participate fully and effectively with other citizens based *on equal rights* (Millati 2016).

Deaf are those who do not lose hearing either partially (hard of hearing) or completely (deaf) which causes they have no functional value in hearing for everyday life and hearing impairment can be interpreted as a state of hearing loss when a person unable to pick up on various stimuli, through his sense of hearing (Zulmiyetri 2017).

Reaction speed is the time taken from the initiation of a stimulus to a conscious movement reaction. In the implementation of motor actions or sports movements there are 5 senses to receive information, such as: visual (vision), acoustic (reasoning), tactile (skin), kinesthetic (muscle), and vestibular (means of balance) (Rahmatullah & K, 2013). Inclusive education is an education system that prioritizes services according to the needs of students with special needs. One form of educational service that is tailored to the constraints and needs of students with special needs is a special needs program. Special needs programs are very important for students, in addition to problems solving in the teaching and learning process, they are also used as intermediaries in adjusting to an inclusive environment. Therefore the special needs program is an activity that must be carried out in organizing an inclusive education system (Firdaus & Madechan, 2016).

The very rapid development of technology today has brought us to the era of modernization. Almost all aspects of human life are very dependent on technology, this is because the technology was created to help make it easier for humans to complete an activity/job. (Kurniawan, Suhery, & Triyanto, 2013).

Advances in science and technology cannot be avoided along with the times. The expansion of science and technology in the field of sports is no exception, which is experiencing more and more rapid development, like the relationship between one field and another (Rachman, Sulaiman, & Rumini, 2017).

Researchers conducted observations in 10 special schools in Central Java and North Sumatra and discussed them with teachers. Interview process with 10 teachers conducted on January 10, 2019. 1) Surmantono: Children with hearing impaired are good enough at doing every movement taught, but they were lacking in reacting. 2) Tri Hardianto: Lack of facilities and infrastructure to support children with hearing impaired reaction skills. 3) Silfi Ayu: Lack of motivation and attractiveness of children with hearing impaired towards existing facilities so

that they were weary quickly in carrying out learning activities. 4) Desi Nur Zunaisa: There were no development tool to help train children with hearing impaired reaction movement skills so that reaction movement skills cannot be measured. 5) Trisusanti: The availability of tools to train movement skills have not developed, so that practicing movement skills is only driven by one traditional tool. 6) Yanti Mawangsari: There were no supporting facilities to train reaction skills. 7) Aryana Agung Sulisty: Children with hearing impaired find it very difficult to arouse their will to practice reaction movement skills because they were not interested in same training tool. 8) Prima Satria: There were a lot to be developed in order to help children with hearing impaired to get better reaction movements. 9) Dani Rahman: There was a need to develop tools to train children's reaction movement skills. 10) Ardiansyah: Means to train reaction skills are less supportive.

The movement skills for reactions to children with hearing impaired were lacking, seen from the results of interviews, which have an impact on the deafness' activeness in their daily activities.

Table 1. Interview Results Needs Analysis for Development of Reaction Movement Skills Training Tools for Special School Children in Central Java and North Sumatra

Number	Name	Status	School	City	Required	
					Yes	Tidak
1.	Surwantono	Movement Skills Teacher	Slb Pelita Ilmu	Semarang	✓	
2.	Tri Hardianto	Movement Skills Teacher	Slb Pelita Ilmu	Semarang	✓	
3.	Silfi Ayu	Movement Skills Teacher	Slb Swadaya	Semarang	✓	
4.	Desy Nur Zunaisa	Movement Skills Teacher	Slb Swadaya	Semarang	✓	
5.	Tri Susanti	Movement Skills Teacher	Slb Widya Bhakti	Semarang	✓	
6.	Yanti Mawangsari	Movement Skills Teacher	Slb Widya Bhakti	Semarang	✓	
7.	Aryana Agung Sulisty	Movement Skills Teacher	Slb Karya Murni	Medan	✓	
8.	Prima Satria	Movement Skills Teacher	Slb Widya Bhakti	Medan	✓	
9.	Dani Rahman	Movement Skills Teacher	Slb Abdi Kasih	Medan	✓	
10.	Ardiansyah	Movement Skills Teacher	Slb Abdi Kasih	Medan	✓	

The results of the researcher interview with the teacher and the development of existing media, the researcher got the idea of making an innovative tool to train reaction movement skills so that children with hearing-impaired get maximum learning results.

METHOD

This research was development research which is usually referred to as research-based development (Sugiono. 2010: 297). This study aimed to develop a tool for practicing reaction movement skills with biometric sensors and LED lights that are used to train reaction movement skills for children with hearing impaired. The development procedure according to (Borg & Gall 1983), described ten steps of implementing the research and development strategy as follows 1) Research and data collection (research and information collecting) 2) Planning 3) Development of a product draft (develop a preliminary form of product) 4) Preliminary field testing (preliminary field testing) 5) Revising the results of the trials (main product revision) 6) Field testing (main field testing) 7) Improving the product results from field tests (revision of product) 8) Testing the field implementation (operational field testing) 9) Completion of the final product (final product revision) 10) Dissemination and implementation. This study used a procedural development model, where the model in this study was descriptive, which was a procedure that outlines the steps that must be followed in producing a product.

The expression above the research intended to conduct research on developing tools to train reaction movement skills for children with hearing impaired with tools to practice reaction movement skills which were expected to be input to movement skills teachers.

RESULT AND DISCUSSION

The product produced in this research is a tool to train deaf children's reaction skills. This training tool contains components that are safe for children in the field. In this tool, teachers also make it easier to increase interest in deaf children's movements. The product developed by the researcher in the form of a tool to train deaf children's reaction skills. This development product was in the form of a tool to train reaction movement skills adopted from let's dance. This training tool contained components that are safe for children in the field. In this tool, teachers also make it easier to increase interest in children with hearing impaired movements. Products developed through the problem identification stage and what kind of needs actually need to be displayed in the observation process carried out in several SLB schools and interviews with several teachers. There were changes in content and appearance from the initial product design draft to the final product after going through revisions from experts. Products developed through the problem identification stage and what kind of needs actually need to be displayed in the observation process carried out in several SLB schools and interviews with several teachers. There were changes in content and appearance from the initial product design draft to the final product after going through revisions from experts. Descriptive notes were used to record and record all events carried out during the study. Meanwhile, reflective notes contain reflections on various events that took place. Reflection related to the provisions that should be in the process of implementing the related-use trial in terms of knowing the effectiveness of the product development of the training tool, the trial takes place recording and taking pictures as an effort to meet the adequacy of references and documentation.

The first stage is to determine the product specifications to be developed. After determining the product development specification criteria and the required components, the next step is to make the initial product through the design and production process. The initial product produced was the development of a tool to train the deaf children's reaction skills developed in the following steps:

Analysis of the objectives and characteristics of the product

Analysis of usage and usage characters

Establish product specifications

Setting product goals.

Checking the validity of the data was carried out by the researcher so that the data that had been obtained could be accounted for its validity, there were 6 aspects and criteria in the development of the training tool for reaction movement skills which was used as a guide, including:

1. Originality aspect, the work of researchers with a new design among children with hearing impaired.

2. Aspects of Excellence Innovation, the advantage and quality was automatic through an electronic system using biometric sensors.

3. The usability aspect, a useful power that can be used by children with hearing impaired in training reaction movement skills.

4. Economic aspects, a positive impact on technological developments in sports education for children with hearing impaired at an affordable price.

5. Safety and comfort aspects, the tools used were environmentally friendly, each student is easy to adjust so that it was safe for children with hearing impaired to use.

6. Completeness spec, this tool has a timer, sound alerts, light and digital accounting. The tool will change colors when the student stepped on the lighted part and the tool is equipped with an initial level using a sensor.

This following were the initial products before being validated by a team of experts:



Figure 1. Tool for Practicing Reaction Movement Skills

1. The initial product was designed for use and also tested whether this product is suitable, can be used, and also that each series that was installed can function properly.

2. The product was made using a mattress that has a thick, elastic, and non-slip layer even when the shoes or feet were wet.

3. The product used a biometric sensor, a timer, a green LED light that indicates start or start, and a red cover that indicates stop or stop.

4. Digital accounting displayed were designed according to needs

5. The purpose of this tool is to help children with hearing impairment practice their motor reaction skills and the tool is easy to reset when using the tool.

The product of developing tools to train the reaction skills of children with hearing impaired before the small-scale trial required validation of the tools by an expert first. Tool validation was done to test the validity level of the tool before conducting the trial. The validity of the tool involved 4 expert validators, they are 2 electro experts and 2 hearing impaired experts. Validation was carried out by a team of experts by observing the product development tool to train the children's reaction skills, accompanied by an evaluation sheet along with a sheet of suggestions and input. The evaluation sheet was in the form of a questionnaire that contains aspects of product quality. The suggestion sheet was used as a revision as well as the input given

to the researcher regarding the tools being a 1-4 rating scale with the following developed. The evaluation results were in the classifications: form of values for aspects of product quality using

Table 2. Percentage Classification

Percentage	Classification	Meaning
75 – 100%	Very Good	Very Appropriate
50 – 75%	Good	Appropriate
25 – 50%	Satisfactory	Need to Improve
0 – 25%	Unused	Can not used

Source: Sugiyono in adiska (2017:68)

Table 3. Results of 1st Phase Validation by Deaf Experts

Experts	Score Total	Percentage	Criteria
A1(Dini Firman Hidayah S.Pd)	27	75%	Good and Very Appropriate
A2(Setya Nungrahaning)	25	69,44%	Good and Very Appropriate

Based on the results of the evaluation of each experts, the total score was obtained which is described as follows:

1. Firman Hidayah S.Pd
2. Setya Nungrahaning

From the results of the first stage product validation, it was found that the product met the

good criteria, but the conclusion from the first stage the product was not feasible to be tested on a small scale because it still needed to be added to the LED light on the on/off button, the light at the start, the lamp when finished, and when the lights were at level 1,2 and 3. can function properly.

Table 4. Results of 1st Phase Validation by Electro Experts

Experts	Score Total	Average	Criteria
B1 (Dr. Djuniadi)	27	67,5%	Good and very appropriate
B2 (Dr. I Made)	35	87,5%	Very good and very appropriate

The results of the 1st phase validation by an electrico expert got the average percentage of an expert I and expert II of 77.5% including the

criteria for good and suitable for use with several revisions of the product.

Table 5. Results of Phase II Product Validation by Deaf Experts

Experts	Score Total	Percentage	Criteria
A1(Dini Firman Hidayah S.Pd)	33	91,6%	Very good and very appropriate
A2(Setya Nungrahaning)	32	88,89%	Very good and very appropriate

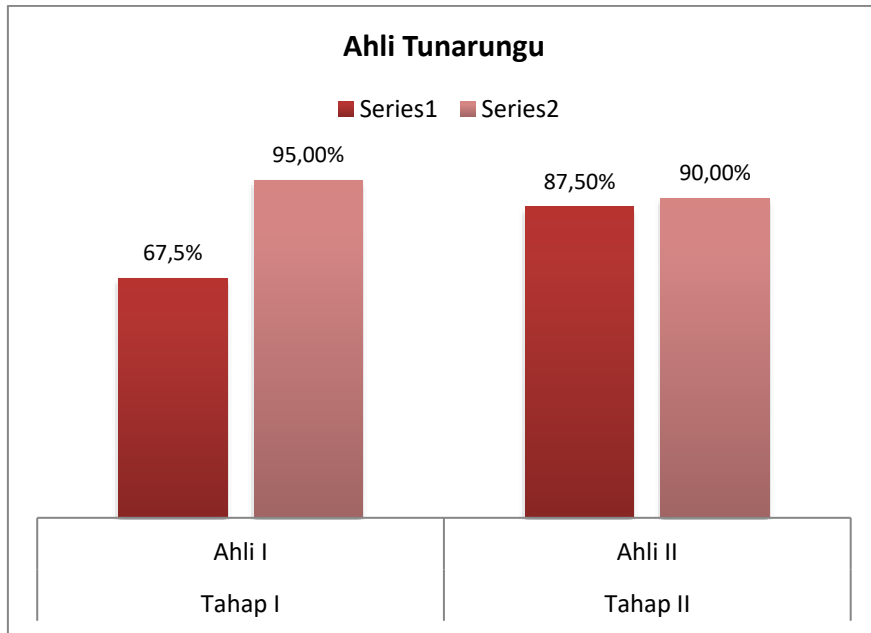


Figure 2. Comparison graph of the results of the validation results of the stage I and stage II deaf experts

Table 6. Results of 2nd Phase Validation by Electro Experts

Experts	Score Total	Average	Kriteria
B1 (Dr. Djuniadi)	38	95%	Very good and very appropriate
B2 (Dr. I Made)	36	90%	Very good and very appropriate

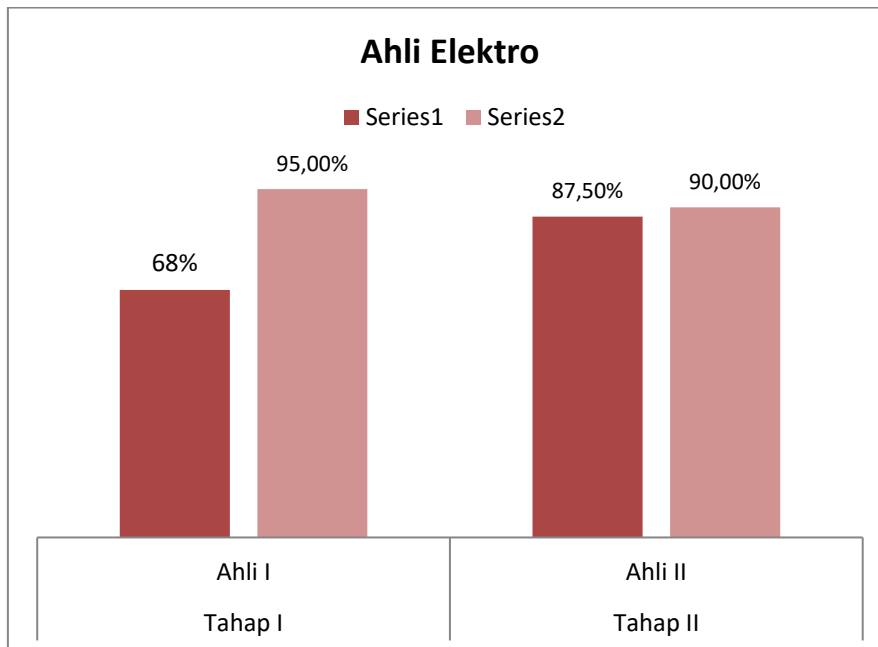


Figure 3. Comparison graph of the results of phase I and stage II electrical expert validation

Product revisions were carried out before product testing or small-scale trials. Based on revisions and suggestions from experts on the development of a tool to train movement skills, revisions were made in the LED light section due to the lack of lights on the on / off button, lights when started, lights when finished, and lights at level 1,2,3 and 3.

The product developed by the researcher in the form of a tool to train children's reaction skills. This development product was in the form of a tool to train reaction movement skills adopted from let's dance. The next stage that will be carried out by the researcher is to make a product through stages, as follows: (1) collecting information in order to find the problems that occur so that these problems can become a potential that becomes the basis for researchers to make research concepts; (2) developing the initial product form, in the form of a tool design model to train the reaction skills of children with hearing impairment; (3) expert validation, carried out by electro experts and deaf experts; (4) product

revision, carried out by electro experts and deaf experts; (5) testing, testing of the products produced, both from small-scale trials and large-scale trials; (6) product revisions, carried out by experts in order to get the perfect product; (7) the final product, improving the product to be effective and producing the product expected from the development of a tool to train the reaction skills of children with hearing impairment.

The small group trial assessment of 12 athletes got a score of 216 out of a maximum score of 336 with a percentage of 64.28%. With this percentage, the product of developing tools for developing tools to train the reaction skills of children with hearing impaired was included in the "Proper" category.

The large-scale trial was carried out on 45 special school students consisting of SLB Swadaya, SLB Darmamulia, SLB Muhammadiyah Surya Gemilang. The results of large-scale trial research data are as follows:

Table 7. The results of large-scale trials

Subject	Score obtained	Maximum Score	Percentage	Category
SLB Swadaya	466	504	92,46%	Very Appropriate
SLB Darmamulia	413	448	92,18%	Very Appropriate
SLB M Surya Gemilang	278	308	90,255	Very Appropriate

From the table above, in the large-scale trial, the assessment of 45 students from 3 different special schools got a total score of 1154 from a maximum score of 1260, with a percentage of 91.58%. With this percentage, the product of developing tools for developing tools to train reaction skills for deaf children is included in the "Very Appropriate" category.

The large-scale trial assessment of 3 teachers who came from 3 different special schools got a total score of 103 from a maximum score of 108, with a percentage of 95.25%. With this percentage, the product development tool to train the reaction skills of deaf children is included in the "Very Appropriate" category.

CONCLUSION

The results of this study were the results of the validation test by the early-stage material experts got an average percentage of 72.22% good criteria. The results of the validation of the electrical experts got an average percentage of 77.55% good criteria. The results of the second stage of validation by hearing-impaired experts got an average percentage of 90.24% outstanding criteria and the average percentage results by electro experts got 92.5% perfect criteria. The results of the small scale try out of 12 children with hearing-impaired got a percentage score of 64.28%. Category "Appropriate". The results of

large-scale trials of 45 students from 3 different special schools got an average percentage score of 91.58 in the "Very Appropriate" category. The results of large-scale trials of teachers got an average percentage of 95.26% very feasible criteria. The conclusion from the skill tool to train reaction skills is excellent and suitable for use by deaf children.

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