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The Implementation Of Media Detector In Track Running Sport Learning For Visually-Impaired Student In Special Needs School

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Abstract **— The purpose of this research is to describe the application of media detector in track running sports learning for visually-impaired students in special needs school. Educational Research Development (R&D) Gall, Gall and Borg (2003) is applied in this study. Prototype media detector product in track running learning for blind students in special needs school, containing the realization of product designs, included the following: (1) Curved track access guide from start to finish, 2) The form of learning media detector for running is held in the hands as instructions when starting towards the finish, 3) Operating how to press the keys when starting in accordance with the desired track running and recorded on the media detector, and (4) The Authentic assessment tools for track running learning as criterion to measure the success of visually-impaired students. Then the prototype produced of detector media for track running learning in special needs school can be used as an effort to introduce innovations to technological advancements that can gives a positive impact on blind students.**

Keywords—Media detector, Sport learning, track running

I. INTRODUCTION

Visually-impaired can be defines as individuals who experiences abnormalities in the visual senses in such a way that interfere their daily activities. As a result of the visual problem, the understanding of the outside world is not fully obtained. According to Krech, Crutchfield, and Ballachey[1] states that those individuals with visual impairment in their physiological structure, and substitute the function of the sense of sight with other senses to perceive their environment. Thus, blind idividual who lost visual sense often causes obstacles in developing the potential and orientation of the environment and motor processes. However, the urgency of other senses that can be functioned and used to interact with the environment for the blind person is the hearing sense.

Sense of hearing as a substitute for poor or non-functioning vision sense, but that does not mean that hearing sense of people with visual impairments are sharper than people in general. Hosni's opinion[2] states that it is not true that blind people hear better and sharper than normal people, because the ability to hear of the blind person is basically the same as the ability to hear normal people. However, the blind people are more concentrated in listening to sound and there is a compulsion to utilize more hearing sense. Therefore indirectly hearing is better because they are not seeing, but to be able to optimally use hearing acuity, more and more practice is needed. One focus is to develop the potential that exists in the person with visual impairment by training and maximizing the use of hearing sense.

In addition to maximize the use of the sense of hearing and to develop the potential of the blind people, Lowenfeld (in Hosni, 1996: 220)[3] explains that blindness can lead to three kinds of limitation. Such as in the following: (1) Limitations in the breadth and the variety of experience, (2) Limitations in the ability to move to another place, and (3) Limitations to control dan interact with the environment. Therefore, one of the results of disruption to sense of sight, the blind people experience slowness when making decision to move and is often associated with the ability of mobilization which tend to move slowly, thus they need mobilization training. For example is by passing through the athletic running sport learning.

The visually-impaired person favored running as a choice of athletic exercise to do everyday. Running has a potential to increase individual physical endurance. However, there is not strong motivation from within the blind person to do the run if only done alone, both those who have been physically trained or those who have not been trained. The habit is depending on the assistance of others makes them need the role of others to continuing oversee and accompany[4].

Based on the results of a preliminary study (2018) at High School Students Visually-Impaired Surabaya, it shows that most blind people with disabilities can learn to run sports without fear of falling or colliding. But only a few disabled people who have the talent of running sports to be trained intensively and prepared to become athletes and take part in several running competitions. Most students who are running athletes do not have much difficulty to run by themselves in a straight line such as the 100 meter run because they are accustomed to going through intensive training. The tendency of impairment athletes with disabilities find it difficult to turn when crossing curved trails as in the 200 meter and 400 meter numbers. The lack of media used for learning to run as an obstacle has not yet been realized to run a curved track for the blind. Realization has been made for learning to run individually and the voice code from a companion who is outside the track. These conditions are constrained during running activities often occur less audible voice companion, because many voices from other facilitators who also voiced giving the code to their students.

Jefry[5], explains that running is a major sport in athletics. Running is also one of the most popular sports in athletics. It is because this sport is easily played by anyone and does not require complicated rules and special places. But in official competitions, for example in a running race held on a special track that surrounds the athletic field. All running competitions are carried out against the clockwise direction which starts at the start line and ends at the Finish line. Except, on some long distance race numbers, the race is held on the highway. Fiqih[6], describes the branches of

athletic running, divided into three numbers, namely, running short distances (sprints) with distances of 100, 200 and 400 meters, running medium distances with distances of 800 and 1,500 meters and running long distances with distances of 5,000, 10,000 and marathon (42,195 km). Short distance running is all running competitions where participants run at full or maximum speed along the distance that must be traveled or up to a predetermined distance of 100, 200 and 400 meters.

Mestika[4] , explains that athletic sports running short distances (sprints) is an alternative for training the physical abilities of the blind who tend to have enormous mobility needs. Like a normal person who needs exercise to balance the harmony of body and soul. Regarding the blind, the sport of running can be considered as a channel of quality of life. The realization is certainly not easy, the visual impairment person always has difficulty in learning the techniques directly. Although running learning can be done by utilizing the senses that are still functioning, but still when implementing independently, the fear of risk, such as falling and frequent collisions. This problem requires professional thinking specifically in preparing the appropriate cross-blind disability sports.

Standard adaptive sprint running methods for the visual impairment, in doing exercises using a normal person's partner as a media partner. Then in the finish line a clapping signal can be given as the orientation of the final goal of running. The realization that has been used for cross-running contests is simultaneously a blind disabled athlete and a normal pair of people running side by side. The position of the hands of the total blind runner holds the rope held by the escort runner, but also without the strap and immediately holds hands with the escort runner. When running, when there is a directional contact with the visually impaired, it can be overcome by the companion by installing a retaining body so that the blind person runs in the right direction. At each step the companion also ensures that the blind position is in the right place by whispering them. As if the runner has been traversed in the right direction, the companion provides information.

The other side of the sprint race with an individual model by a blind athlete is not much different. The use of the sound form in a running race as an initial start signal is constantly sounded by the first supervisor. Then outside the field there are other supervisors shouting at the athlete. However, still body control of the visual impairment person is not as regular when running with a companion, due to the condition of disability there is a shift in position. This affects the running speed of blind athletes.

The vision barrier the blind athlete experienced, when running up to the curved track, did not know the exact position to turn, so that visually-impaired students were very difficult to run alone without any companion on the curved track and so far there has not been an appropriate medium for learning to run on the curved track, especially in running 200 meters that goes through one turn and 400 meters that passes four times so that blind athletes can run independently.

With the development of current information technology, a blind athlete should be able to be independent in running without having learning companion. There are two ways teacher need to do to aid blind student, the first provides orientation and mobility skills in the track running for blind student to carry out various activity on the running track, second develop learning media for running sport to provide an overview of running track for blind student. The tool or media that can aid facilitate blind student to run. One of the ways is by developing a media detector on running curved track running for visually-impaired students. Development of a media detector that is equipped with learning technology is designed and used to assist learning process. Seels, B. Barbara & Rita C. Richey[7] , said that learning technology on development design used for utilization, management and evaluation processes and source of learning.

Arjaya[8], explained that the detector is a human motion detection device that used a passive infrared receiver sensor (PIR) dan Arduino[9]. PIR is an infrared based sensor that can respond infrared signals change emitted by human body. Therefore PIR sensor does not produce output when the sensor is confronted with a hot object that doesn't have an infrared wavelength between 8 to 14 micrometers and an object while the wavelength produced from human body ranges form 9 to 10 micrometers so that it can be detected by the sensor.

Olsson dan Michael[9], Arduino[10] has the advantage of not requiring a programmer chip device because there is a bootloader inside that can handle uploading programs from a computer and already has a USB communication device. Laptop user who have not an RS323 serial port can use it then a module ready to used, Shield module can be plugged in to an Arduino board such as a GPS shield so that input or output digital or digital pin is a pin to connect Arduino with digital components or sequences

the opinion realization above requires the development of a media detector that can provide codes or alarms and vibrations for blind students when running individually on curve tracks without require for a companion to shout the detector placed on running curved track, the use of detectors placed on running curved track running in addition to being more effective can make it easier for the other blinds directly with knowing where they are and when to turn. Detector media can minimize collisions between runners due to cross the line when running. In addition, the students with visual impairment can reach the maximum time according to their talents and ability to run without experiencing obstacles in running track lesson

Based on the complexity of the problems of visually-impaired students in running track lesson require for a detector media for running track require to be learned in special need education especially for running 200 and 400 meters the purpose of this study is to describe the application of the detector media in running track lesson sport for blind students in High School Students Visually-Impaired Surabaya.

II. RESEARCH METHOD

1. Approaches and Types of The Study

   Research on the development of the application of the detector media in the learning of running sports for blind students in these High School Students Visually-Impaired Surabaya in their technique using the model Gall, Gall and Borg[11], below 1) *research and*

information collecting, 2) *planning*, 3) *develop preliminary form of product*, 4) *preliminary field testing.* Determination of research subjects was conducted by purposive sampling, namely visually-impaired students of Gebang YPAB Surabaya Special High School.

2. Data Collection Techniques

As for the technique used in this research:1) questionnaire 2) test. The questionnaire is given to medical experts and blind person to get data about the responses of the prototype design of detector media in learning sports for the blind. The test is used to test the application of students abilities in learning to run the curved track running for visually-impaired students in Special High School YPAB Surabaya.

3. Data Analysis Techniques

The analysis technique in this research used descriptive qualitative and quantitative descriptive data obtained from the results of expert reviews in the implementation of this product validation test quantitatively processed using qualitative descriptive analysis technique by grouping the information above from qualitative data in the form of inputs, responses, criticisms and suggestions improvements that have been provided through a questionnaire. Descriptive quantitative data was conducted to obtain data from the results of the application of the acquisition of this data product from a small-scale trial of the performance results In the running track lesson of each blind person in a special need school. The data result of the media detector are analyzed in the descriptive percentages form through the following formula below :

$$\text{Percentage} : \frac{x\,(Total\ Scores\ Obtained}{Maximum\ Total\ Scores} \text{ x } 100\%$$

The criteria used for decision making from the product valuation analysis are tested in the following table.

TABLE 1. EVALUATING CRITERIA OF THE PRODUCT TRIALS APLLICATION ON STUDENTS ABILITIES TO LEARN CURVED TRACK RUNNING LESSON FOR BLIND STUDENTS.

Level of Achievement	*Qualification*
85% - 100%	Excellent
70% - 89%	Good
55% - 69%	Average
40% - 54%	Fair
0% - 39%	Poor

III. RESULTS AND DISCUSSION

A. Results

To produce a media detector product in learning to running track lesson in accordance with the rules of theory to produce a good product the process of developing a media detector in learning running track lesson for the blind disabled refers to Gall, Gall and Borg[11] model of the steps undertaken in the stage of the process of developing a media detector in the running sports lesson for the visually-impaired students conducting searches and gathering information developed through :

1) Literature study to get a theoretical references both book and articles
2) On this field study is carried out by conducting interview observations and reviewing documentation on objective conditions in the field at SMPLB-A YPAB Surabaya located on Jl. Gebang Putih No. 5 Surabaya.

The results of the literature study and field study, the data obtained from the trend of the blind disabled there are three limitations, namely the limitations of the environment and diversity of experience, limitations in interacting with the environment, as well as limitations in orientation and mobility. In special running lesson experienced at YPAB Surabaya Special High School.

The fact on the field of observation results shows students often have difficulty in running through the curved track. Visually-impaired students who become athletes running often have difficulty determining where the position turns when running. turn, and lack of sensitivity to understand signs or alarms that can be used as instructions in running the track. The results of interviews conducted with sports teachers at YPAB Surabaya Special High School, that visually-impaired students often hesitate when running alone without a companion for fear of colliding or collision. However, to run a curve, requires careful guidance on the 200 meter running number that passes I times the curved track and the 400 meter running number that passes 4 times the curved track. Sports teacher, so far, has never used tools or media in learning to run. The data obtained, the researchers analyzed that visually-impaired students at the YPAB Surabaya Special High School did not yet have mastery of the concept of running track on the curved track. and verbal sports teacher directives, difficult to interpret by blind disabled students without the media. The need for a media that is able to give a sign or alarm in running to detect when it has to turn when it reaches a curved track.

The stages of planning making of a media detector can help provide a sign or alarm that is able to facilitate learning to run a track on blind disabled students. The basis that must be mastered by blind students is orientation and mobility skills as the main provision to be able to walk and run independently. Students with visual impairment must master some basic concepts, such as the concept of shape, the concept of direction, the concept of distance, the concept of size, and the concept of time. To do mobilization, the concepts of direction and distance are two things that must be mastered, when running, guidelines or directions used in direction and distance. Directions such as facing the left, turn left and right, walk and run straight forwards or backwards. Then hint how many steps, how many meters especially when running straight curved track running.

In running sports learning is inseparable from orientation and mobility skills, optimizing other senses that students still have such as the senses of hearing, smell, touch and taste. These four remaining senses can be used to gather information needed for mobility. Hearing senses are enabled to collect the information obtained is used as a consideration when learning to sport curved track. The next step is to introduce the concept of the running track environment through media that can provide a sign or alarm and ease of learning to run curved track. Therefore, the detector media in the learning of curved track sports developed by taking into

account the rules of orientation and mobility. In planning making a prototype of detector media for learning to curved track running paying attention to the characteristics and needs of blind disabled students. Learning to curve track running, the detector media are tied to the arm and given sounds that can be heard and felt by students with disabilities. There are several things that must be planned are, among others, (1) objectives, (2) funds, (3) personnel, (4) time, (5) media product qualifications.

The stages of developing the preliminary form of product are as follows.

1. Determine the design of the detector media in the learning curved track running

   The initial step of the design of the detector media in the learning of the sport of running curved track is by assembling the required detector components, namely 4 sensors, 4 tripods as sensor stands placed at four corners of the bend angle of a full lap run by determining a distance of about 5 meters before the curve is curved, 1 receiver and 1 receiver holder can be tied to the blind disabled arm.

2. Arranging sensor and tripod devices as a place holder

   The sensor used on the detector media that has been made, is focused on detecting blind disabled running placed outside the running track with a distance of 5 meters before the curved track running. Then the tripot holder to place a sensor that can reach up to a distance of 10 meters ahead and detect running participants who passing in front of it. Next, it sends a signal to the detector mounted on the arm of the blind disabled student who runs and vibrations that can be felt ringing through the path attached to the detector.

The next stage is testing the products that have been developed to experts to assess the feasibility through 2 experts, namely media experts in educational technology and special need school experts in the field of blindness. As for the results of the assessment of the running detector media on the curved track are found in the following table

TABLE 2. FINAL ASSESSMENT RESULT BY SPORT EXPERT IN CURVED TRACK RUNNING LESSON FOR BLIND STUDENTS

No.	*Assessed aspect*	*Draft Revision I*	*Draft Revision II*
1.	Athletic learning adjusted according to the needs of blind students	Running track lesson material taken from the textbooks of school with 2013 curriculum	Learning material taken from 2013 curriculum which is adapted for children with special needs
2.	Additional tools are needed to be inserted into the detector media for curved track running lesson about the distance explanation for blind students	Media detector on curved track running is less effective in terms of sport because there is no clarity about the distance that must be passed by blind students.	Unable to redesign from the beginning to the distance detection.
3.	Further development is needed, so this detector media can detect blind students who exit the track or stop running.	Media detectors can not give a sign that blind students exit the track or miss the curve.	Unable to redesign a tool that detects the running students and the boundary lines of curved track in one way.

TABLE 3. FINAL ASSESSMENT BY MEDIA DETECTOR EXPERT AND SPECIAL EDUCATION EXPERT

No.	Assessed aspect	Draft Revision I	Revision Draft II
1.	Angle sensor device is reduced to ± 30º from a straight line in order to get better focus in detecting blind runners.	Angle sensor is too wide for ± 120º, so before it reached the corner detector start to beep and vibrate and after the runner passing the bend, the detector still ringing.	Angle censored device is reduce to ± 30º in order to get better focus detect visual disabilities runners crossing detector media.
2.	Detector media which brought by runners to give an indication / alarm and vibration is too big, so it needs to be designed in smaller size and can be inserted into a pocket provided.	Detectors media which brought by blind runner has been scaled down and fit into a pocket while running.	Detectors which brought blind runners smaller than before and can be inserted into a pocket that has been provided so it will not fall over while running.
3.	Censor placement on the tripod has been made permanent.	Censor device placement is still in regular glue that is still easy to take.	Censor device placement is still in regular glue that is still easy to take.

This stage was demonstrated by visually impaired students in Special High School YPAB Stadium KONI Surabaya, East Java Province. The number of students involved in testing the worthiness of these products as much as 3 people. Assessing the worthiness of the product obtained from the value of the performance of students with a range of values of 4 (very appropriate), the value 3 (as appropriate), the value 2 (less appropriate) and a value of 1 (not appropriate). The test is done with a small group aimed to measure the students' independence visual disabilities without the assistance of others to medium runs track detector in the curved track learning.

Based on the data generated during user test against three blind students carried out by a gym teacher, then the results of the analysis to measure the independence of visually-impaired students without the assistance of others, the value of the average score on the test media detector in the curved track lesson is 70% - 89 % (well). The conclusions show that the independence of blind students without the assistance of others against the use of detector media in curved track running lesson declared worth to use based on the results of the assessment of the validates who are competent in their field.

B. Discussion

The design that used in the process of development of these detectors media refers to the model Gall, Gall

and Borg[11] Explained the process in the development of these detectors media supported by the expert's theory , so the products will be in a good quality. Amrullah[8], suggests the motion detector to form an important component of security, automatic lighting control, home control, energy efficiency, and other useful system. Then Arjaya[9], explains that the detector is a device that detect human's motion using Passive Infra-red Receiver (PIR) censor, Hallahan, Kauffman, and Pullen[16], showing support for the needs of media adapted to learners who experience a disruption in visual senses. It is important that the media produced on target so as to overcome the problems faced by visually impaired students. Lowenfield[20] , states that a person can lead to blindness in the three forms of limitations, namely: the limitations of the concept and the diversity of experience, limitations in the interaction with the environment as well as limitations in orientation and mobility. This tested media detector can optimize independence in running sports learning for blind students.

In order to optimize student's independence in providing running sport learning services need a proper facilities and infrastructure in accordance with the potential and needs of visually impaired students. Hadi[13], that education for visually impaired students to be able to live independently and move as people in general, need to be adjusted with the potential and needs. Sports lesson in Special High School to be prepared and adjust the detector media. In the process of learning for visually impaired students should use strategies that fit the needs and characteristics, Mestika, etc[21], states that learning strategies in the education of visually impaired student is based on two ideas, namely 1) modifying the environment to fit the child's condition, 2) optimizing another senses that are still working well in order to cover visual impairment condition.

Optimizing another working sense is a strategy that suit and easily applied during the lessons. Optimization and integration as well as support appropriate learning media can determine the success in learning. Therefore the media detector in curved track running lesson designed based on the characteristics and needs of blind students. The sensitivity in touching and hearing of the students, can make the media detector to curve track running learning because it was developed by combining Tactual and audio aspect. Tactual aspect manifested in the form of a modified instrument's detectors can produce vibrations and palpable,

Media development in the curved track running lesson is shown to provide concrete means for blind students. In running sports learning, visually impaired students can feel the vibration and hear the alarm sound generated from the media detector to run a curved track that is easy to learn. Support Neda[15] , revealed by seeing and interacting with the original object, then the students can be more easily learn it. In line with the great benefits brought about by the medium of learning in the learning process for creating meaningful and memorable learning. The media in the learning track detector in the form of a curved track and physical aspects of media content detector. The media structure consists of five elements, which includes the title, basic competence, supporting information, task or work steps and assessment. Opinion Prastowo [16], that the structure of the model in the media detector in the learning track curved path consists of a title, or subject matter competence base, supporting information, task or work steps and assessment. The physical appearance and content of the media detector to curved track running lesson, this should be interesting.

Physical appearance and media content according to the user running track detector in this study are interesting. The results of the worthiness assessment validator gives a good assessment (score 3) this media detector has an attractiveness. Arsyad's opinion[17] stated that one of the important elements to consider in making learning media is the attractiveness. The validity of the media detector in the curved track lesson is composed of the aspects of appearance, media design and structure of the media contents detector. Ariani, et al[18], the media experts assess products developed in terms of media quality and suitability of media with the needs and characteristics of the user. Asses the worthiness of the curved track lesson materials done by experts. The validation asses the suitability of the curved track lesson materials to the curriculum in 2013, and assess the suitability of media used for visually impaired student's logical thinking. It fits Prastowo[16], who states that the model or the media detector must be made according to the child's way of thinking.

The worthiness of detector media on a curved track running lesson for visually impaired students as users. To assess the worthiness, it was tested to class VII YPAB Surabaya. The worthiness by the user can be seen at the value of the test performance of students when using the detector media in the track learning.

The results of the assessment by the validator on the trial of media detector in the curved track lesson is in line with Asyhar[19], that an assessment needs to be asked to comment on the perception of the student to the media detector to be used in learning through assessment sheet that has been available as a result of data collection. In line with the findings of Nandi[20], the media in learning is worth to use and students are motivated to learn, so that the results of student achievement increases. Detector media in curved track running lesson for blind students raised Tactual and audio. Tactual related to the forms of media that can be touched and felt in the form of vibration. Then the audio associated with something that can be heard in the form of an alarm sound generated from the current sensor detects visual disabilities runners. Similar findings Ungar, Blades, Spencer[21], that the use of the media can inform a better understanding of the outdoor environment that is relatively unfamiliar to individual with visual impairment.

IV. CONCLUSION AND SUGGESTION

A. Conclusion

Based on the research related to the media detector running on a curved track in athletics for visually impaired students it can be conclude:

1. The results of the prototype development of media detector in running curved track learning with vibration and sound alarms can be used directly by visually impaired students.
2. The worthiness of media detector in running curved track learning for with visually impaired students declared feasible which is tested for three students with blind users with the acquisition of the results of 70% - 89% (good).

B. *Suggestion*

Based on the research results and explanations on this study, it can be given suggestions i.e.:

1. According to the results of this study, the media detector in the running curve track learning is worth to be used in order to help visually impaired students independently, but the design still need to be improved.
2. The media detector in running track learning need to be improved, especially for clarity mileage before the turn and need the addition of a sensor track again so that visually impaired runners are not off the track when turning and the future is expected to be used in the race for visually impaired athletes independently without an escort.
3. This study need for further research to go deep into the media detector, a curved track running in the race of athletics for visually impaired students.

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