



Development of REACT- Based Physics Braille Learning Module in Linear Motion

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Abstract: This research aims to develop a valid and feasible physics braille module based on Relating, Experiencing, Applying, Cooperating, and Transferring (REACT) learning model in linear motion. This study used R&D design with a procedural model that modified from the 4-D model consisting of define, design, and develop. The methods used in collecting data in this study are from interview and questionnaire. This study has successfully developed a valid and feasible physics braille module based on REACT, with the average scores of 3.12 for content and 2.85 for media aspect. These results also supported by the inclusive teachers and students who gave positive responses.

Keywords: braille module, inclusive, linear motion, REACT

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INTRODUCTION

Physics is a part of science that is born and developed through observation steps, formulation problems, hypothesis formulation, hypothesis testing through experiments, completion, and the discovery of theories and concepts. Physics learning has been considered unattractive because it only emphasizes mathematical formulas. It is necessary to overcome these problems. It is necessary to make a physics learning media that can facilitate students in overcoming physical problems that were previously difficult to improve to become easier (Alhidayatuddiniyah et al., 2018).

The presence of children with special needs in regular schools in the teaching and learning process will have an impact on the process of class change, besides being faced with classical classes, teachers are also given the responsibility to guide, educate and teach the diversity of children with special needs. Therefore, inclusive students also have the same rights and obligations as normal students (Erwin & Winarti, 2012).

Based on observations made in the field especially in MAN 2 Sleman that the school needed a braille module for inclusive students, because there were no braille modules available at the school. According to the physics teacher at MAN 2 Sleman, there are several obstacles and difficulties when the teacher explains the physics material for inclusive students. Based on teacher's experience in teaching, they confused how to explain physics material, especially for vectors or direction of motion, and illustrated images. Because of physics is a lesson that requires reasoning and understanding, therefore we need a media to make it easier for inclusive students to understand the physics (Iradaty, 2017). One aspect of improving the quality of learning is the availability of quality learning media (Erwin & Winarti, 2012).

On the other hand, the use of learning media must be well considered by the teacher in order to support student learning motivation. The choice of media as a source of independent learning can enrich the learning experience and help the readiness of students to get material that will be taught in the next meeting (Depdiknas, 2003). It is necessary to develop modules that facilitate students needs based on school environment (contextual).

The study related to braille module development for mathematic has been investigated (Tarida et al., 2016). The study which has been developed about physics braille module just focused on temperature and heat materials for junior high school (Erwin & Winarti, 2012), but not about linear motion. Therefore it is important to developed physics braille module on linear motion materials.

The development of physics braille module based REACT is expected to be able to support physics learning independently in accordance with what has been explained by the teacher in the classroom, in addition students also know the relationship between matter and phenomena that exist in everyday life. This study aims to: (1) Produce physics braille modules for students with visual impairment in class X in Sleman 2 as a source of independent learning, (2) Knowing the quality of physics braille modules that have been developed by researchers, (3) Knowing student responses to physics braille modules that has been developed.

Sounders (1999) explains that contextual learning is focused on REACT (Relating: learning in the context of life experiences; Experiencing: learning in the context of search and discovery; Applying: learning when knowledge is introduced in the context of its use; Cooperating: learning through communication contexts interpersonal and sharing; Transferring: learning to use knowledge is a new context or situation).

Effendi (2006) states that the term disability in everyday conversation is connoted as a condition that deviates from the average in general. This deviation has a value of more or less. The effects of irregularities are often momentary and ongoing.

Somantri (2007) states that in the field of extraordinary education, children with visual impairments are more familiarly called inclusive children. Understanding inclusive people are not only those who are inclusive, but also include those who are able to see but are very limited and can not be used for the benefit of everyday life, especially in learning. So children with vision conditions that include "half-sighted", "low vision", or nearsightedness are part of a group of inclusive children.

Modules are a complete unit that stands alone and consists of a series of learning activities arranged to help students achieve a number of objectives specifically and clearly formulated (Nasution, 2008). Braille is a method of writing for inclusive people. The basic unit of braille is Braille cells. Braille letters found by Louis Braille consist of 6 points, namely the upper left point is point one, the middle left point is a colon, the lower left point is point three, the upper right point is the fourth point so on (Khoswantoro et al., 2003).

METHOD

This study used R&D design with a procedural model that modified from the 4-D model (Thiagarajan, 1974) consisting of define, design, and develop. The subjects in this study were inclusive students and teachers in MAN 2 Sleman. Data collection techniques are interviews, observations, and questionnaires by using developed instruments. The instruments of data collection in the development research were questionnaire for interviews, questionnaire for product validation, questionnaire for product evaluation and questionnaire for responses students.

RESULT AND DISCUSSION

This development research produced REACT-based physics braille modules in linear motion. At the initial product development stage, expert validation and user validation are carried out. Validation modules to produce valid products, can be tested for audiences. As for compiling the initial product of REACT-based physics braille module including several parts including: opening part, in this section contains covers of physics braille modules, islands (description of braille modules, competency standards, basic competencies, and general instructions for using modules), preface, table of contents and concept maps; the contents section includes a description of information and material, and insight into physics; the closing section includes a final evaluation, glossary, and bibliography.

Before the module is assessed for quality, the module is first validated by the validator. Validation results are input sheets from the validator. The revised results from the validator produced module II, which then the module can be assessed for quality by experts and physics teachers as practitioner.

The second development result is the quality of the physics braille module which is reviewed based on the assessment of 2 material experts, 2 media experts, and 1 inclusive teacher MAN 2 Sleman by filling out the physics module quality questionnaire sheet and providing input in module development.

The analysis results of content expert judgements show that the average score for each material indicator was 3.12 which mean the physics braille module was feasible

to be used in a high category. Furthermore, the analysis results of media expert judgements showed that the average score each indicators was 2.85, so that the module was feasible in the same category as the content judgment. At the time of the media expert's assessment there were still several revisions regarding consistency in writing variables in the physics braille module.

The evaluation of the quality of physics braille module according to the teacher of inclusive in MAN 2 Sleman overall can be categorized very well (SB) with a mean score of 3.83.

After revising module II based on input from material expert, media experts, and inclusive teachers of MAN 2 Sleman, module III was obtained, which will then be tested to students in a limited test. The results of the analysis of the data from the limited test obtained a mean score of 0.66 with a mean score for each aspect.

At the limited trial stage there were several inputs from inclusive visual students of MAN 2 Sleman, namely the need for the introduction of physical variables in the physics braille module because so far many students had never read physics braille modules so that many inclusive students did not understand the internal variables physics. In addition, according to inclusive students this physics braille module has been able to explain straight-motion material well which is accompanied by phenomena that are easily imagined by inclusive students.

Based on these inputs, the author followed up by chanting the introduction of physical variables contained in the material of Linear motion. After following up on input from a limited trial, a draft IV was obtained which was then tested on students in a broad trial.

During the extensive trial, students were asked to understand the material contained in the physics braille module on the subject of linear motion, which in turn students were asked to do the final evaluation on the back of the braille physics module to find out the extent to which students could understand the material contained in the physics braille module. In addition, input from inclusive students is also indicated, namely there are several symbols that cannot be read by students because of several factors including the lack of carefulness in converting the material from a blank letter to a braille letter. The braille physics module based REACT that has been developed shows a good presentation, because in this Physics braille module the material presented is packaged in such a way and made as simple as possible so that inclusive students can understand the linear motion material contained in this braille physics module and can apply it in learning process. In addition, in a braille module physics mathematical equations developed in the form of descriptive equations. The selection of descriptive equations is intended so that students who do not know the symbols contained in physics will be better able to understand using this descriptive equation. One of the advantages of this braille physics module is that it uses simple sentences that are easily understood by students and also the equations used are adjusted to the characteristics of inclusive students.

After following up on the input during the extensive trial, the module V was obtained, namely the final product of the physics braille module subject of Linear motion in MAN 2 Sleman.

CONCLUSION

Based on the results of the research that has been done, it can be concluded that physic braille module based the REACT on the Subject of the Linear Motion can be categorized as good (B) according to the assessment of material experts, media experts and inclusive teachers. In addition, in the limited test response students can be categorized as agree (S) with the existence of this Physics braille module and also in the broad test students provide input that in this module there are some mathematical symbols that students cannot read clearly.

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