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Learning Physics Using a Contextual Teaching and Learning Approach to Children with Physical Impairment

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ABSTRACT

This study aims to see the effect of the Contextual teaching and learning model on science learning for disabled children. The learning devices use the Contextual Teaching and Learning (CTL) approach and the PBI (Problem Based Instruction) learning model for disabled children in class X SMA which consists of the syllabus , RPP, LKPD, teaching materials and competency assessment. This research is a type of research and development using the ADDIE development model which consists of 5 stages, namely the Analysis, Design, Development, Implementation, and Evaluation stages. This study uses data collection consisting of expert validation, observation, interviews and tests. Based on the results of the study, it was found that the learning tools that had been developed met the appropriate criteria and could be used with minor revisions. Decent learning tools were obtained from validation results by 3 validators who were test lecturers, while the effectiveness of the devices was obtained from several indicators, namely learning implementation with an average of 93.93%, student activity with an average of 86.9%. As well as positive responses from teachers and students obtained by interview.

INTRODUCTION

Physics is a learning material that contains reality, concepts, speculation, standards and laws that discuss the general framework. Science that examines physics is physics, in physics it means that it must be based on logical discoveries that occur around [1]. Physics is one of the elemental sciences that deals with the nature, structure and behavior of matter. Physics is a science that not only seems to contain speculation and equations that must be memorized, but physics requires an understanding of concepts that are centered on methods of forming information through disclosure and introduction of information [2]. The theory of physics is not only enough to read to learn it, because the hypothesis of physics is not just memorized, but needs to be understood and practiced.

Every human being born into this world is always different from one another. Both physical form, behavior, nature, and various other habits. No human being has the same physical form, behavior, and characteristics, even if they are twins. Even how to absorb and process the information received by every human being is different from one another. Absorption of this information is highly dependent on the education received at school. For this reason, every Indonesian child has human rights and obligations to obtain a good and proper education, not only the absorption of information which is very influential in education but also physical limitations, and mental disorders can affect a child to obtain an education.

Children with physical disabilities are children who experience abnormalities in their physique or body alone, but there are also those who experience disabilities in addition to physical disabilities accompanied by various disorders such as impaired intelligence, perception, and communication [3]. In the government regulation of the Republic of Indonesia number 72 of 1991 concerning Special Education with the aim of chapter 2 article 2 that special education aims to help students with physical and/or mental disabilities to be able to develop attitudes, knowledge and skills as individuals and members of society in establishing reciprocal relations with the social, cultural and natural surroundings as well as being able to develop skills in the world of work or following further education [4].

Special education is special education for those who have a level of difficulty in the learning process due to limitations such as physical, emotional and social mental disorders, but have the potential for intelligence and special talents. A special school is a formal educational institution that serves education for children with special needs [5]. In special schools (SLB) with special needs of different types, the strategies and learning facilities are also different. As an educational institution, SLB is formed by many elements directed at achieving educational goals, the core of which is learning for students with special needs.

In government regulation number 13 of 2020 concerning adequate accommodation for students with disabilities article 5 paragraph 4, namely the provision of a curriculum is carried out by developing: graduate competency standards, content standards, process standards and assessment standards according to the needs of students with disabilities. In this regard [6] persons with special needs who are identical with these limitations require facilities both in terms of facilities and infrastructure. application of learning, media and teaching materials used to accommodate the needs of persons with special needs in obtaining education. So as to create innovations in learning such as in developing learning models, methods and media for children with special needs.

Learning tools are components that function as guidelines for teachers so that the learning process (one of which is learning physics) becomes structured, effective and efficient. Learning tools in the 2013 curriculum require students to be more active than teachers, so the teacher is only a facilitator. The CTL approach is a contextual learning that involves students more directly. If students feel involved in learning activities, of course, this will arouse emotions or feelings of students to pay more attention to their learning. According to Tyng et al [7] said emotions have a major influence on human cognitive processes, including perception, attention, learning, memory, reasoning, and problem solving. Emotions have a particularly strong influence on attention, it modulates the selectivity of attention and motivates action and behavior.

Contextual learning is a learning concept that connects the material being taught with conditions that exist in the daily lives of students whose educators act as facilitators so that students are empowered to be able to form associations with information obtained in real life. Contextual learning can be a learning tool that emphasizes maximum student assistance methods so that students are able to independently translate the material obtained from their life experiences [8].

The Contextual Teaching and Learning (CTL) model is a learning concept that helps teachers relate the material being taught to students' real-world situations and encourages students to make

connections between their knowledge and its application in everyday life [9] [10]. CTL is a learning strategy that emphasizes the full involvement of students to be able to find the material being studied and relate it to real life situations so as to encourage students to be able to apply it in everyday life [11]. According to Huda [12] in "CTL, one group consists of 3 students who have heterogeneous abilities (low, medium, and high)". Science learning outcomes with games designed in the CTL Learning Method allow students to learn more relaxedly while fostering responsibility, cooperation, fair competition, and learning involvement.

CTL is the relationship of each learning material or topic to real life. To connect it can be done in various ways, apart from the factual subject matter being studied, it can be tricked by providing illustrations or examples, learning resources, media that are linked to real life experiences so that students can experience the benefits of learning directly [12] [13]. Learning with using Contextual Teaching and Learning (CTL) its meaning will be felt because through CTL it is able to relate the material being taught to real-world situations so that this can encourage students to make connections between knowledge and application in everyday life. With this concept learning becomes meaningful for students In the teaching and learning process there are several methods that can stimulate students' creativity and interest in the lesson, one of which is learning using contextual models. Contextual Teaching and Learning (CTL) is a learning model that encourages students to understand the meaning of the subject matter they are studying by relating the material to the context of their daily lives (personal, social and cultural contexts) so that students have knowledge and skills that are flexible can be applied (transferred) from one problem [14]. Basically CTL is a learning concept that assists teachers in relating subject matter to students' real lives, and motivates students to make connections between the knowledge they learn and everyday life, thus encouraging students to be able to apply it in their lives [15].

Based on the results of observations at SLB Negeri Gorontalo City, on July 19 2022 for mentally retarded children in class X, researchers found that mentally retarded children experienced limitations in participating in the teaching and learning process, in the form of physical, emotional, social mental disorders, short-term memory where they only remember when the teacher was explaining after that they forgot again what the teacher had explained. In addition, the achievement of each student's learning goals is different, each student is given an initial test. The results of this initial test are used as the formulation of each student's learning objectives, in the learning process some students also have minimal abilities in terms of reading, understanding, remembering, counting, and writing, so that when the teacher explains in front of the class some students experience difficulties. When the teacher gives daily evaluations, he must first provide a grid of questions, so that students can recall the learning that has been explained by the teacher. taught by the teacher and cannot develop the potential that exists within him. This is caused by the use of learning models that do not arouse student activity in learning, therefore a learning model is needed that can help students in terms of being active in learning. For children with disabilities who attend education up to the upper level (SMALB-D), not all of them can continue their education to tertiary institutions, this is because the intelligence possessed by each disabled child is different, therefore schools need to prepare special skills for them to be able to work in a middle age. -in the community for the sake of survival and get used to not depending on others.

In the CTL learning model in learning physics for children with physical impairments, it is hoped that it can help children with physical disabilities understand physics material easily. In learning physics, it has an important role in improving the quality of human resources. Apart from being an interesting subject [16], physics can train and develop students' critical thinking skills analytically, inductively and deductively in solving problems related to everyday life [17], especially phenomena that appear around us [18]. Apart from studying phenomena, this physical theory also has an important role in industrial and technological development [19]. We can find this in the working principles of technology and industry. The importance of physics in life. Need to train and develop students' thinking skills by directing meaningful learning that interacts directly with real life [20] by observing, understanding, and utilizing existing phenomena and knowing their application in technology [21].

METHOD

The research carried out was a quantitative descriptive study using the experimental method with the One Shot Case Study research design, which in this design only used one experimental class without any comparison and also without a pre-test. In this study, the experimental class was given treatment to determine the effect of the treatment [22].

This research was conducted at the Gorontalo State Extraordinary School (SLB), which is located on Jalan Banyan, Tuladenggi sub-district, Duingingi sub-district, Gorontalo City. At the senior high school (SMA) level, class X is physically disabled.

The instruments used in the study were student activity assessment sheets and learning achievement test sheets. Data collection techniques used were observation and test methods.

The data obtained was analyzed descriptively quantitatively, with the assessment of student activity during the learning activities being observed by two observers with reference to the assessment rubric. Study results test results.

Interpreted according to the scoring and predicate criteria contained in the assessment guidebook for SMP/MTs curriculum 2013, as listed in Table 1.

Table 1. Score intervals and predicates for KKM 75

Predicate Intervals	Predicate	Information
>90-100	A	Very good
>80-90	B	Good
>70-80	C	Enough
<70	D	Not enough

RESULTS AND DISCUSSIONS

Students with disabilities are students who have permanent disabilities in their locomotors (muscles, bones, joints) and/or nerves so they need special education services that are appropriate in order to minimize the impact of their disability and optimize their potential to support independence in life. daily. Physical disability is caused by genetic and chromosomal defects, teratogenic, prematurity and pregnancy complications, and other causes.

In this study there were 2 students as respondents with the following characteristics;

- 1) The first student has cleft lip (cleft) so that the pronunciation is not clear, a little slow in moving so that in the learning process when designing experimental tools the teacher must help, and when presenting the experimental results the teacher must clarify again. However, this first student can receive the lesson well so the teacher does not need to explain over and over again.
- 2) The second student has deformity in the eyes, slow in moving the same as the first, so that during learning the teacher helps in designing experimental tools, and guides when reading instructions contained in work procedures. However, the second student is slow in accepting the lesson so the teacher has to explain it over and over again.

The effectiveness of learning is seen from 2 indicators, namely the results of observations of students' activities during 3 meetings, and the results of competency assessment which consists of 3 domains namely cognitive (knowledge), affective (attitude), and psychomotor (skills).

Analysis of student activity data

The results of the analysis of student activities were obtained through observing student activities during the learning process (during three meetings) which referred to the indicators carried out by 2

(two) observers. The 7 indicators namely 1). Observing demonstrations, 2) conducting experiments, 3) presenting experimental results 4) analyzing data and making experiments 5) responding to discussion results, 6) listening to teacher explanations, 7) concluding material.. The following are the results of observations of student activity:

Table 2. Percentage of Student Activity

Meeting	Percentage of Student Activity (%)	Criteria
1	80,35	Good
2	85,71	Very Good
3	94,64	Very Good

Based on the data presented in Table 2, it can be seen that student activity using the CTL learning model students are in the good and very good criteria of 80.35, 85.71 and 94.64 respectively at the first, second and third meeting.

Based on these results it can be said that CTL learning for children with disabilities has a positive impact on students with disabilities, such as observing experiments even though they have limitations but the students' activities in observing experiments are very active. In this lesson, the teacher acts as a facilitator and students get the opportunity to be actively involved in every learning activity. Students are also more active in discussing with their group mates to solve problems, actively asking questions to the teacher and actively presenting the results of the discussion.

According to Arikunto [23] the CTL learning model can be used to foster understanding of concepts and problem solving abilities simultaneously in learning. The CTL learning model focuses on the seven CTL components where the discovery component (inquiry) can foster the ability to understand concepts, as well as the constructivism component (constructivism) which can develop problem solving abilities for students.

Even so, there were still students at the first and second meetings on activity indicators that were still low due to several factors such as a less conducive classroom atmosphere, teachers who were less than optimal in class management activities, so that students were not focused, students who were not used to doing experiments caused a lot of time to be spent . it is useless to explain work steps and guide students, as well as differences in students' ability to absorb the information conveyed by the teacher. According to Ibrahim [24] Mastery of the skills of planning and conducting experiments by teachers and students is the main provision needed to develop themselves and find answers or solve problems encountered in learning science in the classroom and in everyday life.

The CTL learning model is a learning model that has the principle of constructivism, where with this CTL learning model students can construct their own understanding, so that the students themselves are active. With this CTL learning model, it is hoped that students can be responsible for their learning. This is what can foster conceptual understanding in solving problems faced by students in the learning process which will affect the improvement of learning outcomes [25].

Analysis of student learning outcomes data

The following is an analysis of student learning outcomes based on 3 domains.

(1) Cognitive Realm

The results of the competency assessment for the cognitive domain are seen from the learning outcomes test given to students 5 items for multiple choice questions, and 5 items for descriptions. The learning outcomes obtained by students during the pre-test did not reach the minimum completeness criteria (KKM) ≥ 75 , so that the classical completeness obtained was 0%. In contrast to the learning outcomes obtained by students during the post-test, there was one student with a final score of 86.20, and the other students got a final score of 75.86. so that the classical completeness obtained after the posttest is 100%. The following results of student learning in the cognitive domain can be seen in Table 3

Table 3. Pre test and post test values

<i>Pre-test</i>		
Serial Number of Learners	Final score (NA)	Description
1	17.24	Not Completed
2	10.34	Not Completed
<i>Post-test</i>		
Serial Number of Learners	Final score (NA)	Description
1	75.86	Complete
2	86.20	Complete
N-gain	0.78	Currently

Based on the analysis of learning outcomes in the cognitive domain in table 3, it can be concluded that there was an increase from the pre-test to the post-test by students, so the learning tools used were effective.

(2) *Affective Realm*

In this study, the learning outcomes of students in the affective domain (attitude) were seen from the percentage of observations of students' attitudes observed by observers during 3 meetings made by researchers.

The effectiveness of learning is measured by assessing competence for the domain of attitudes and skills as seen from the observations of the attitudes and skills of students by observers. The average percentage resulting from the assessment of students' attitudes was 90.27%, and the average percentage from assessing students' skills was 87.5%. thus the learning outcomes of students for the realm of attitudes and skills meet the good criteria. Based on the results that have been obtained, the learning tools implemented can be declared effective. The following student learning outcomes in the affective domain can be seen in Table 4

Table 4. Percentage of student attitudes

Meeting	Percentage of Student Attitudes (%)
1	86,11
2	88,88
3	95,83
Average	90,27

Based on the percentage of student attitudes in table 4, it can be concluded that the attitudes of students in participating in learning are very good with an average of 90.27% and the learning tools used are effective.

According to Kistian [26] that the teaching and learning process is an interaction activity between teachers, students and reciprocal communication that takes place in educational situations and achieves learning goals. Interaction and reciprocal communication between teachers and students are the main characteristics and requirements for the teaching and learning process to take place. It instills an attitude of value in students who are learning.

(3) *Psychomotor Domain*

In this study, student learning outcomes in the psychomotor domain (skills) were seen from the percentage of psychomotor observations observed by the observer during 3 meetings conducted by the

researcher.

Table 5. Percentage of students' skills

Meeting	Percentage of Student Skills (%)
1	84,72
2	87,5
3	90,27
Average	87,5

The average percentage resulting from the assessment of student attitudes is 90.27 and the average percentage from assessing student skills is 87.5%, thus student learning outcomes for the domain of attitudes and skills meet the good criteria. In children with physical impairment there are disturbances, namely motor and mobility disorders. Motoric disorder is a disability that affects a person's ability to control muscle movements which sometimes limits mobility. The impact of these conditions on learning is that development and participation varies from one child to another. Meanwhile, impaired mobility can be disrupted at several levels/conditions. Some of them are permanent, others are temporary. In addition, disabled children have less ability in motor / movement.

CONCLUSION AND SUGGESTION

Assessment of the competency results of students through 3 domains, namely the cognitive domain obtained a classical completeness score of 0% pre-test and 100% post-test and the pre-test and post-test gain test scores of learning outcomes were 0.78 included in the high category and attitudes and skills were in the effective category is used because it meets the effectiveness criteria.

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