



Development of Teacher Modules for Learning Manipulative Movement for Autistic Students

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Abstract. The problem for Special School teachers today is that they have difficulty delivering manipulative motion material to students with different child conditions. This research and development aim is to develop a teacher module in learning manipulative motion material for class IV SDLB with autism with the Research and Development (R&D) method using the ADDIE model. The researcher uses a questionnaire/questionnaire instrument in collecting data. The research subjects included 2 schools, namely SLB Autism Laboratorium, State University of Malang, and SDLB C Autism Tuban. The subjects of the small group trial were 3 SLB teachers and the large group trial consisted of 22 SLB teachers. Based on the results of the study, the feasibility level was very valid with a figure of 87%. The results of the study can be concluded that the product of developing a manipulative motion training module for SDLB class IV students is feasible to use.

Keywords: Teacher Modules · Manipulative Movement · Autism

1 Introduction

Physical education (PE) can be interpreted through activities to improve physical fitness, motor skills, sportsmanship, and emotional, healthy, and active living behavior through a physical education approach [1]. Physical education is a movement activity that prioritizes physical movement [2]. Physical education is defined as a compulsory subject by the Ministry and Culture of the Republic of Indonesia because it involves physical activity as the achievement of learning objectives that encourage mental, social, and student growth [3]. Education through the experience of physical activity is a process of developing the potential to improve fitness through mental, emotional, moral, physical, and physical fitness [4]. Physical education is a physical activity that combines games and sports with learning orientation in education.

Adaptive physical education is a sport that can enter all worlds of autistic children so adaptive physical education plays an important role for autistic children [5]. Physical education is education that instills physical activity activities ranging from simple to managing sports games by including development that can manage education to increase the development and growth of each individual.

The development and growth of humans are not all normal, moreover, they have limitations in physical education. There is physical education learning for autistic children, namely adaptive physical education which is learning by training motor and physical development to form a healthy lifestyle [6]. Adaptive physical education is an activity of physical activity by instilling positive values by always being positive about its shortcomings and teaching self-esteem ownership and always being confident by socializing learning through fun and joy [7]. Adaptive physical education can be adapted to the needs to be designed and modified as needed by instilling the value of self-confidence motivation in students [8]. Adaptive physical education is a physical activity that leads to fitness, patterns, and basic movement skills designed for people with disabilities [9]. In this case, modifying according to needs and making children able to do things that can make students more confident in themselves through adaptive physical education.

In this study, the movement activities of autistic children were adapted to the adaptive physical education curriculum, one of which was manipulative movement. Manipulative motion is a movement that can train children's coordination with objects around them [10]. Manipulative motion is the mastery of various objects in motion that involves the whole body, especially the hands and feet [11]. Manipulative motion is a motion exercise that can modify a movement exercise so that children do not get bored quickly with a motion exercise [12]. Manipulative motion is a movement that can control an object with the limbs or tools that are controlled [13]. Manipulative motion is a basic motion that can manipulate objects using all parts of the body in a complex manner [14]. Children with autism prefer new things so they will be interested when they are faced with new objects. Interesting explanations through objects will attract students' attention to do things more clearly. In learning manipulative movements for children with autism have been carried out, but only basic manipulative movements such as throwing and kicking. Therefore, researchers provide innovations in manipulative movements that can support students' learning goals following basic competencies in the national curriculum.

One example of a child with special needs is the inhibition of growth and development of cells that occurs due to genetic factors that can attack the brain [15]. Children with special needs (ABK) are children who have the potential to experience problems in learning so they need the help of others to help them in every activity [16]. Children with special needs have sensory, motor, learning, and behavioral stimulation problems that can interfere with the child's physical development so that he does not make directed movements [9]. Children with special needs have barriers to physical development that stimulate children's sensory which affects the growth and development of children [17]. Explaining that children with special needs have certain problems including sensory and motor skills that affect their development to become fully human [18]. From the explanation above, it can be concluded that children with special needs are children who have sensory and motor barriers that affect the development of children to become normal human beings at their age. Children with special needs need a companion or someone who always helps in every way. So that children with special needs can still do things like other friends even though they have to be helped.

One type of special needs is autism with an inappropriate syndrome in the habits of children with sensory, communication, and social system barriers [19]. In general, autistic children have psychological disorders and medical disorders that are interrelated

because what happens is a disturbance in the brain that affects their behavior [20]. Autistic children have their mindset so that they do what they want due to differences in interaction, social, and communication due to delays in the growth and development of their bodies [21]. Autism is a neurological disorder that inhibits the development of abilities and skills based on complex thought patterns [22].

The characteristics of autistic students are students who experience intellectual delays and experience many differences from normal children which can be known through their different abilities [23]. The internal characteristics of autistic children do need assistance because at the time of learning they are difficult to carry out movement activities so teachers are needed to implement learning as interesting as possible so that autistic students can have more curiosity [24].

According to initial observations at SLB Lab UM, there were autistic students in grade IV who experienced a lack of concentration and students found it difficult to carry out manipulative movement activities. So that it affects children's activities that should be able to be carried out by normal people such as communication interactions, movement, thinking abilities, and skills that experience slowness of stimulus due to brain cell disorders. Therefore, it is necessary to have companion assistance to realize the objectives of learning. A teacher needs teaching materials to support learning, one of which is a module [25]. The module is the development of teaching materials that are packaged to be systematic and specific to learn to be efficient and effective [26]. The module is a student guidance tool that provides logically structured material [27]. Learning-based modules are oriented to learning models that help realize the learning process for students [28]. A module is a form of learning media innovation that is arranged with an attractive appearance and the use of easy-to-understand language to assist in learning objectives [29].

Development of teacher modules for learning Autistic student locomotive motion is currently very limited. Previous development put more emphasis on the locomotor motion [30] and non-locomotor [31]. Specific development of manipulative motion material has not been carried out but rather emphasizes the variation and combination of the basic motion of locomotor, non-locomotor, and manipulative [32, 33]. Based on these conditions, it is necessary to develop a teacher module for manipulative material for autistic grade 4 autistic students. This manipulative motion learning module for SDLB grade 4 students has the advantage of having manipulative motion videos packaged in barcode scans and YouTube links so that they are easy to access.

From the initial needs analysis, in the current condition of PE learning in various SLB teachers stated that 48% of PE learning had been carried out well, 85% of teachers had done manipulative motion training material, but what happened 90% of teachers experienced problems when providing manipulative motion training material., then there are 38% of teachers who use modules in PE learning, and 90% of teachers agree with the development of manipulative motion exercises in PE learning modules. Based on the results of the initial needs analysis above, the hypothesis is concluded that the development of teacher learning modules for manipulative movement training materials for SDLB class IV students is still very rare to find modules so it is necessary to update learning resources accompanied by the development of manipulative movement training modules. Facts in the field, the implementation of learning is very necessary for

the development of manipulative motion training modules because flexibility in learning also affects learning. After all, students feel that the place where students learn is only a school. Based on the results of the survey, the implementation of PE learning has been declared good with the condition of the learning program design under the adaptive curriculum, then PE teachers have a physical education background [34]. In general, PE teachers mostly have special education teacher backgrounds, not from physical education, therefore in implementing PE teachers need teaching material guidelines in the form of modules. This development can help teachers and students in adaptive physical education learn to practice manipulative movements anywhere and anytime because of this manipulative movement training module which will be practically used anytime and anywhere effectively and efficiently. Researchers hope that the manipulative motion exercise module can be a solution to the limitations of students' physical activity independently.

2 Method

The research method used is Research and Development (R&D) is a research method that produces products by looking at the effectiveness of a product. The reference for the ADDIE 5-step research model is (1) Analyze, a needs analysis related to the development of manipulative motion training modules for grade IV in special schools. (2) Design, namely the module is the product design (prototype) of this research. (3) Development, an assessment stage is carried out by PE expert validators, characteristics of autistic children, and learning media experts, as well as suggestions for product improvement before testing. (4) Implement (Implementation), the product trial stage in small groups and large groups, namely SLB teachers provide an assessment through a questionnaire that has been prepared by researchers. (5) Evaluation, the last stage is product evaluation based on trials by reviewing how effective this module is, as well as refinement and preparation of the final product [35].

The subjects of this study used 2 types of samples, namely 3 teachers at SLB LAB UM for a small group trial and 22 teachers at SLB C Tuban for a large group trial. This study uses the 2016- BSNP instrument [36] in the form of expert validation questionnaires and teacher responses. The assessment of the questionnaire uses a tick on the selected value in the column which is worth 5 (very good), 4 (good), 3 (good enough), 2 (poor), and 1 (not good). The questionnaire that has been filled out by the research subjects produces quantitative descriptive data from the assessment of the manipulative movement exercise module for SDLB grade 4 students so the data analysis technique uses descriptive quantitative statistical analysis [37].

3 Result and Discussion

3.1 Result

Referring to the Core Competencies (*Kompetensi Inti*) and Basic Competencies (*Kompetensi Dasar*) of the Physical Education SDLB Autism curriculum, it turns out that a

development product is very much needed, namely learning modules. Product development will go through the expert validation stage to determine the feasibility of the manipulative exercise module product. This section describes the research and development method, namely ADDIE.

3.1.1 Analyze

Analysis at this stage is the analysis of product development needs. This activity consists of several stages, including.

3.1.2 Curriculum Analysis

Subject achievement can be reviewed through curriculum analysis by looking at the PE curriculum at SDLB Autism. Curriculum analysis refers to core competencies and basic competencies according to class. The suitability based on SDLB Autism Laboraturium UM applies. The results of the study were obtained from the curriculum as shown in Table 1.

3.1.3 Concept Analysis

Analyzing concepts and compiling material to be presented in the manipulative exercise module. This concept becomes a reference in the preparation of the manipulative motion training module (Table 2).

Table 1. Curriculum analysis.

No.	School Level	Class Level	Basic Competency
1	Elementary School	IV	3.1. Recognize variations in basic manipulative movement patterns in the form of simple games and/or modified traditional games 4.1. Practicing variations of manipulative basic movement patterns in the form of simple games and or modified traditional games

Table 2. Concept analysis.

Concept	Movement Task
Manipulative Movements	<ul style="list-style-type: none"> • Doing the motion of kicking the ball as far as possible • Doing the movement of kicking the ball to a goal • Doing the motion of throwing the ball into the basket • Do the movement of throwing the ball to the color that has been ordered • Make a ball rolling motion like playing bowling

Table 3. Analysis of learning resources.

Learning Resources	Description
Curriculum Guidelines	Curriculum 2013 regarding Core Competencies and Basic Competencies
Fundamental Motor Skill	Understanding Motor Development Infant—Children—Adolescents [38] Understanding Physical Education [39]

3.1.4 Analysis of Learning Resources

Analyzing learning resources that will be used in the implementation of the module by collecting various references to learning resources. Some of the learning resources that will be studied include (Table 3).

3.1.5 Design

This stage consists of several activities, namely.

3.1.6 Designing Exercise Modules

Designing an exercise module by including several things including (Table 4).

3.1.7 Designing Learning Media

The media developed in this study is a module with the help of audio-visual media using a QR Cthathich contains instructions for motion exercises starting from the warm-up, main, and cool-down stages.

3.1.8 Develop

At this stage, several development activities are carried out, namely: Design the movement module by making some manipulative movement exercises (Fig. 1).

3.1.9 Perform Validation Test

VA validation test is carried out by giving a questionnaire to the validator to assess the feasibility of the device. Validation is done by assessing the feasibility of the production one expert to assess the characteristics of autistic children, one expert to assess the material, and one expert to assess the media.

The characteristic expert validation questionnaire resulted in the development of a deceptive movement training module product for SDLB grade 4 students, suitable for group testing by making revisions to the product, namely the title specification, instructions for using the module, and writing sub-chapters on the manipulative movement training barcode to make it easy to use (Table 5, Fig. 2).

Table 4. Components of teacher module.

Components of Teacher Module	
Concept Map:	A concept map contains an interconnected visual presentation of an important idea
Introduction:	The introductory sheet contains identity, basic competencies, a brief description of the material, instructions for using the module, and learning materials
Exercise:	Manipulative Movement
Ability Target:	Throws and Kicks
Age Group:	9–10 years old
Equipment:	Big balls, small balls, baskets, cones, bottles, colored paper
Duration:	15–20 min
Mentor:	Teacher
Preparation Stage:	Warming-up with video provided on the barcode
Main Stage:	Main activity-1 and Main activity-2 equipped with videos provided on the barcode
Colling down Stage:	Cooling down with the video provided on the barcode
Practice Question:	Practice questions from student learning activities according to the material
Evaluation:	Evaluation of student practice complete with answer keys

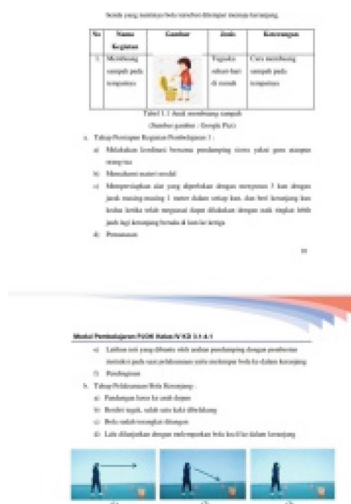


Fig. 1. Developed module

Table 5. Expert validation results of child characteristics.

	Aspect	Eligibility	Category
1	Content	84%	Very Valid
2	Language	84%	Very Valid
3	Presentation	83%	Very Valid
	Average	84%	Very Valid

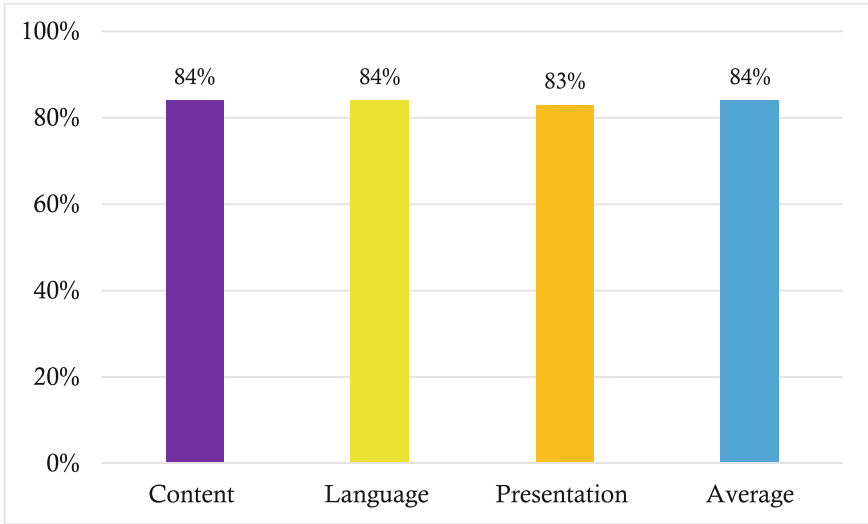


Fig. 2. Percentage of expert validation results of characteristics of autistic children.

Table 6. Validation results of physical education learning.

No	Aspect	Eligibility	Category
1	Contents	96%	Very Valid
2	Language	100%	Very Valid
	Average	98%	Very Valid

Questionnaire validation by physical education learning experts showed that the product development of the manipulative exercise module is suitable for group use. The revision made is a reminder that this module is used for autistic children with accompanying guidance to make it more effective and efficient in carrying out manipulative motion exercises (Table 6, Fig. 3).

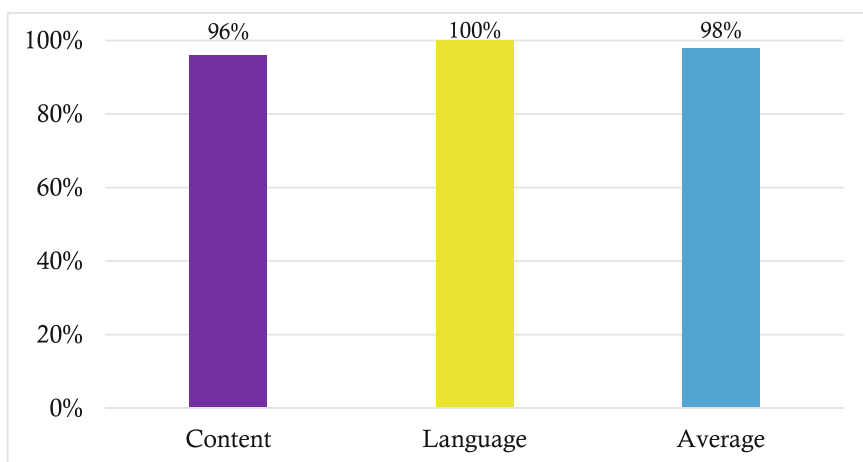


Fig. 3. Percentage of results of physical education learning expert analysis.

Table 7. Validation results of learning media experts.

No	Aspect	Eligibility	Category
1	Presentation	100%	Very Valid
2	Graphical Feasibility	98%	Very Valid
	Average	99%	Very Valid

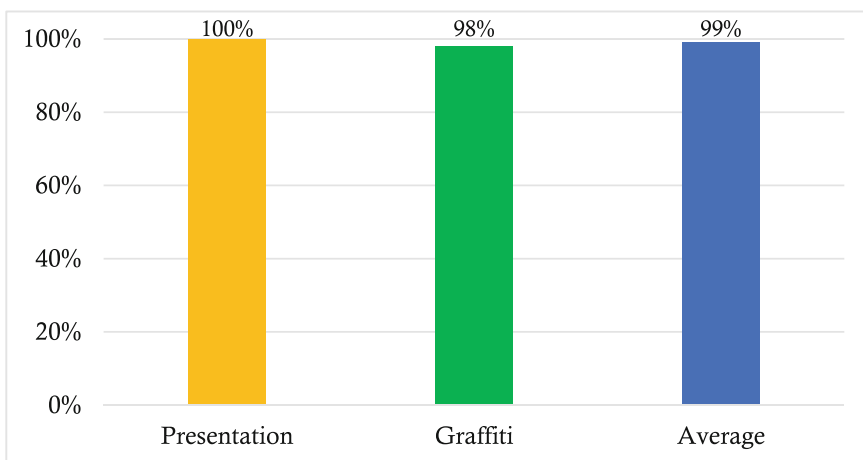


Fig. 4. Percentage of validation results of learning media experts.

Table 8. Revision of teacher module.

No.	Validator	Feedbacks
1	Expert for Autistic Children	Instructions for using the module Added barcode sub-chapter to make it easier to find
2	Expert for PE Learning	The title specification is more explained The module is further explained for whom the module can be used
3	Learning Media Expert	Add the correct class for the title and more specified

Table 9. Small group trial results.

No	Aspect	Eligibility	Category
1	Suitability	73%	Fairly Valid
2	Attractiveness	67%	Fairly Valid
3	Convenience	76%	Fairly Valid
4	Usefulness	77%	Fairly Valid
	Average	73%	Fairly Valid

An analysis of the validation questionnaire of learning media experts resulted in the development of a manipulative motion training module for SDLB grade 4 students, it was appropriate to use because the product was good (Table 7, Fig. 4).

3.1.10 Module Revision

Suggestions and inputs through the assessment of the validator are reviewed and then taken into consideration to revise the module (Table 8).

3.1.11 Implementation

At this stage, it is a validation result that will be tested on students to obtain data on the feasibility of the manipulative movement module (Table 9, Fig. 5).

Table 9 can conclude that the percentage of eligibility level obtained by an overall average score of 73%, the feasibility qualification table converted to the product development of the manipulative motion exercise module for SDLB grade 4 students can be used with minimal revisions. The data obtained from the results of the large group trial in this study were obtained from the distribution of questionnaires to 22 teachers in special schools. The percentage of scores is based on a questionnaire/questionnaire using a Likert scale with the results in Table 10.

The large group analysis Table 10 can be concluded through the percentage level of eligibility with an overall average score of 87%, the table is converted to feasibility in

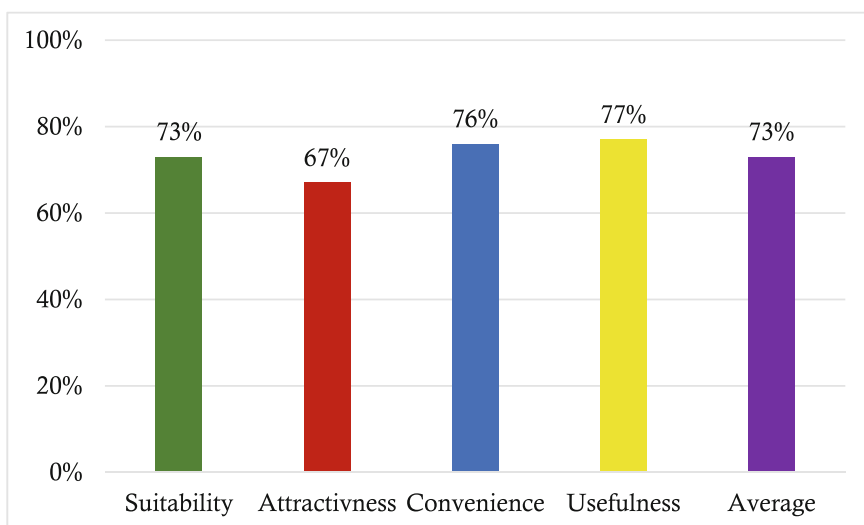


Fig. 5. Percentage of small group trial.

Table 10. Large group trial results.

	Aspect	Eligibility	Category
1	Suitability	90%	Very Valid
2	Attractiveness	85%	Very Valid
3	Convenience	84%	Very Valid
4	Usefulness	88%	Very Valid
	Average	87%	Very Valid

the product development of the manipulative motion exercise module for SDLB grade IV students can be used without revision (Fig. 6).

3.1.12 Evaluate

At this stage, the teacher module on learning manipulative movement exercises for SDLB Grade 4 students was analyzed and a final revision was made.

3.2 Discussion

The purpose of this research and development is to produce a useful module for learning autistic children effectively and efficiently. This development is to help teachers with learning difficulties because learning resources for manipulative motion exercises are rarely found. This research and development resulted in a module that was very valid through the trials that had been carried out. The learning module contains a cover,

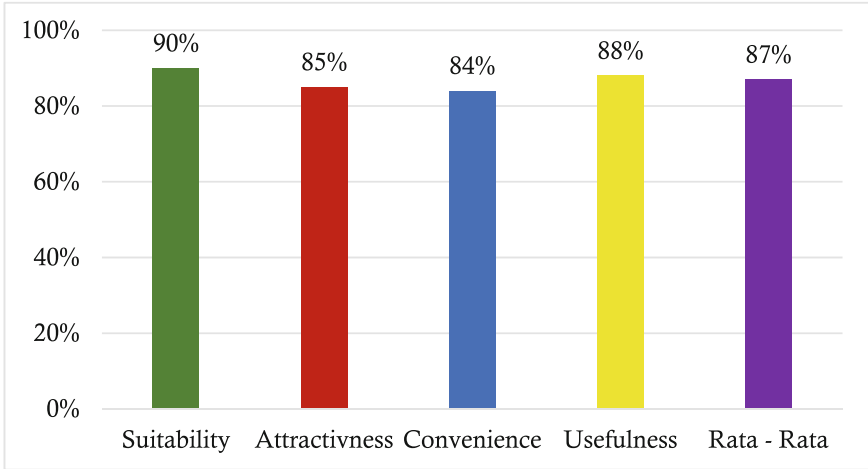


Fig. 6. Percentage of large group trial.

introduction, how to use, table of contents, concept map, and materials [40]. The characteristics of the module from the journal are already in the module that the researcher made by using additional questions and evaluations so that the module is more complete.

A guide to teaching materials is developed in a systematic and structured manner for efficient and effective implementation of learning because the teaching materials have been designed in the module. The advantages of this module are that it is easy to use because there are instructions for use, and the learning process is very clear because it is accompanied by videos which are very helpful for teachers in learning. This module is also equipped with questions, self-assessments, and evaluations so that they are effectively and efficiently applied in the PE learning process in schools.

Elementar-school-age children are a developmental age in pre-skills including reflective and sensory [41]. Exercise not only improves physical fitness but also improves the health of the whole body by reducing stress and anxiety so that it increases self-confidence and improves the cognitive way of thinking of the autistic child [42]. Physical activity includes body movements so that the motor skills performed by autistic children can help build cognitive knowledge and maintain the physical fitness of an autistic child [43]. Physical activity can affect a child’s behavior because it can stimulate the child’s mindset following the condition of the child’s body [44]. The daily life of autistic children can be regarded as an exercise in learning movement skills of children because it trains the physical activity of autistic children to move their motor skills to get used to it so that they experience an increase in their growth and development.

Physical fitness can be used as a home activity that can help children’s physical development to be more optimal. Autistic children need to be involved in physical activity because with physical activity, autistic children can train in terms of socialization or practice being real humans to improve learning outcomes by growing every day [45].

Early childhood prefers simple symbolic commands that be explained clearly [46]. Autistic children often if not explained or through reading need verbal assistance can be through audio and visual [14]. Manipulative movement exercises need special attention

because of the current lack of psychomotor abilities in early childhood [47]. The explanation also supports the development of this product including learning materials that can be used in student learning. The implementation of this learning material is knowing and practicing manipulative movement exercises into directivities and traditional games that are modified and adapted to the KI and KD SDLB class IV.

The implementation of learning uses large balls and small balls that have been modified to make it easier for children according to KI and KD for SDLB class IV students. Researchers analyzed learning resources, learning media, and characteristics of students based on facts in the field. Students only have one learning resource in the form of a printed PE book so it is less relevant when offline and online learning is carried out but only refers to offline activities. So this module is intended to help autistic students continue to do PE learning anywhere and anytime. Autistic students can use this module with the help of a companion to make it more effective.

The results of the research and development of the teacher module on manipulative movement learning for class IV SDLB with autism are very valid research development. Judging from the product issued in the form of a module and has been tested, which is very helpful in learning adaptive physical education. Autistic students are also enthusiastic because there are games from simple manipulative movement exercises that make students curious so students want to repeat the games in the module.

4 Conclusion

Based on the results of data analysis in research on the development of manipulative motion training modules for SDLB class IV students, it is concluded that the module is suitable for use in the process of teaching and learning activities in physical education, sports, and health through offline and online effectively and efficiently so that children can still do movement exercises even though they are not was at school. This module also expects students' interest in manipulative movement exercises because they are equipped with pictures and videos to make learning easier.

Research and development on the teacher module in learning manipulative movement exercises is the answer to the constraints of special education teachers for learning manipulative movement exercises. This research and development have several limitations, namely, the module is only intended for fourth-grade SDLB students. Future research is expected to provide more interesting movement innovations or add other grade levels to make it easier for all students to learn physical education.

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