

# Developing Multiple Intelligences Based and Cooperative Learning Media to Improve Students' Cognitive, Affective, and Psychomotor Learning Outcomes at Public High School in Majene

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**Abstract:** The research design used R&D (research and development) which the main objective was to measure the quality of Multiple Intelligence Based and Cooperative Learning Media to Improve Students' Cognitive, Affective, and Psychomotor Learning Outcomes at Public High School in Majene. The desired product in this study was the multiple intelligence based and cooperative learning media which was valid, practical, and effective. The product consists of five components, namely: syllabus, lesson plan (RPP), student's book (BPD), student's activity sheet (LKPD), and learning result test (THB). The trial of this media was conducted in two different classes at a public high school that is SMA Negeri 3 Majene located in West Sulawesi. The result--after having two-time trial--showed that multiple intelligences based and cooperative learning media was valid, practical, and effective. It was considered as valid because the assessment of all components done by the valuator have met the elements of validity. It was also considered to be practical because the components were fully implemented, and the teachers' ability in learning management was categorized as 'high'. Similarly, it was an effective media because the students' learning outcomes have increased which categorized as 'high' and the students' activities in learning has fulfilled the estimated time. Also, the result of students' questionnaires provided positive responses to this media.

**Keywords:** Learning outcomes, multiple intelligence, cooperative, learning media

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## I. Introduction

Teacher's expectation in learning includes that students can achieve the best learning outcomes according to planned learning objectives. But in fact, not all students can achieve maximum learning outcomes. Several efforts to overcome biological learning difficulties have been done, even continuously strived. These efforts include: (1) teacher upgrading; (2) teacher education qualification; (3) curriculum renewal; (4) the application of new learning model or method. Those are implemented, among others, by paying attention to the causes of the difficulty, either sourced "within" or "outside" the students. It is often spotlighted that the cause of difficulties derived from "student's self" as if there is no other cause for difficulty that comes from "outside" such as "ways of presenting learning" or "learning atmosphere".

Pursuing this further, Trianto (2010) stated that the low achievement of students in the field of biology is closely related to the learning process that is still conventional and does not interact with the students' dimension of themselves and what actually learning is. Nowadays, the learning process still gives teacher dominance (teacher-cantered) and does not provide access for students to develop independently through discovery in the process of thinking.

Biology learning activity as a process of discovery is also expected to change the behaviour, which includes the behaviour with respect to affective, cognitive, and psychomotor aspects (Trianto, 2010). However, the empirical fact that occurred in many schools, specifically in biology learning, also still focused on the cognitive domain; less attention to the affective and psychomotor aspects as shown in the final evaluation held nationally known as *Ujian Nasional* (National Examination). Nevertheless, the education in the affective and psychomotor domains is part of the process of students' character building that is actually far more important than cognitive education.

In the same way, each student has potential assessment on learning outcomes for cognitive, affective, and psychomotor aspects, but the level varies between students from one another (MoNE, 2008). Therefore, these three abilities should be part of the assessment for learning outcomes, so as to provide an overview of the students' abilities that is cognitive, affective, and psychomotor aspects. Another fact related to the assessment of learning outcomes as revealed by Mulyadi (2003), a practitioner of children education, stated that it is a big

mistake to measure the students' ability by considering their logic-math and language skills and put aside the fact that students have different abilities and multiple intelligences.

In Curriculum 2013, all subjects should contribute to the formation of attitudes, skills, and knowledge. Two modes of learning process that take place are the process of direct and indirect learning. The process of direct learning is the process of the students developing knowledge, thinking ability, and psychomotor skills with a scientific approach (observing, asking, gathering information, associating, and communicating). While indirect learning process is a learning process that develops moral and behavior-related attitudes. From these facts, it appears that students are required to actively optimize the intelligence and possess talents. This is in line with the function of national education as stipulated in UUSPN No. 20, Year 2003, Article 3, that is for the sake of the students' potential development to become human beings who believe and fear to God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become citizens of a democratic and responsible (Sanjaya, 2010).

The mentioned facts are also explained based on preliminary studies conducted by the researcher at SMA Negeri 3 Majene. The results showed that: (1) there were some students who achieved low score in biology subjects or under the passing score (*KKM*); (2) media for learning use has not included psychomotor and affective aspects (scientific attitude) optimally and without well-preparation, ranging from syllabus making planning, lesson plan (*RPP*), student's book (*BPD*), student's activity sheet (*LKPD*), and assessment system which focused only on cognitive aspect; (3) frequent use of media developed by other people (publishers) in the form of teaching media or books package, whereas *LKPD* used are not in accordance with the ability of students and facilities owned by the school; (4) the absence of student's book and *LKPD* for biology subject that contains affective aspects in the process of teaching and learning; (5) less practicum (psychomotor aspects); (6) the learning process in the classroom is still less student-centered, the biology learning is dominated by using lecture-method, question and answer method, discussion and demonstration. In the learning process, teachers only focuses on the learning media as demanded by the curriculum and only prepares the students for test and exam; (7) lack of student's initiative in raising question to teacher regarding the given material; (8) still apply a learning system that only demands the students to have a single intelligence that is intellectual intelligence (logical mathematic and linguistic) not a pluralistic intelligence; (9) the tendency of students to accept only media taught, without interest to do sustainable and deep examination; (10) lack of teacher's ability in designing and implementing the challenging learning.

There have been many developments of various models, strategies, methods, and learning media used in learning process. Most of them still refer to the ability of speaking, memorizing, and counting and learning that has not included the three aspects of the assessments, i.e. cognitive, psychomotor, and affective without optimal and well preparation including the syllabus planning making, lesson plan, student's book, student's activity sheet, and assessment system.

The low creativity of teachers, the activities, and the achievement of learning outcomes of the students, indicate that the learning process done so far has not been effective. In response to the problems stated, it needs an innovation from the teachers. By considering the characteristics of students who have different intelligence and low background, it is needed to develop learning media that enable the sharing of knowledge among peers and between the students and teacher. They need to be given the opportunity to learn interactively and cooperatively with friends by developing an understanding of important concepts and principles based on their prominent intelligence. The learning model that supports this problem is cooperative learning (Ibrahim & Nur, 2002). Therefore, it is necessary to develop learning media by applying cooperative learning model based on multiple intelligences.

In essence, multiple intelligences based and cooperative learning media is a media which uses cooperative learning model that seeks to optimize the multiple intelligence of each individual (student) to achieve certain competencies. Through combining various intelligence that are owned by the students who learn with a variety of learning methods, it can provide opportunities for them to learn actively, respect each other and interact with group members, share roles with tolerant attitudes, assess the contribution of each individual to group members, readily give and receive between groups, and apply centralized learning (Isaac in Masaong, 2012). Thus, in the learning practice at the school, it is better if a teacher obtain the data regarding the tendency level of multiple intelligence of each student.

According to Gardner (2003), one person has nine different intelligence, namely logical-mathematical, kinetic, linguistic, musical, visual-spatial, interpersonal, intrapersonal, naturalist and existential intelligence. Those are known as multiple intelligences. Gardner stated that everyone possess these nine intelligence. It only differs from its composition and degree of mastery for each person. Yet, the existing schools do not explore or provide sufficient development space for potential students.

A research by Eisner (2004) from Stanford University stated that the concept of multiple intelligences is in accordance with the current educational policies that tend to focus on a learning process which meets the students' need. The development of multiple intelligences can be inserted in the learning through the use of

varied learning methods. In line with that, a research by Sugiharti (2005) showed that the application of multiple intelligences in learning can develop students' learning spirit and self-confidence.

In addition, developing activities and students' creativity can be improved through interacting with other students and teachers. Further researches on the use of multiple intelligence theories conducted by Campbell (1990), Chan (2000), Nurdin & Suyata (2004), Ali & Zaman (2006), Özdemir et al. (2006), Gandasari (2009), Samosir (2009), and Simatupang (2010) indicate an increase in achievement or learning outcomes including cognitive, affective, and psychomotor domains based on student's existing intelligence. Therefore, it is assumed that biology learning which uses multiple intelligence based and cooperative learning media is in accordance with giving students the opportunity to learn actively, respect each other and interact with group members, share roles with tolerant attitudes, assess the contribution of each individual to group members, readily give and receive in the group that is ultimately expected to improve cognitive, affective, and psychomotor learning outcomes among the students.

#### Research Problem

The problem of this research considers *how does the quality of multiple intelligences based and cooperative learning media developed to improve the students' cognitive, affective, and psychomotor learning outcomes at Public High School in Majene?*

#### Research Objective

The objective of this research is to produce qualified multiple intelligence based and cooperative learning media after going through a series of development stages.

#### Research Benefits

The benefits of this research are (1) producing multiple intelligences based and cooperative learning media which expected to improve the students' cognitive, affective, and psychomotor learning outcomes at Public High School in Majene; and (2) generally contributing as a teacher's reference, specifically for biology teachers at high schools regarding multiple intelligence based and cooperative learning media.

## **II. Research Method**

#### Research Type

The type of the research was a development research. Through initiating the development research, a preliminary study was conducted to analyze the characteristics of the students and the learning media used by teachers which showed that multiple intelligences based and cooperative learning media needed to be developed. The results of preliminary research were used as supporting media in the development of learning media.

#### Research Object

This research was conducted in Grade XI at SMA Negeri 3 Majene, Academic Year 2016-2017. The characteristic of all classes in Grade XI was relatively similar because the process of forming the class was selected randomly, not by the level of ability. This research selected two of four classes in Grade XI that is Class XI MIA1 and Class XI MIA2.

#### Research Variables

The main variables in this study were multiple intelligence based and cooperative learning media while other variables considered or involved in the process of developing the media were (1) the students' cognitive, affective, and psychomotor learning outcomes; (2) the effectiveness of the normative learning media, i.e. the suitability between instructional media theoretically with its implementation in the classroom; and (3) the effectiveness of correlative learning media that can be observed in the students' activities during learning process.

#### Preliminary Research

A preliminary research was undertaken to reveal an initial overview of the students' characteristics and the learning media used by teachers in the implementation of biology learning for high school standard. It also concerns with early descriptions of the biological value in students' learning outcomes.

#### Research Development

The learning media developed in this research was multiple intelligence based and cooperative learning media to improve the cognitive, affective and psychomotor of the students' learning outcome. The stages of

developing this learning model refer to development model proposed by S.Thiagarajan, Semmel and Semmel (Four-D model).

The stages of developing multiple intelligences based and cooperative learning media to improve the cognitive, affective, and psychomotor of the students' learning outcomes are described as follows:

a. Defining Stage

The purpose of this stage was to define what is needed in learning. This stage was essentially an early stage which contained analysis (initial condition analysis, student analysis, media analysis) and set the learning objectives.

b. Design Stage

The design stage aimed to design a draft of multiple intelligence based and cooperative learning media to improve students' cognitive, affective, and psychomotor of the students' learning outcomes. The activities in this stage included test preparation, media selection, format selection, and initial design of learning media.

c. Development Stage

The purpose of the development stage was to produce learning media that is valid, practical, and effective. This stage includes: (1) expert consideration; (2) test implementation for prototype I in Grade XI MIA1, SMA Negeri 3 Majene, Academic Year 2016-2017; (3) revision of prototype I based on test result and consideration of the researcher, experts, and teachers. This revision activity was carried out on necessary matter for each component of the model. From the results of this review, prototype II was designed to be tested. Furthermore, it was revised again on the components that are considered necessary, then be tested again (trial II). The learning media for the prototype II was the concept of Animal Structure and Function. In this trial II, it used final prototype of multiple intelligence based and cooperative learning media to be tested in Grade XI MIA2, SMA Negeri 3 Majene.

Technique of Data Analysis

The data analysis of this research was done with reference to the research problem formulated. Based on it, the analysis was done in two ways, that is quantitative and qualitative ways. To answer the problem of learning outcomes, the researcher used descriptive statistical analysis with N-gain normalization test. In addition, to clarify the interpretation of the analysis results, the data acquisition was also described in the form of tables, percentages, and diagrams.

For development research, the activity of dominant data analysis was qualitative and actually has been implied in all series of activities undertaken in each stage of learning media development. This analysis was conducted in all components of instructional media by considering teaching and learning activities and the learning effectiveness.

### **III. Results And Discussion**

The results obtained at each development stage related to the process of developing multiple intelligence based and cooperative learning media are described below:

Stage 1: Defining

The preliminary results from the overview of the current condition relate to the students' characteristics, biology learning media in SMA Negeri 3 Majene, and the description of the biology learning outcomes from the students, whether obtained through preliminary surveys, direct observation, or non-direct observation. Prior to conducting this research, the researcher identified students' multiple intelligence, learning media used by teachers at the school and the students' learning outcomes by providing a composite questionnaire, a questionnaire to a biology teacher at SMA Negeri 3 Majene, and interviews with teachers and students. Based on the results of the initial assessment, it was revealed that the students at the school have a diverse intelligence; in general, the biology teachers still used learning media that had been prepared by the curriculum without any modifications prior to the characteristics of the students and their learning outcomes for the subjects are mostly completed after going through the remedial process. However, for every daily test, the results of biology learning results showed fewer than 75%. It suggested that there is a need for a biology learning media which concerns to the development of multiple intelligences by the students through an application of cooperative model is able to improve their cognitive, affective, and psychomotor learning outcomes. The learning media was expected to be valid, practical, and effective.

## Step 2: Designing

In this phase, the designed learning media established the format and selection of the following related elements: (1) syllabus; (2) lesson plan (*RPP*); (3) student's book (*BPD*); (4) student's activity sheet (*LKPD*); and (4) learning outcome test (*THB*).

The successful design of syllabus was based on Curriculum 2013 (*K13*) with a scientific approach involving the multiple intelligences of the students on the biology material of the structure and function on plant and animal tissue. The successful lesson plan (*RPP*) was designed based on the syntax of cooperative learning model with involving prominent students' multiple intelligence by considering their association with other components such as reaction principles, social systems, and the impact of instructional and companion impact. The results of the book design of students (*BPD*) refer to the material structure and function on plant and animal tissue based on multiple intelligence and *LKPD* design which based on basic competence (*KD*). While learning objectives and implementation guidance based on students' multiple intelligence.

At the early design of knowledge test, it successfully designed 20 points on description-type item. The draft of the test was prepared based on the formulation of learning objectives along with the key answers. The manuscripts generated problems which included problem-based theory and practice-based problem that involved students' multiple intelligence. During the early design of the affective aspect assessment, it successfully designed an assessment sheet containing the students' name, the aspects of scientific attitude (religious, honest, discipline, responsible, care of environment, and cooperative), attitude statements, observation results, and acquisition scores. On the other hand, during the initial design of the psychomotor aspect assessment, it successfully designed an assessment sheet that containing the students' name, the indicators of skill aspect, and scoring. The design of the test was done based on the results of preliminary observation regarding the biological media that was considered difficult and the lack of scientific attitude and the practicum skill at SMA Negeri 3 Majene.

## The Results of The Research Instrument's Design

The validity's instruments generated in the design stage were to define the aspects of the assessment and the indicators of following related aspects, for instance: (1) the validation sheet of the learning media development that needs analysis; (2) the validation sheet of the multiple intelligence identification questionnaire; (3) the validation sheet of the cooperative learning media based on multiple intelligence; (4) the validation sheet of learning media's implementation; (5) the validation sheet on teacher's ability in learning management; (6) the validation sheet of students' activity; (7) the validation sheet of response questionnaire; and (8) the validation sheet of syllabus, *RPP*, *BPD*, *LKPD*, and test result.

The successful design of the practical media includes the following observation sheets: (1) Observation sheets of learning media implementation; and (2) Observation sheet of teachers' ability in learning management. While the instrument's design of effectiveness included: (1) test sheets of cognitive, affective, and psychomotor learning outcomes; (2) observation sheet of the students' activities; and (3) student's response questionnaires.

## Stage 3: Developing

### a. Test Results on Trial Evaluation

The results of the syllabus validation for one syllabus was developed with the value of = 3.58 (very valid). In line with that, *RPP* was developed into two which had the same value that was equal to = 3.64 (very valid). The student's book (*BPD*) was developed which only consisted one *BPD* and obtained validity that was equal to 3.78 (very valid). *LKPD* was developed which only consisted one *LKPD* with validation value of = 3.85 (very valid). While for test result (*THB*) was developed into three received unequal mean total values, that is cognitive = 3.92 (very valid), affective = 3.73 (very valid), and psychomotor = 3.97 (very valid). Thus, in terms of the overall aspects of learning media such as syllabus, *RPP*, *BPD*, *LKPD*, and *THB* were stated to successfully meet the criteria of validity.

In summary, the results of the validity analysis of the instruments showed that: (1) the assessment result of the learning needs and media development obtained the total average value = 3.49 (valid) with reliability coefficient  $R = 0.89$ ; (2) the result of identification questionnaire with the multiple intelligence in all aspects showed = 3.48 (valid) with the reliability coefficient  $R = 0.82$ ; (3) the result of the teacher's observation in learning management including all aspects showed = 3.95 (very valid) with the reliability coefficient  $R = 0.97$ ; (4) the assessment result of observation sheet for learning media in all aspects showed = 3.8 (very valid) with reliability coefficient  $R = 0.95$ ; (5) the result of activity observation sheet for all aspects showed = 3.83 (very valid) with reliability coefficients  $R = 0.97$ ; and (6) the result of the questionnaire assessment of students' response in all aspects showed = 3.91 (very valid) with reliability coefficients  $R = 0.9$ . Thus, if we consider from all aspects, the entire sheets of the instrument were stated to successfully meet the criteria of validity.

b. Test Results on Practicality

Based on analysis result of syntax component implementation during trial I, it was showed that the average score of syntax component implementation  $M = 1.71$ , social interaction component  $M = 1.57$ , reaction principle component  $M = 1.58$ , support system component  $M = 2$ , and the impact and impact components  $M = 1.82$ . Thus, it can be concluded that the average of all components from the media implementation was performed entirely ( $1.5 \leq M \leq 2.0$ ). While in trial II, the average score of syntax component implementation was  $M = 1.77$ , social interaction component  $M = 1.77$ , reaction principle component  $M = 1.75$ , support system component  $M = 2$ , component the impact of instructional and the impact of companion  $M = 2$ . Thus, it can be concluded that the average of all components of the media implementation in trial II was done entirely ( $1.5 \leq M \leq 2.0$ ).

The analysis result for teacher's ability in managing multiple intelligence based and cooperative learning media on trial I was the mean value of teacher's ability in learning management on preliminary activity of  $(KG) = 4,18$  (good), core activity equal to  $(KG) = 4$  ( $KG) = 4.94$  (excellent), time management ability  $(KG) = 4.63$  (very good), and class atmosphere aspect  $(KG) = 5.00$  (very good). While on trial II, the average value of teachers' ability in learning management on preliminary activity was  $(KG) = 4,58$  (very good), core activity of  $(KG) = 4,57$  (very good), closing activities ( $KG) = 4.82$  (excellent), time management ability  $(KG) = 4.75$  (very good), and class atmosphere aspect  $(KG) = 4.94$  (very good). So, in terms of all aspects in learning management, multiple intelligence based and cooperative learning media on trial I and II were stated to meet the criteria of practicality.

c. Test Results on Effectiveness

The test results on the effectiveness of multiple intelligences based and cooperative learning media for each trial were analysed through the observation of the students' activity, the questionnaire of students' response, and the test of learning outcomes (THB). In trial I and II, the observation of the students' activity showed that 8 of 10 categories fulfilled based on *PWI* Tolerance Interval (%). This showed that in terms of aspects of the students' activity, the media on trial I and trial II has met the criteria of effectiveness.

Based on the results of the students' response, it was found that from 19 students in trial I and 21 students in trial II, it acquired positive response to the learning media, the learning atmosphere in the classroom, the way teacher taught, the language used in learning media. The students felt enthusiastic to do practicum activities. This showed that in terms of the response aspects, multiple intelligence based and cooperative learning media in trial I and II has met the criteria of effectiveness.

Pursuing this further, based on the result of cognitive achievement test which was obtained in pre-test and post-test in trial I, the classical completeness gained 84,21% for learning mastery and the average N-Gain value as a whole was 0,68 or in the medium category. This suggested that the media in trial I was considered effective to improve the students' cognitive learning outcomes. While in trial II, the classical completeness gained 80.95% for learning mastery. Based on the calculation of normalized gain analysis (N-Gain test), it was found that the average value of N-Gain as a whole was 0.72 or was in the high category. This suggests that the media in trial II was also considered effective to improve the students' cognitive learning outcomes.

Based on the results of the affective learning test using the observation sheet in trial which obtained the data within three meetings, it showed that the most students have a religious attitude, honest, discipline, responsible, care of environment, and cooperative with the score in the range of 8-12 after implementing the learning media. These scores were in the positive category. While the results of affective learning test using the observation sheet in trial II which obtained data within three meetings, it showed that most students have affective scores in the range of 7-12 after implementing the learning media. These scores were in the positive category.

Similarly, based on the results of psychomotor learning test using the observation sheet in trial I which the data obtained within two practicums, it is showed that most students have psychomotor skill which were categorized fair with the total average of 2.28. While the results of psychomotor learning test using the observation sheet in trial II which the data obtained from two practicums, it is showed that most students have psychomotor skill which was categorized fair with the total average of 2.36. Therefore, in terms of overall indicators of validity, practicality, and effectiveness, it can be concluded that the multiple intelligence based and cooperative learning media through the implementation of trial I and II was stated to meet the criteria of validity, practicality, and effectiveness.

Stage -4: Distributing

The distribution of the multiple intelligences based and cooperative learning media was done through published scientific journals in certain website.

#### IV. Conclusion

Based on the results of the research, it can be concluded as follows:

1. Multiple intelligence based and cooperative learning media to improve the cognitive, affective, and psychomotor learning outcomes of the students at SMA Negeri 3 Majene has met the criteria of validity which based on the validation results of experts and practitioners on the components of developed learning media;
2. Multiple intelligence based and cooperative learning media to improve the cognitive, affective, and psychomotor learning outcomes of the students at SMA Negeri 3 Majene has met the criteria of practicality because the implementation has been done entirely and the teacher's ability in learning management considered as high;
3. Multiple intelligence based and cooperative learning media to improve cognitive, affective, and psychomotor learning outcomes of the students at SMA Negeri 3 Majene has met the criteria of effectiveness, because the activities have been achieved based on the standard criteria of ideal time, where most students positively responded to the media that resulted in significant increase for their learning outcomes.

#### Suggestions

Based on the results of this research, it can be suggested as follows:

1. There should be policy makers to train teachers on multiple intelligence based and cooperative learning media to emphasize the benefits of using the media as the findings of this research;
2. Multiple intelligences based and cooperative learning media was tested using population in SMA Negeri 3 Majene. Therefore, it is suggested that further researches can use larger population, so that the results obtained are more valid.
3. The development of multiple intelligences based and cooperative learning media is expected for teachers to develop other material in biology or other subjects.

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