Project Based Learning (PjBL) integrated with realia media towards learning outcomes on students' creativity and learning interest in classification of living things at SMA Negeri 3 Tondano

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Abstract. The purpose of this study was to see student learning outcomes using the Project-Based Learning (PjBL) learning model combined with realia media on students' creativity and learning interest in the classification of living things at SMA Negeri 3 Tondano. The form of research used is a quasi-experimental research design with the non-equivalent pretest-posttest control group design. The research subjects were students of class X MIPA III and X MIPA IV totalling 52 students. The instruments used are creativity rubrics, learning interest questionnaires, and multiple choice questions. The creativity rubric is used by researchers to assess creativity during the learning process through indicators of student creativity, namely fluency, flexibility, authenticity and detail. Students' interest in learning questionnaires were filled in by students to assess the extent of students' interest in learning and were given multiple choice questions that were used to measure student learning outcomes whether they experienced differences in grades in the control and experimental classes. The results showed that there was an increase in learning outcomes in the experimental class for the pre-test 8.00 and for the post-test 10.84 with students' creativity in working on realia media (herbarium) where the assessment was based on four indicators, 75% fluency in good category, 60% flexibility in sufficient category, Originality 88% with very good category and 66% elaboration with good category. Creativity also assesses the Realia Media Making Practicum Report (herbarium) based on four fluency indicators reaching 70% in the good category,

1. Introduction
Education in Indonesia today has implemented a curriculum that is expected to enable students to have productive, creative, innovative and affective attitudes, through strengthening attitudes, knowledge and skills competencies [1]. Depdiknas stated that designed with characteristics with the hope of being able to develop a balance between spiritual, social behavior, curiosity, creativity, and cooperation with intellectual and psychomotor abilities in students.

Observations made previously at SMA Negeri 3 Tondano where the application of learning models were still few with real actions carried out in the field, one example was practicum activities. The existence of this real action can provide all students with concrete knowledge found in the field, so the school expects teachers and researchers to be able to provide all students with a learning process that involves real action activities in the field.
In the problems stated above, learning biology is one of the means that can arouse students' creativity and interest in learning through the Project Based Learning (PjBL) learning model combined with realia media. Project-based learning is also a learning model that can provide opportunities for teachers to manage learning in the classroom by involving project work (Thomas in Wena [2]). This research also involves realia media as an assistant in the research process. Media realia which is meant here according to Lestari [3] are objects that can be seen, heard or experienced by students so as to provide direct experience to students.

2. Methods

2.1. Place and time of research
The research was carried out at SMA Negeri 3 Tondano, odd semester of the 2019/2020 school year, during August – September 2019, on the subject of classification of living things.

2.2. Research variable
The variables of this study are the independent variables (independent variables) that use the PjBL learning model combined with realia media on the subject of classification of living things and the dependent variable (dependent variable) namely creativity and interest in learning to see the learning outcomes of class X MIPA III students which can be seen through the results posttest of students, after carrying out learning with the PjBL model combined with realia media at SMA Negeri 3 Tondano.

2.3. Types of research
This type of research is experimental research with a quasi-experimental design or quasi-experimental design using the non-equivalent pretest-posttest control group design. The research design used two groups, namely the experimental group using the PjBL model combined with realia media and the control group not using the PjBL model. The research design can be seen in Table 1.

| Group   | Pretest | Treatment | Posttest |
|---------|---------|-----------|----------|
| Experiment | P1      | X         | P3       |
| Control  | P2      | -         | P4       |

2.4. Population and sample
The population in this study was the entire class X MIPA 3 Tondano SMA Negeri 2019/2020, which consisted of five classes, with a total of 250 students. The sample in this study was class X MIPA III as an experimental class and class X MIPA IV as a control class with 26 students in both classes.

2.5. Research instruments
The observation phase is the beginning of a research plan (proposal) for seminars, preparing learning tools (RPP, Syllabus and LKS) as well as research instruments for student creativity and interest in learning.

The implementation stage entered the stage of giving pre-test to both classes, namely the experimental class and the control class, simultaneously. Where the experimental class is given an instrument for assessing student interest in learning. Then held a normality and homogeneity test from the pre-test results obtained in the initial test which were given different treatment to the two classes. In the experimental class the learning process uses the PjBL model combined with realia media as well as an assessment of student creativity during the learning process and in the control class the learning process does not use the PjBL model combined with realia media, then both classes are given a post-test.
The final stage is managing and analyzing pre-test, post-test, interest in learning and student creativity, analyzing and concluding research results.

2.6. Data processing and analysis techniques

The research was conducted to obtain learning outcomes data and then processed using SPSS by testing the normality and homogeneity of the control class and the experimental class. Meanwhile, students' creativity and interest in learning were analyzed using a questionnaire on students' creativity and interest in learning and then measured on a categorical scale. Can be seen in table 2.

| Table 2. Category scale creative ability and student interest in learning [5]. |
|---------------------------------|---------------------|
| Score                          | Criteria            |
| 81% – 100%                     | Very good           |
| 61% – 80%                      | Good                |
| 41% – 60%                      | Enough              |
| 21% – 40%                      | Less                |
| 0 – 20%                        | Not much            |

The next data do the ANCOVA (Analysis of Covariance) test using SPSS windows 16.

3. Results and discussion

3.1. Description of research results

3.1.1. Student creativity. Student creativity data was measured using a research rubric during the learning process in the experimental class by assessing two aspects of the assessment at the level of creativity in working on realia media (herbarium) and the level of student creativity in making reports on realia media (herbarium). The assessment is categorized into four indicators, namely: originality, flexibility, elaboration & fluency [6,7]. The results of student creativity can be seen in table 3 and table 4 as follows:

| Table 3. The level of student creativity in working on realia media (herbarium). |
|---------------------------------|---------------------|
| No                              | Rated aspect       | Percentage | Criteria  |
| 1                               | Originality        | 88%        | Very good |
| 2                               | Flexibility        | 60%        | Enough    |
| 3                               | Elaboration        | 66%        | Good      |
| 4                               | Fluency            | 75%        | Good      |

| Table 4. The level of student creativity in making reports on realia media practicum (herbarium). |
|---------------------------------|---------------------|
| No                              | Rated aspect       | Percentage | Criteria  |
| 1                               | Originality        | 72%        | Good      |
| 2                               | Flexibility        | 83%        | Very good |
| 3                               | Elaboration        | 85%        | Very good |
| 4                               | Fluency            | 70%        | Good      |

3.1.2. Student interests. Data on student interest in learning outcomes was measured using a learning interest questionnaire. there is one student who gets a presentation of 87% in the very good criteria, and 25 other students are included in the good presentation category from 61 - 80%.

From these data, it shows that there is a high interest in learning in the students in the class. Looking at the average of the student's interest in learning, 79.88% is in the good category.
3.1.3. **Student learning outcomes.** Data on student learning outcomes was measured using a student learning outcome test consisting of 20 questions in the experimental class and the control class with a total of 52 students. The following is the data on the results of the pre-test & post-test of the experimental class and the control class which can be seen in table 5 and table 6.

| Table 5. Experimental class pretest and posttest results data. |
| --- | --- | --- |
| No | Statistics | Statistical value |
| --- | --- | --- |
| 1 | Minimum score | Pre-test 4.00 Post-test 5.00 |
| 2 | Maximum score | Pre-test 15.00 Post-test 16.00 |
| 3 | Average | Pre-test 8.00 Post-test 10.84 |
| 4 | Standard deviation (S) | Pre-test 3.22 Post-test 3.20 |
| 5 | variance | Pre-test 3.22 Post-test 3.20 |

From the table 5 above, the pretest and posttest data of experimental class students have an average pretest score of 8.00 and an average score of 8.00 posttest i.e. 10.84.

| Table 6. Control class pretest and posttest results data. |
| --- | --- | --- |
| No | Statistics | Statistical value |
| --- | --- | --- |
| 1 | Minimum score | Pre-test 3.00 Post-test 5.00 |
| 2 | Maximum score | Pre-test 13.00 Post-test 14.00 |
| 3 | Average | Pre-test 7.96 Post-test 9.88 |
| 4 | Standard deviation (S) | Pre-test 2.69 Post-test 2.45 |
| 5 | variance | Pre-test 7.23 Post-test 6.02 |

From the table 6 above, the experimental class pretest and posttest data has an average pretest value of 7.96 and an average value of posttest which is 9.88.

3.2. **Hypothesis test**

3.2.1. **Data normality test.** From the test using the Liliefors method, it is known that the experimental class has a significance value of 0.200>0.05. Based on the criteria, it can be said that the value of the experimental class is normally distributed as well as the control class of significance 0.200>0.05 which is normally distributed, meaning that the data distribution is normally distributed.

3.2.2. **Data homogeneity test.** Homogeneous data using the F test with = 5%. From the SPSS data analysis to test the homogeneity of the data, it got a significance value of 0.361.

   After finding the existing value by using the level = 5% then the value of α =0.05< from the value of sig = 0.361 then H0 is accepted and the two classes are homogeneous.

3.2.3. **ANCOVA test.** After knowing that the two classes are normally distributed and homogeneous, then the ancova test can be continued by using the t-test statistic, which is as follows: see table 7.

   Ancova test criteria (with FTable = 4.03):
   - Reject H0 if: Fcount > FTable
   - Accept H1 if: Fcount < FTable
Table 7. ANCOVA test results.

| Score          | Sum of squares | df  | Mean square | F      | Sig.  |
|----------------|----------------|-----|-------------|--------|-------|
| Between groups | 108.173        | 1   | 108.173     | 12.339 | .001  |
| Within groups  | 438,346        | 50  | 8,767       |        |       |
| Total          | 546,519        | 51  |             |        |       |

From the table of calculation results above, the value of Fcount = 12.3 is obtained. Based on the distribution table in FTable = 4.03 if it is converted to the Ancova statement, it will get the H1 hypothesis because 12.3 > 4.03. Based on the test criteria, if 12.3 > 4.03 it can be concluded that H1 is accepted. This means that the posttest scores of students who use Project-Based Learning (PjBL) learning combined with realia media on learning outcomes on creativity and student interest in the classification of living things in the X MIPA III experimental class got a higher score compared to class X MIPA IV using conventional learning.

3.3. Discussion

Research conducted in both classes obtained learning outcomes where the experimental class using the Project Based Learning (PjBL) learning model combined with realia media on students' creativity and interest in learning was higher than the control class which only used conventional learning models.

The experimental class using the PjBL learning model has an average gain of 10.84 while the control class using the conventional learning model only gets an average of 9.88. Then the difference test of the two averages (post test) was carried out to obtain the value of Fcount = 12.3. Based on the distribution table in FTable = 4.03 if it is converted to the Ancova statement, it will get the H1 hypothesis because 12.3 > 4.03. The test criteria if 12.3 > 4.03 then it can be concluded that H1 is accepted. The two analyzes concluded that the average presentation value in the experimental class was higher than the control class so that there was a significant difference between the experimental class and the control class.

The increase in student learning outcomes is also seen from the creativity of students during the learning process in the experimental class which adds more insight than the control class. The results of the assessment of student creativity are assessed on four indicators, namely fluency, flexibility, elaboration and originality. The four indicators can categorize students into the level of creativity as very good, good, sufficient, less and less. The results of the assessment of student creativity in working on realia media (herbarium) based on four indicators of fluency or fluent thinking reached 75% with good categories, flexibility or flexible thinking reached 60% with sufficient categories, Originality or original thinking skills reached 88% with very good and elaboration categories, or detailed thinking skills reached 66% with good category. This shows that there is high student creativity in making the realia media. Then the assessment of the Creativity of the Realia Media Making Practicum Report (herbarium) also assessed based on four indicators of fluency or thinking smoothly about the goals and the resulting data reached 70% with good categories, flexibility or flexible thinking in the use of tools and materials used reached 83% with categories very good, Originality or original thinking skills in presenting basic theoretical concepts 72% with good category and elaboration or detailed thinking skills in expressing existing work steps reaching 85% with very good categories. Creativity is an ability that operationally describes fluency, flexibility & originality in thinking, and the ability to develop/enrich the details of an idea. So that this ability is very necessary in solving and solving problems related to this research. A person's high level of creativity can more easily solve existing problems. The results of research from Mahanal & Darmawan [8] also explain that project learning can provide better conceptual mastery compared to students who are only facilitated by conventional learning.

The researchers also saw the improvement of student learning outcomes from students' interest in learning. Students' interest in learning is one that is needed in the learning process. The assessment of learning interest is seen from the indicator of student interest in the form of a questionnaire. The research data obtained where from 26 students who have a high interest in learning only one student with a percentage of 87% in the very good category, and 25 students of whom have an average of 61% - 80%
the results obtained are in the good category. This data concludes that students’ interest in learning in
the experimental class is high. High student interest in learning makes students more active in doing
something. Someone with a high interest in learning causes curiosity and learning, is fast in
understanding and remembering the learning being studied.

Creativity will never be separated from students' interest in learning because that is what inspires
students to act creatively. Learning not only fills students' intelligence, but also directs students to act
creatively during learning. Students who have high learning creativity, must also have a high interest in
learning. Because that interest in learning can be a driving force for students to do creative things during
the learning process.

Thus, it can be concluded that the results of the research conducted at SMA Negeri 3 Tondano by
using the Project Based Learning (PjBL) learning model in realia media on creativity and student interest
in the classification of living things provide good learning outcomes for these students. Judging from
the results of the post test analysis, these students had different learning outcomes compared to the
control class. The increase in learning outcomes is also due to the creativity in making realia media
(herbarium) and high interest in learning, so that understanding of the classification of living things can
be understood and students can answer the questions given well.

4. Conclusion
From the results of the study concluded that:

- Project-Based Learning (PjBL) combined with realia media has a significant effect on student
  learning outcomes in class X MIPA III experimental class.
- The creativity seen in making realia media (herbarium) and students' interest in learning also
  affect student learning outcomes to further improve understanding of the classification of living
  things so that the learning outcomes obtained are satisfactory.

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