

Implementation of Project-Based Learning Models in 2D and 3D Animation Techniques to Improve Psychomotor Skills and Student Creativity of Class XI Multimedia SMK Negeri 3 Surakarta

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ABSTRACT

The purpose of this study is to (1) Improve psychomotor skills of students in creating 2D animation with a project-based learning model; (2) Know the increase in creativity of students of class XI MM 2 of SMK Negeri 3 Surakarta by implementing a project-based learning model on 2D and 3D animation engineering subjects. This research is a Classroom Action Research conducted in 2 cycles. Subjects in this study were students of class XI MM 2 of SMK Negeri 3 Surakarta, amounting to 36 people. Data collection techniques used were observation, document review, practice tests, and portfolio assessments. The data validity test technique used is triangulation and the data analysis technique used is descriptive statistics. The results of the study stated that after the project-based learning model was applied, (1) the percentage of completeness of the results of the psychomotor skills test had increased by 41.67% in the pre-action, 63.89% in the first cycle, and 80.56% in the second cycle; (2) the creativity of students in terms of fluency, flexibility, authenticity, and elaboration has increased. Based on observations, students look more active and responsible for completing tasks. The conclusion of this study is the application of Project-Based Learning models in 2D, and 3D Animation subjects can improve psychomotor skills and creativity of students of Class XI MM 2 of SMK Negeri 3 Surakarta in 2018/2019 Academic Year.

Keywords: Project Based Learning, Creativity, Psychomotor Skills, 2D and 3D Animation

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1. INTRODUCTION

The 2013 Curriculum application refers to the world of education that is able to adapt to the development of the 21st century. Based on Permendikbud Nomor 70 Tahun 2013, The 2013 Curriculum is designed to develop a balance between developing spiritual and social attitudes, curiosity, creativity, cooperation with intellectual and psychomotor abilities. SMK Negeri 3 Surakarta has five expertise packages, one of which is the Multimedia expertise package. In the multimedia expertise package, one of the compulsory subjects is 2D and 3D Animation Techniques delivered in class XI with an allocation of 10 hours of lessons. 2D and 3D animation engineering subjects with existing basic competencies require students to have skills and creative thinking in making animation. In an effort to produce animated products students will find it difficult if learning only focuses on strengthening the material not accompanied by assignments or projects to train psychomotor skills and creativity.

The conditions described previously also occurred in SMK Negeri 3 Surakarta class XI MM 2, based on the results of preliminary observations obtained by data that showed students' skills and creativity were still low. This can be seen from several indicators, including students who have not succeeded in making 2D animations and still rely on friends to make animations. The percentage of students who completed the psychomotor skills test with KKM 75 was only 41.67% or as many as 15 students. Based on the assessment

of pre-action stage of creativity, it is known that the percentage of student creativity is still in the sufficient category (40% - 60%). The results that are still low indicate the inaccuracy between the application of learning strategies to the abilities of students. The learning model that has been applied so far is Discovery Learning. According to Kemendikbud (2014), the discovery learning model places more emphasis on finding previously unknown concepts or principles. Based on the evidence above the discovery learning model tends to be inaccurate and ineffective if applied in 2D and 3D animation learning, most of the material is practical.

A climate of teaching and learning that is good for developing the potential for creativity and psychomotor skills needs to be developed. Teachers need to apply a more varied learning model to train students' creativity and psychomotor skills. Based on Permendikbud Nomor 65 Tahun 2013 concerning Process Standards, one of the preferred learning models in the implementation of the 2013 curriculum is a project-based learning model. Project-Based Learning is a learning model that focuses on giving projects or assignments to students that can enhance the creativity of each individual Mulhayatiah (2015). According to Boss dan Kraus, Project-Based Learning is learning that emphasizes student activities in solving various open-ended problems and applying their knowledge in working on a project to produce a certain authentic product (Abidin, 2014). Fadilah (2015) in his research stated that the implementation of PBL could improve learning creativity Physics of class X students on rigid body equilibrium material. Saputra (2013) stated that the implementation of project-based learning models in the CAD learning process proved to be able to improve the activeness of students, both from the affective and psychomotor domains. In line with the results of the study, Sumarni (2016) in his journal stated that learning with project work in the form of teaching aids is the essence of student-centred laboratory learning that is very important and useful for students to develop three learning fields, namely; cognitive, affective and psychomotor. Based on the background of the above problems, the research is carried out by taking the research title "Application of Project-Based Learning Model in 2D and 3D Animation Techniques to Improve Psychomotor Skills and Student Creativity". The purpose of this research is to:

1. Know the increase in creativity of students of class XI MM 2 SMK Negeri 3 Surakarta by implementing a project-based learning model on 2D and 3D animation engineering subjects.
2. Improve the psychomotor skills of students in making 2D animation with a project-based learning model.

2. RESEARCH METHOD

This research is a classroom action research conducted in 3 stages, namely pre-action, first cycle, and the second cycle. In each cycle generally includes 4 stages, namely planning, implementing actions, observing, and reflecting. Things that need to be implemented in the planning stage are (1) equality of perception with subject teachers about the learning scenarios to be carried out, (2) compiling a lesson plan (RPP) and preparing syllabus, (3) compiling research instruments, (4) making sheets student work, (5) preparing media, tools and teaching materials to be used in learning, (6) preparing learning evaluation tools, (7) setting indicators of achievement and compiling instruments for data collection. Furthermore, the implementation stage of the action according to plan, then the activity begins by conditioning the study room, praying, doing attendance, giving apperception, motivation, and conveying the learning objectives. At the observation stage, observation of the learning process is carried out using the project-based learning model and documenting learning activities. Activities at the reflection stage are analyzing the results of observations, discussions about the quality of the learning process and determining corrective actions for deficiencies that occur. This research was conducted at SMK Negeri 3 Surakarta. The implementation of class action research is in September 2018. Subjects in this study were students of class XI MM 2 of SMK Negeri 3 Surakarta in 2018/2019 Academic Year, amounting to 36 students. Data collection techniques used in this study were observation, interviews, document studies, practice tests, and portfolio assessments. In this study, the data analysis technique used was descriptive statistics. The steps to implementing project-based learning are as follows: (1) determining fundamental questions, (2) designing project planning, (3) arranging schedules, (4) monitoring students and project progress, (5) testing results, (6) evaluate the experience. The measurement of creativity in this study used a verbal creativity test from Munandar (1999) which refers to 4 basic creative elements from Guilford. Assessment of the level of creativity is done by analyzing and assessing the collection of students' work taken during the learning process. Analysis and assessment are carried out in accordance with the creativity assessment rubric by giving a 1-4 scale on each indicator of each aspect of creative thinking, specifically fluency, flexibility, originality, and elaboration. The data obtained are converted into a percent (%) to be categorized based on the standards of creative thinking skills (Purwanto, 2000) such as Table 1.

Table 1. Standards of Creative Thinking Ability

No	Percentage	Category
1	81%-100%	Very Good
2	61%-80%	Good
3	41%-60%	Fair
4	21%-40%	Bad
5	0%-20%	Very Bad

3. RESULT AND ANALYSIS

Discussion of the results of research and testing obtained presented in the form of theoretical descriptions, both qualitatively and quantitatively. The results of the experiment should be displayed in either a graph or table. For charts can follow the format for diagrams and drawings.

3.1. PRE-ACTION DESCRIPTION

Pre-action tests are carried out to measure students' understanding before the action is taken and based on the results of preliminary observations obtained data showing the skills of students are still low. This can be seen from a number of indicators including students not succeeding in making 2D animations, still relying on friends to make animations, the time needed to make an animation beyond the specified time, and the animation results do not match the questions given. The results of the observations also showed that the percentage of students' creativity in the initial conditions was still very low, from 36 students only 10 people or 27.78% who had fulfilled indicators of creativity assessment such as being able to create new or unique animations, communicative generated animations, and it fits the theme with a balanced color composition. The results of the psychomotor skills practice test at the pre-action stage are visualized into diagrams such as Figure 1 which shows that the percentage of students who complete (KKM 75) is only 41.67%, 15 students, while the students who do not complete the percentage are 58.33%, 21 participants student. Percentage of creativity of students in the pre-cycle stage is presented in Figure 2.

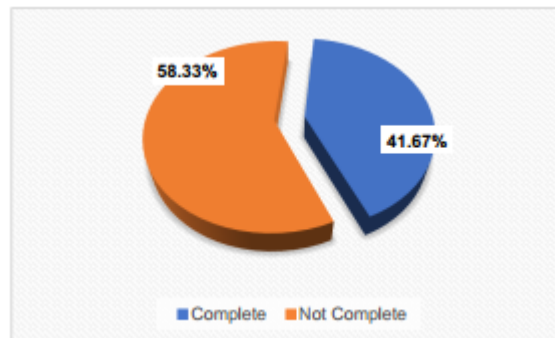


Figure 1. The percentage of completeness of the pre-action psychomotor skills.

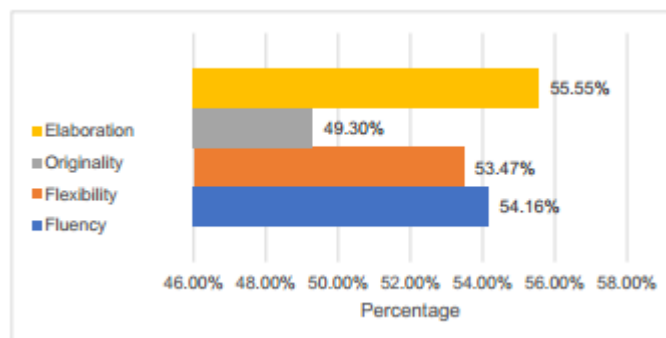


Figure 2. Percentage of creativity level pre-action stage

Preliminary data on creativity assessment of each creative thinking indicator shows the percentage level of creativity for aspects fluency is still 54.16%, flexibility aspect is 53.47%, originality aspect is 49.30%, and the percentage for elaboration is 55.55%. The percentage of the level of creativity of students at the precycle stage for each indicator is still in the sufficient category (41% - 60%).

3.2. FIRST CYCLE

Learning begins with giving fundamental questions to students, namely questions that can be used to achieve learning goals. The following are questions that are asked to students:

- a. What products can be produced from learning 2D & 3D Animation Techniques?
- b. What knowledge is needed by students to be able to design animated products correctly?

In the core activities, the teacher conveys the material of the tweening technique with demonstrations and the students follow, then conveys the project assignments along with the rules that must be done individually by the students because to measure the extent of students' skills in making animation. There are 6 simple questions given to test students' psychomotor skills and 1 project task to test the creativity of students. Project assignments given to students are explained by conveying the theme of the project so as not to force students to do the same thing. The theme in the first cycle is "building". The process of working on projects by students starts from the planning stage. The planning steps carried out by students include, (1) making animated story ideas from predetermined themes, (2) gathering the information that supports project execution from various sources such as books, teachers, and browsing the internet, (3) making simple script and outline. The next stage of implementation, students begin to make animations in Adobe Flash. At the stage of making animation, the teacher acts as a facilitator by helping students when there are difficulties. Not a few students asked how to use tools, especially pen tools in Adobe Flash, teachers approached the students' computers to understand the difficulties. Then the teacher shows how to use pen tools through the projector so that all students in the class can understand not only students who ask.

After students complete, the project was given the next stage, evaluation or reporting. Students present 2D animation work that is made in the future of the class along with a discussion if there are other students who ask. The teacher provides feedback from the students' presentations and at the end of the lesson, the teacher gives a brief review of the material that has been studied.

Based on the results of the first cycle, data obtained that psychomotor skills and the level of creativity of students have increased, but have not met the criteria for success of the action. This is because, during the implementation of the action in the first cycle, there are still some disadvantages such as the following:

1. There are still many students who are asking for help from teachers and friends to make an animation of tweening techniques. Learners ask for help if they have difficulty using the tools in Adobe Flash.
2. Some students have not been able to make animations that are different from the examples given by the teacher and from other students. This is because the theme in the first cycle was only 1; finally the students had difficulty finding references and ideas for making different objects.
3. The results of the projects undertaken by students are not optimal because the reason for the duration of time given is quite short, which is a maximum of 20 minutes for one skill test question and 2x35 minutes for the creativity test.

The psychomotor test results in the first cycle showed a mean grade of 73.1 and the percentage of completeness of psychomotor skills by applying the project-based learning model experienced an increase from 15 students (41.67%) to 23 students (63.89%). The creativity of students based on thinking indicators also increased, namely fluency aspects by 70.83%, flexibility aspects by 68.06%, authenticity aspects by 64.58%, and elaboration aspects by 67.36%. The results of the psychomotor skills practice test at the first cycle stage are presented in a diagram such as a Figure and the percentage of creativity of students in the first cycle stage is presented as Figure 4.

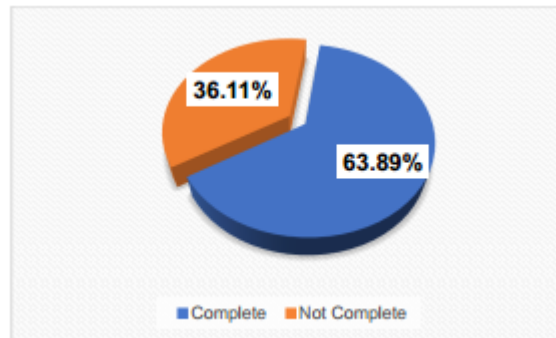


Figure 3. Percentage of completeness of psychomotor skills in the first cycle

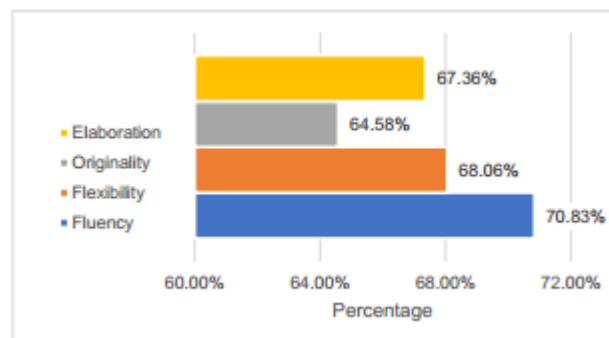


Figure 4. The percentage level of creativity in the first cycle

3.3. SECOND CYCLE

Implementation of the second cycle is an action to improve the lack of action in the first cycle. Deficiencies in the first cycle are:

1. There are still many students who are asking for help from teachers and friends to make an animation of tweening techniques.
2. Some students have not been able to make animations that are different from the examples given by the teacher and from other students.
3. The results of the projects undertaken by students are not optimal because of the short duration of the time given.

The improvements in the second cycle to overcome the shortcomings in the first cycle are as follows:

1. The teacher facilitates students with tutorial videos and modules in addition to student references to be more independent and as a substitute for help from teachers and friends.
2. Increase the number of project themes to avoid some students making the same object and so that it is not fixed on the example. The themes determined in the second cycle included transportation, the solar system, games, and education.
3. Increase the project processing time, which is a maximum of 30 minutes for 1 psychomotor skills test question and 2x45 minutes for a creativity test.

The teacher gives questions encouraging students to achieve the learning objectives and remember the previous activities in the first cycle. The questions addressed are:

- a. How to design animated products correctly?
- b. Why do you need to do product planning?

In the core activities, the teacher conveys project assignments that need to be done individually by students with some rules changes according to the improvement plan. The process of working on projects by students starts from the planning stage. In the second cycle, planning steps are carried out more than the first cycle. The activity begins with the students compiling a project execution schedule, making animated story

ideas from the themes that have been chosen, gathering information, making simple scripts along with outlines, and making storyboards with the format and examples of the preparation given by the teacher. Next is the implementation stage, which begins with making animated layouts and characters, to give text and sound. The teacher makes observations and becomes a facilitator when there are students who ask. After students complete the project given, the last activity is product presentation. The teacher provides feedback from the students' presentations and a brief review of the activities that have been carried out. As a whole, the learning process of 2D and 3D Animation by applying the project-based learning model in the second cycle runs well and maximally. Based on the test results obtained data that psychomotor skills and the level of creativity of students have increased in the second cycle and have achieved the target of research success. Some of the things obtained from the implementation of the second cycle of action are that students can make good use of time so that learning goes according to plan, students enthusiastically follow learning and seriously work on projects given, presentations run well and active students, the results of cycle psychomotor tests the second shows the average grade value of 81.3 and the percentage of completeness of psychomotor skills by applying project-based learning has increased from 23 students (63.89%) to 29 students (80.56%). The creativity of students based on thinking indicators also increased, namely fluency aspects by 78.47%, flexibility aspects by 77.78%, authenticity as much as 78.74%, and elaboration aspects by 76.39%. The results of the psychomotor skills practice test at the second cycle stage are visualized into diagrams such as Figure 5 and the percentage of creativity of students in the second cycle stage is presented as Figure 6.

3.4. COMPARISON OF ACTION RESULTS

Based on data analysis and observation it was concluded that there was an increase in the value and percentage of success of psychomotor skills and levels creativity of students in class XI MM 2 with the implementation of project-based learning during learning. The value of students' psychomotor skills during pre-action, cycle I and cycle II are presented in Table 2. Comparison of the level of creativity of students before and after project-based learning in 2D and 3D animation subjects can be seen in Figure 7.

Table 1. Increased value of psychomotor skills

No	Explanation	Pre-Cycle	Cycle 1	Cycle 2
1	Class Average	60.5	73.1	81.3
2	Highest Score	81.5	87.1	94.5
3	Lowest Score	37	53.7	63.0
4	Completeness (%)	41.67%	63.89%	80.56%

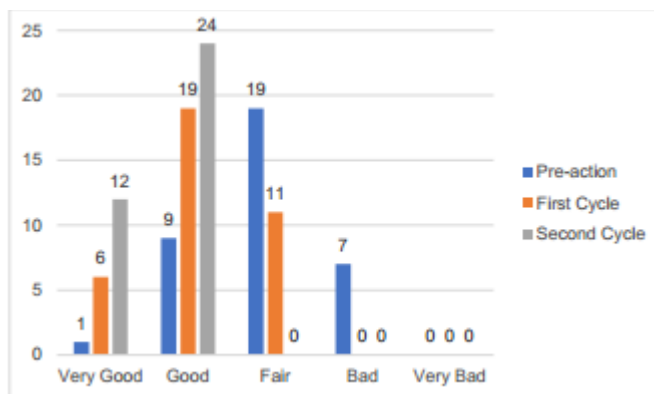


Figure 7. Increased creativity of students every cycle

3.5. DISCUSSION

Based on the results of the psychomotor test at the pre-action stage, it was found that the percentage of completeness achieved was 41.67% and increased after the project-based learning was applied in the first cycle which was 63.89% because students felt responsible for completing complex tasks. So that indirectly also sharpen the skills of students to get good grades. The increase in the first cycle has not yet reached the indicators of research success, so that it is implemented second cycle action. In the second cycle the percentage of completeness increased to 80.56%. The results of the psychomotor ability test in the second cycle showed that the target of research success had been achieved, namely 75% of students completed. The increase in completeness that occurs in the second cycle is also influenced by students who are more active in solving complex problems. This statement is in accordance with Saputra (2013) which states that

the application of the project-based learning model is proven to increase the activity of students, both from the affective and psychomotor domains. The creativity of students also increases, namely at the pre-action stage, the average percentage of creativity of students is 53.13%, which is classified as sufficient and after being applied project-based learning in the first cycle to 67.71% which belongs to the good category. Increased creativity that occurs in the first cycle shows the task of making animated tweening techniques given to stimulate the imagination of students to think creatively. The average percentage of the level of creativity of students in the second cycle is 77.78%. The 2D animation theme in the second cycle is more than one which means giving students a choice to choose the topic of their own work. Creativity cannot develop if students only do things in one way. In accordance with the research conducted by Fadilah (2015) which states that the implementation of project-based learning can enhance learners' creativity. The 2D animation project provided by applying the project-based learning model can develop the creativity and skills of students because it encourages the independence of students in completing the tasks given.

4. CONCLUSION

Based on the results of the study it can be concluded that:

1. The application of the project-based learning model as an effort to improve the psychomotor skills of students in 2D and 3D Animation subjects, the tweening animation material is achieved.
2. The application of the project-based learning model can improve the creativity of students as seen from aspects of fluency, flexibility, originality, and elaboration.
3. There are improvement efforts in the implementation phase of the second cycle of learning that affect the success of the research, namely:
 - a. Additional project themes
 - b. Providing tutorial videos
 - c. Added duration of project work
 - d. Storyboard preparation by students
4. Project-based learning involves students in problem-solving, design, decision making, and problem finding. Students feel responsible for completing complex tasks so that indirectly also sharpen the skills of students to get good grades.
5. Discovery learning models tend to be inaccurate and less effective if applied in 2D and 3D animation learning, most of which are practical in nature. The discovery learning model focuses more on finding concepts or opinions that were previously unknown, making it difficult to develop aspects of skills.

5. SUGGESTION

Based on conclusions and discussions, suggestions that can be submitted as material for consideration are as follows:

1. For students, can take advantage of the time given by the teacher in the learning process to learn and do the task seriously. Students can apply the lessons learned in everyday life while honing psychomotor skills and creativity.
2. For Teachers, they can implement a project-based learning model in the learning process to improve students' psychomotor skills and creativity. The teacher explains the learning objectives according to the learning plan and prepares learning media before the learning activities begin and acts as a facilitator in the learning process.
3. For Schools, provide guidance to teachers so that project-based learning models can be implemented in teaching and learning activities, especially those that lead to practice because of it has been proven that project-based learning can improve the quality of learning and skills of students. schools provide support in the form of facilities and infrastructure to teachers and students who apply the project-based learning model in the learning process.

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