DEVELOPING PROJECT BASED LEARNING MODEL TO ENHANCE 21ST CENTURY SKILLS IN SMART SCHOOL

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ABSTRACT

This study was aimed to develop effective project based learning model for improving 21st century skills in terms of communication, collaboration, critical thinking, and creativity. Research and Development with ADDIE steps; analysis, design, development, implementation, and evaluation was used as the research methodology to gain qualitative and quantitative data. The qualitative data were collected through interview, observation questionnaire, documentation, and some suggestion of research and development person, school principal, and lecturer about developing PjBL model. The quantitative data were collected through validation result of PjBL model development and tools, implementation of PjBL model, first and second phase drama project assessment, teachers observation, pair assessment and self evaluation for 4C skills. The experimental development research was examined by a validator and implemented into two phases in which mini drama as the first phase project and big drama performance as the second. This findings showed mini drama provided good score and the big drama got remarkable score from audiences. 4C skills of students were significantly improved in the first to the second phase. Those results revealed that PjBL model was appropriate to be implemented in the classroom.

Keywords: Project Based Learning, Communication, Collaboration, Critical Thinking, Creativity

I. INTRODUCTION

The 21st century is known as the century of knowledge. Knowledge is the main foundation of various aspects of life. The characteristics of the 21st century are marked by the increasingly intertwined world of science, so that synergies among them become faster, technology develops, relations between nations are getting stronger, there is a change in the way of life, and the interaction between citizens of the world is getting closer. Life in the 21st century demands skills that must be mastered by a person in order to be able to compete and be able to make adjustments to become quality human resources.

Today's information and communication technology requires students to no longer focus on memorizing a set of facts to pass exams. They must be lifelong learners who can manage data and understand and be able to solve the complex problems of their time. They need to be creative thinkers who can innovate in a world that offers open access to knowledge. So now success indicators are based more on the ability to communicate, be creative, think critically and flexible problem solving, collaborate and innovate as 21st century skills to achieve the required transformation.

The Ministry of Education and Culture implements the 2013 Revised 2017 Curriculum which emphasizes the importance of 21st century skills. In addition, the 2013 curriculum explicitly states to use constructivism-based methods or models. Constructivism is a widely supported learning theory that rests on the idea that students construct their own knowledge within the context of their own experiences. The PjBL approach can be seen as an approach to creating a learning environment that can encourage students to construct knowledge and skills personally.

Project based learning (PjBL) is a learning approach developed based on a constructivist understanding that requires students to construct their own knowledge. In addition, PjBL is an innovative learning approach, which
emphasizes contextual learning through complex activities (Thomas, 2000). Project based learning focuses on the main concepts and principles of a discipline, involving students in problem solving activities and other meaningful tasks, giving students opportunities to work autonomously to construct their own learning. Students are given problems at the beginning of the implementation of learning by the teacher, then during the implementation students solve them and finally produce valuable and realistic student work products.

In contrast to traditional learning models which are generally characterized by short-duration, isolated, and teacher-centered learning activities, the project-based learning model places more emphasis on relatively long-duration, holistic-interdisciplinary, centered learning activities. learners, and integrates with real-world practices and issues. In project based learning (PjBL) students learn in real problem situations, which can give birth to permanent knowledge and organize learning projects (Thomas, 2000).

PjBL can help students to have creative thinking, problem solving, and interaction as well as assist in investigations that lead to solving real problems (Thomas in Made Wena, 2011:144). In addition, PjBL can stimulate motivation, process and improve student learning achievement by using problems related to certain subjects in real situations. (George 2005)

21st century skills developed from the implementation of the 2013 curriculum are expected to develop skills in the form of communication, collaboration, critical thinking and creativity. This is as stated by the US-based Partnership for 21st Century Skills (P21) (2009) which identifies the competencies needed in the 21st century, namely 'The 4Cs'-communication, collaboration, critical thinking, and creativity. These skills then refine the knowledge framework in the form of core subjects that have been taught so far.

Smart School Elementary School which has been established for 13 years continues to adapt to educational developments in accordance with national education goals and the school's vision and mission. Efforts to develop 21st century skills at the elementary school level through the learning process have given birth to the characteristics of a separate learning system, one of which is the application of project based learning (PjBL) as a learning approach. The implementation of PjBL in SD Smart School has entered its fifth year. So far, the implementation of PjBL is still being developed to meet expectations. The results of observations made by researchers are that the current 2013 curriculum does not support the implementation of this method, so the teacher team with R&D guidance and school principals must design a typical school curriculum that supports the achievement of PjBL implementation based on the vision and mission of SD Smart School. The development of the SD Smart School curriculum, which is unique in itself, is by choosing the right unit topic according to the character of the school, children's needs, existing facilities and learning resources needed.

II. METHODS

This research method uses R&D according to the research steps made by Robert Maribe Branch (2009), namely ADDIE analysis, design, development, implementation and evaluation. ADDIE can help solve complex learning problems and develop educational and learning products. Analysis is a needs analysis to determine the right problem and solution and determine student competence. Design is to make a PjBL model design based on the PjBL stages or steps. Development is to realize the PjBL model design into a product that is ready to be implemented. Implementation is carried out by testing PjBL steps based on the design carried out in schools. Evaluation is carried out by analyzing the quality of the resulting product.

III. RESULT AND DISCUSSION

The results of the study based on the ADDIE method:

1. The analysis consists of: a) Needs analysis is obtained through observation and interviews. Based on the results of observations and interviews with 6 homeroom teachers, school principals and R&D, information was obtained that teachers still had difficulties in implementing the PjBL model in schools. The level of teachers' understanding of the PjBL model varies. So, as a team of teachers who teach integrated thematics, it is necessary to share knowledge and understanding of this PjBL model. b) Analysis of the SD Smart School curriculum compiles a typical school curriculum, namely the 'Smart School Curriculum' which is based on three things: (1) it is made to facilitate the implementation of the PjBL model in order to improve 21st century skills and student characters developed in schools. (2) The curriculum is made thematically based on the characters that have been determined by the school. The
character theme is made continuously starting from grade I to grade VI adjusted to the age and psychological condition of students. (3) The 2013 curriculum is a supplement to the school curriculum.

2. The plan for Pjbl steps is as follows:

Step 1: Opening Moments and Essential Questions
Learning activities begin with the opening moment by the teacher. The opening moment ends with essential questions, namely questions that challenge students. These questions will lead students to the context of project-based learning and assign tasks to students to carry out a controlled activity. The questions posed are questions related to the real world. The question begins with an in-depth investigation.

Step 2: Collaborative Project Planning with Students
Students with the guidance of teachers develop project plans from the beginning to the end. Activities carried out in planning include: (1) formation of mini-drama groups; (2) determine the rules; (3) selection of activities to be carried out in response to essential questions; (4) determine project implementation (mini drama) with group tasks and responsibilities; and (5) determine the materials and tools needed for staging the mini drama.
Making a schedule of activities is also a plan made by students. Students with the guidance of the teacher are asked to make a schedule of activities carried out based on the planning of the activities to be carried out. The purpose of this activity is to provide students with an understanding that to carry out a large project, a work group needs a good work schedule so that the project can be carried out according to plan. However, this project was attempted to be carried out in a simple manner and not to confuse students, for example by providing examples of previous activities.

Step 3: Build Knowledge and Skills
Teachers build 4C knowledge and skills with 'Workshops'. The teacher organizes student-centered learning. The teacher applies inquiry in learning. The teacher forms six groups per class. Class IV A and IV B, a total of 12 groups. Each group will go through the stages of the workshop model. Students are invited to work in groups or individually to practice the skills and concepts introduced during the lesson. During this lesson the teacher can monitor misunderstandings and draw in small groups to correct their understanding. Teachers and students can discuss for reflection.

Step 4: Develop and Improve Project
The teacher develops and improves projects by guiding students in conducting research to extract information to answer essential questions

Step 5: Presenting the Project
Fourth grade students presented their project in the form of the drama 'I'm Wise with My Gadget'

Step 6: Project Evaluation
Teachers and students evaluate the projects that have been implemented.

IV. DEVELOPMENT.
Researchers carried out a series of PjBL model development processes with validators. The results of the Validation of the PjBL Model Design Assessment obtained an average value of four categorized as very good Revision.

The results of the improvement of the PjBL model were carried out based on the responses, criticisms, and suggestions of the validator. This is done so that the quality of the development model becomes better, namely: the phase 2 project needs to be made a bigger drama by combining two classes IVA and IV B into a team. The urgency is 1) improve students' 4C skills by trying students to design and display dramas resulting from large team collaboration. 2) Students will automatically invite other school students to behave honestly and fairly (the target of achieving morals for grade IV) in this case wisely using gadgets. So what must be developed from the PjBL stage 2 model is to give students the opportunity to be able to plan.

V. IMPLEMENTATION
Implementation is carried out with two trials through pjbl steps according to the revision Trial Phase 1.
**Phase 1 trials were carried out using a PjBL design that had been validated by the validator. This phase 1 research trial was conducted from September 23 to October 1, 2019. This trial is an activity carried out by teachers and students using the PjBL model that has been developed. Details of the phase 1 trial activities are presented in the following table of the validator.**

**Table 1. Schedule of Phase 1 Research Trial Activities**

<table>
<thead>
<tr>
<th>Day/ Date</th>
<th>Teacher Activities</th>
<th>Student Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday 09/09/19</td>
<td>Meeting 1 The teacher answers the greetings of the students. The teacher checks the condition of the students.</td>
<td>The class leader prepares friends (class VI A and class IV B) to pray to start the lesson and say salam.</td>
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<tr>
<td></td>
<td><strong>Step 1 Opening Moments and Essential Questions</strong> Learning activities begin with an opening moment by the teacher. The teacher acts as a cleric who advises his congregation (grade IV students to be able to take care of their limbs as a sign of gratitude to Allah (for example, take care of the eyes). The opening moment ends with the essential question 'How do we keep the eyes of gratitude to Allah and convey this to other friends?' The teacher leads students' understanding to make a mini drama project as a means to convey the message of keeping the eyes open. So the next essential question arises 'How to make a mini drama 'I'm Wise with My Device'?'</td>
<td></td>
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<tr>
<td></td>
<td>Students responded to the opening moment as a surprise for them because their homeroom teacher today looked different. Appearance with a turban like a cleric who gives advice in the morning. Most of the students pay close attention.</td>
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<tr>
<td></td>
<td>Students do question and answer with the teacher related to the opening moment.</td>
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<tr>
<td></td>
<td><strong>Step 2 Collaborative Project Planning with Students</strong> The teacher divides the students into 12 groups and then explains about the mini drama project, and gives students confidence to carry out their project. The teacher gives an example of scheduling activities in a project. The teacher begins to observe the students by using the 4C rubric</td>
<td>Students respond to the teacher's essential questions There was a discussion between students. Students and teachers agree to make a schedule in advance. Learners work together collaboratively.</td>
</tr>
<tr>
<td></td>
<td><strong>Step 3 Building Knowledge and Skills</strong> The teacher builds knowledge by explaining the parts of the eye and their function and the process of seeing an object. This knowledge of the eye, its function and the process of seeing is also a means of extracting information or their research to</td>
<td>Students work on the Activity Sheet Drawing the process of seeing an object Students in groups make five questions to conduct interviews with other class students</td>
</tr>
</tbody>
</table>
| Tuesday 10-11/09/19 | Meeting 2 and 3  
|-------------------|--------------------------------------------------|
| Wednesday | Step 3  
|         | Building Knowledge and Skills  
|         | Step 4  
|         | Developing and Improving Projects  
|         | The teacher asks students to interview other classes according to the instructions in the Activity Sheet and do it in groups.  
|         | The teacher observes the activity.  
|         | The teacher explains the elements of making drama. After that the teacher explained about the dialogue contained in the drama script.  
|         | The teacher teaches drama scripts by reminding them of drama scripts that they have received in grades 3, 2 and 1, because previously they have known what drama scripts are in annual performances. The teacher constructs their understanding of the drama script.  
|         | Students interview other class students with questions that have been made in their groups. Then record the class how many students wear glasses and make a graph, done in the Activity Sheet  
|         | Students work in groups on the elements of making drama (writing scripts, determining actors, determining equipment, exercises and performances). The elements of making the drama are included in the time line.  
|         | Students make mini drama scripts in groups, by entering information about the material they have obtained, namely:  
|         | Islamic element: about keeping the eyes part of gratitude to Allah.  
|         | Elements of mathematics: data on students with glasses and their relation to the use of gadgets.  
|         | Social element: includes examples of the fulfillment of rights and obligations related to the sense of sight.  

| Thursday-Friday 12-13/09/19 | Meeting 4 and 5  
|-----------------------------|--------------------------------------------------|
|                             | Step 4  
|                             | Developing and Improving Projects  
|                             | The teacher monitors the implementation of group collaboration work. The teacher calls groups that do not understand in the process of working on the Activity Sheet Lembar  
|                             | The teacher asks the students to complete the mini drama script and start dividing the roles in their groups  
|                             | Students complete the Activity Sheet in groups.  
|                             | Each group corrects the script and begins to divide the roles in the group and then practice.  

| Monday 16/09/19 | Meeting 7  
|----------------|--------------------------------------------------|
|                | Step 4  
|                | Developing and Improving Projects  
|                | The teacher monitors and assesses observations  
|                | 4C observasi  
|                | The teacher informs the rubric that will be assessed in the form of characterizations of students in group performances. Representatives from students' parents will individually assess their performance as input for improvement for stage 2 mini-drama performances  
|                | Students practice mini drama with groups.  
|                | Students prepare simple properties to complete the mini drama performance on Monday 30/9/2019.  

| Tuesday 17/09/19 | Meeting 8  
|-----------------|--------------------------------------------------|
|                 | Step 5  

The teacher's role is to guide and facilitate the students' learning process, ensuring that they understand the concepts and skills being taught. The rubric for assessment includes various criteria such as technical proficiency, artistic expression, and storyline development. The groups are encouraged to work collaboratively and are given opportunities to practice and refine their skills. The teacher monitors the implementation of group collaboration work and provides feedback to help the students improve their understanding and performance.
Presenting Projects

The teacher does conditioning mini drama show. The teacher prepares the assessment sheet for the audience

Students present the mini drama in groups, based on serial numbers.

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**Wednesday 18/09/19**

**Meeting 7**

**Step 6: Project Evaluation**

Teachers and students reflect on project implementation. Students reveal what they experienced during the process of making and performing the mini drama. In addition, students are also asked to express their feelings and new experiences they have gained

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The Phase 2 trial was carried out after evaluating the Phase 1 trial. The Phase 2 trial was held on Thursday, September 23 – November 2, 2019. The Phase 2 trial activities are presented in the table.

**Table 2. Schedule of Research Trial Activities Phase 2**

<table>
<thead>
<tr>
<th>Day/ Date</th>
<th>Teacher Activities</th>
<th>Student Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thursday</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23/9/19</td>
<td><strong>Step 1</strong> Opening Moments and Essential Questions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The teacher starts the lesson with the opening moment in the form of a short animated film 'One Small Step' by TAIKO Studios. This film is about how a child achieves his dream to become an astronaut, namely by planning something even though there are obstacles and obstacles.</td>
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<tr>
<td></td>
<td>Students are given an activity sheet in the form of columns: Plan, do, review, improve. Students fill in the column based on the contents of the two films that have been shown. The purpose of filling out is so that students understand the meaning of plan, do, review and improve</td>
<td></td>
</tr>
<tr>
<td><strong>Tuesday-Wednesday</strong></td>
<td><strong>Meeting 2 and 3</strong> Collaborative Project Planning with Students</td>
<td></td>
</tr>
<tr>
<td>24-25/9/19</td>
<td>The teacher invites students collaboratively to plan the making of a project by drawing up a plan.</td>
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</tr>
<tr>
<td></td>
<td>Students answer according to their knowledge.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students search for information via the internet about the tasks of each element of the drama builder, with the guidance of the teacher</td>
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</tr>
<tr>
<td></td>
<td>Students work on the tasks contained in the Activity Sheet.</td>
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</tr>
<tr>
<td></td>
<td>Students choose their own assignments in drama projects based on the research they have done.</td>
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</tr>
<tr>
<td></td>
<td>Students and teachers collaboratively make groups based on the tasks of the elements of drama performances, namely 1) assistant director, 2) stage manager, 3) sound stylist, 4) costume stylist, 5) presenter / MC, 6) documentation, 7) writer script, 8) players.</td>
<td></td>
</tr>
</tbody>
</table>

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Thurday- Meeting 4-9 Pertemuan
### Step 3: Building Knowledge and Skills

- The teacher builds knowledge about the elements of drama staging.

### Step 4: Developing and Improving Projects

- The teacher monitors the course of group work and assesses the students' 4C skills during the drama-making process.
- One of the fourth grade teachers becomes the drama director who will coordinate the making of the drama project.
- Teachers share tasks to monitor the project as well as train the team that has been formed.

### Meeting 4-9 Pertemuan

- **Step 3: Building Knowledge and Skills**
  - The teacher builds knowledge about the elements of drama staging.
- **Step 4: Developing and Improving Projects**
  - The teacher monitors the course of group work and assesses the students' 4C skills during the drama-making process.
  - One of the fourth grade teachers becomes the drama director who will coordinate the making of the drama project.
  - Teachers share tasks to monitor the project as well as train the team that has been formed.

### Friday 04/10/19

- **Meeting 10**
  - Step 4: Developing and Improving Projects
  - Language teachers and R&D validate the manuscripts made by the script team.

### Monday-Friday 07-11/10/19

- **Meeting 11-15**
  - Step 4: Developing and Improving Projects
  - Teachers monitor collaboration both per team and between teams.

### Monday-Friday 14-18/10/19

- **Meeting 16-20 Pertemuan**
  - Step 4: Developing and Improving Projects
  - Thursday, 17/10/19
  - The researcher and the fourth grade teacher team prepared the 'less structured condition' performance of the fourth grade student project to the students of SDN 01 Jagakarsa.

### Wednesday-Thursday 16-17/10/19

- Combined practice by equipping and making the required stage attributes and costumes. The stage stylist team started to make accessories for stage equipment to support the drama performance which will be shown at SDN 01 Jagakarsa on October 22, 2019. Such as making sticks for players with bad souls and good spirits, making ornamental plants for garden backdrops, and others.
- The fashion/costume team ensures a list of what costumes the cast and drama crew need.
- Other teams began to rehearse, such as the actor team, dance team, and singer team so that they would be better memorized and better in their performances later.
- The stage stylist perfected a poster about the relationship smartly using smartphones to our eye health. Later the poster will be installed on the event stand.

### Tuesday 22/10/19

- **Meeting 21**
  - Step 5: Presenting Projects
  - Performances at SDN 01 Jagakarsa

### Presenting Projects

- Each team occupies a position according to their duties.
- They carry out their duties as planned and have been trained repeatedly.
Wednesday  
23/10/19  
Meeting 22  
Step 6  
Project evaluation  
All fourth grade students fill out the reflection sheet.

Monday-  
28-31/10/19  
Meeting 23-26 Pertemuan  
Step 4  
Developing and Improving Projects  
Students practice refining drama for performances at UI's Center for Japanese Studies (PSJ), in front of their parents.

Friday  
01/11/19  
Meeting 27  
The teacher directs the students to carry out Rehearsal at the Center for Japanese Studies  
The assistant director plays an important role in managing the drama. All teams work together by carrying out tasks according to planning and training.

Saturday  
02/11/19  
Meeting 28  
Step 5  
Presenting Projects  
Mini drama stage: 'I'm smart with my gadget'  
Students perform their respective roles according to planning and practice.

Evaluation.

a) Evaluation of the implementation of the PjBL steps as follows: the value of the implementation of the PjBL model development based on the PjBL steps that have been implemented in stage 1 is 100% achieved. Based on the criteria for the implementation of the PjBL model development based on very good steps. In stage 2, the implementation of the PjBL Model development based on the model steps was carried out 100%. This means that the implementation of the PjBL model development is very good.

b) The drama project is carried out in two stages. The first stage is in the form of a mini-drama which is carried out in groups with an audience of representatives from parents who assess the drama performance. The achievement of the total assessment results of the mini drama staging project in stage 1 was 73, categorized as good. In the second stage, the drama is staged with a large team with the division of tasks between the performers and the team behind the scenes. The second performance was staged at SDN 01 Jagakarsa attended by students from SDN 01 Jagakarsa. From the data above, it can be concluded that the drama project 'I'm Wise with My Gawai' which was staged in front of class VI students of SDN 01 Jagakarsa was interesting, the story elements such as characters, storyline and clear message, story ideas contain value/value, and the ending is not easy guessed. Assessment of the team in the form of players playing seriously, crew or teams other than actors, dancers and singers can carry out their duties well, players and crew can work together very well. But in terms of players and crew being able to solve problems, it's quite good. This shows that the drama performances at SDN 01 Jagakarsa received a positive response from the audience, enjoyed the drama performances and received the drama's mandate in the form of using gadgets wisely.

The results of developing the PjBL model in an effort to improve 21st century skills or in this case are limited to the 4Cs (communication, collaboration, critical and creative thinking) are obtained by looking at the effectiveness of the PjBL model which is carried out in two stages. Assessment of 21st century skills is obtained through the results of teacher observations, self-assessments and peer assessments. These results are then processed using N Gain SPSS.

Based on the results of the calculation of the N-Gain Score (%) the average value of communication skills on teacher observations is 81.2%, peer assessment is 82.4%, self-assessment is 77%; means that it can be interpreted that the development of the PjBL model is effective in improving the communication skills of fourth grade students.

Based on the results of the calculation of the N-Gain Score (%) obtained the average value of collaboration skills on teacher observation is 78.4%, assessment between friends is 83.5%; self-assessment was 78.1%; means that it can be interpreted that the development of the PjBL model is effective in improving the collaboration skills of fourth grade students.

The results of the N-Gain calculation obtained that the average score of creative skills on teacher observations was 80.2%; on the assessment between friends is 82.5%; on self-assessment was 78.7%; means that it can be
interpreted that the development of the PjBL model is effective in improving the creative skills of fourth grade students.

Based on the results of the N-Gain calculation, the average score of critical thinking skills on teacher observations was 76.1%; on the assessment between friends is 83.6%; on self-assessment was 69.5%; means that it can be interpreted that the development of the PjBL model is effective in improving the critical thinking skills of fourth grade students on teacher observation and peer assessment. While the self-assessment is interpreted quite effectively. This is because the fourth grade students judged that they had not been able to use information for making projects during the process and limited vocabulary to explain why they were working on projects.

Based on the results of the N-Gain calculation, the average creative skill score on teacher observations was 80.2%; on the assessment between friends is 82.5%; on self-assessment was 78.7%; means that it can be interpreted that the development of the PjBL model is effective in improving the creative skills of grade IV students. The development of the PjBL model, which is applied in two stages, effectively improves communication, collaboration, critical and creative thinking skills based on the results of teacher observation, peer assessment and self-assessment. .

VI. CONCLUSION

1. SD Smart School has used a curriculum that supports the implementation of the PjBL learning model as an effort to improve 21st century skills which at least include communication, collaboration, critical and creative thinking skills to students from an early age. This is done so that students can face life in their era.

2. The PjBL model was developed in two stages. The two stages are passed according to the implementation of the model based on the syntax that has been made, such as the teacher making opening moments, the teacher making collaborative project plans, the teacher building knowledge and skills to answer essential questions, the teacher developing and improving student projects by guiding information mining and students presenting project results.

3. The location of the development of the model lies in the implementation of the syntax when 'teachers build knowledge and skills to answer essential questions' by applying the workshop model. In the second stage, students presented drama products at SDN 01 Jagakarsa and received very good appreciation from the audience.

4. The effectiveness of the PjBL model developed can be seen from the percentage of observations, peer assessments and self-assessments on communication, collaboration, critical and creative thinking skills. The results of communication skills scores from teacher observation, peer assessment and self-assessment respectively were 81.2%; 82.4% and 77%. The results of collaboration skills scores sequentially are 78.4%; 83.5%; and 78.1%. The results of the critical thinking skills score sequentially are 76.1%; 83.6%, and 69.5%. The results of the creative skills score sequentially are 80.2%; 82.5%; and 78.7%. Based on the results of the analysis, it can be concluded that the PjBL learning model developed is effective for improving 21st century skills, so it is feasible to be applied to classroom learning.

REFERENCES