ASSESSMENT OF PROJECT-BASED LEARNING IN SCIENCE CLASS

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Abstract

   This study reports the students' assessment through applying the project-based learning in science class for elementary school. The research methodology applied is case study with qualitative approach. The participants of this study are teacher and students of grade 1 and 5 at Budi Luhur elementary school. The instruments to collect data are classroom observation sheets, interviews and rubric of project-based assessment for science class. The result shows that project-based learning is conducted in semester 2 as the substitution of written mid-term test. It is non-test because project-based learning emphasizes on the authentic learning, therefore it is applicable and meaningful for the students. The steps undertaken in project-based learning consist of planning, implementation and evaluation. The assessment of project-based learning uses analytical rubric comprising four scales, 4 (excellent), 3 (good), 2 (fair), dan 1 (poor). To conclude, the project-based learning makes the students glad and enthusiastic. It also encourages the students to have higher cognitive thinking (synthesizing level in Bloom's taxonomy) and build students' character.

Kata Kunci : assessment, project-based learning, rubric.

Abstrak

   Penelitian ini menguraikan secara mendalam mengenai penilaian pembelajaran berbasis proyek di SD Budi Luhur. Metode penelitian yang digunakan adalah studi kasus dengan pendekatan kualitatif. Penelitian ini dilaksanakan di SD Budi Luhur. Partisipan penelitian ini adalah guru dan siswa kelas 1 dan 5. Instrumen yang digunakan untuk mengumpulkan data adalah lembar observasi kelas, wawancara dan dokumen yang berupa rubrik penilaian berbasis proyek mata pelajaran sains/IPA.

   Hasil penelitian menunjukkan bahwa pembelajaran berbasis proyek di SD Budi Luhur dilakukan di semester 2 sebagai pengganti ujian tertulis tengah semester. Pembelajaran berbasis proyek bersifat non-tes karena menekankan pada pembelajaran autentik/ nyata sehingga bersifat aplikatif dan bermakna bagi siswa. Terdapat beberapa langkah-langkah dalam pembelajaran berbasis proyek yaitu tahap perencanaan, pelaksanaan, dan evaluasi. Penilaian pembelajaran berbasis proyek menggunakan rubrik penilaian yang terdiri dari beberapa kriteria dengan skala rentangan 4 (excellent), 3 (good), 2 (fair), dan 1 (poor). Kesimpulan dari studi ini adalah siswa sangat senang dan antusias dengan pembelajaran berbasis proyek. Selain itu pembelajaran ini memberikan banyak manfaat bagi siswa seperti kemampuan kognitif tingkat yang lebih tinggi (tingkat menciptakan dalam taksonomi Bloom) dan dapat menumbuhkan karakter siswa.

Keywords: Pembelajaran berbasis proyek, penilaian autentik , rubrik penilaian.

I. INTRODUCTION

   Hard skills are not enough in twenty-first era. Those skills must be supported by soft skills in real life. How people can work in a team (cooperative way), socialize to other (interpersonal), solve the problems, do something creatively and innovatively, has flexibility and confidence (Boss and Krauss, 2007:11). The soft skills have important roles especially in workplace or industrial place; therefore those skills must be formed at earlier stage through education.

   In national education system, Law No.20 of 2003 reveals that educational goal not only creates the intellectual students but also gives them the spirituality, good moral, character and skill to equip them in their life. In fact, mostly Indonesian schools just concern on the intellectual development. It can be seen from the learning

process in which the students are asked to memorize the lesson.

Sanjaya (2006:1) explains that the learning process in Indonesia should be reformed. Memorizing the lesson should be changed because the students just understand the information without connecting to their real life. This condition makes the students are expert in theory but are not able to apply the knowledge in their life. For instance, students are asked to memorize kinds of verbs in present and past context. They are very fluent to mention them; however, they are not able to retell their daily using those contexts. It proves that they have not developed their critical, innovative and creative thinking as well solved the problems sufficiently. The learning process emphasizes memorizing route that is meaningless for the students (Gunawan, 2003:19).

Moreover, mostly teachers evaluate the learning process by using standardized-test. The standardized-test is in written test (pencil paper-based test) such as multiple choices, fill-in the blank, and essay. Those tests measure the extent to which students understand and master the lesson given without concerning on whole students' development. The standardized test does not embrace the social interaction and real-life context. At the end, the teachers just see the result of students' achievement not the learning process (Sanjaya, 2006:268-269).

Sanjaya also uncovers that students are not successful if their progress is only seen from the result of their achievement. Their learning process must be concerned by looking at the whole students' development. Therefore, this study proposes the authentic assessment in learning process.

Tommi (2014:62-64) argues that the authentic assessment is applied to measure students' cognitive, affective, and psychomotor development. It shows that the authentic assessment not only measures the intellectual aspects but also the behavior or attitude. One of the authentic assessments is project-based learning.

Project-based learning emphasizes on students as subject because students are given chances to explore and discover the knowledge. Teachers do not require talking a lot to deliver the lesson all day long. They have roles as facilitator, guidance and motivator for their students. The paradigm change influences the project-based learning. It is not teaching but learning.

Some results of research conducted by the experts show that assessment of project-based learning gives the benefit in students' learning process. Boss and Krauss (2007:11) conclude that project-based learning is a good strategy to increase students' motivation, participation, problem solving, spirit of teamwork and critical thinking. The learning process will be meaningful for the students. Moreover, project-based learning gains not only students' intellectual but also the attitude or behavior.

Thomas (2000) in McGrath (2002:42) describes that students' performance is better when they have project-based learning than conventional way. Their understanding is deeper and more focus to undertake the project.

Many countries implement project-based learning such as America, Singapore, Scotland, and so on. Singapore has slogan to insist its school to do more learning less teaching. Those countries conduct project-based learning because it is beneficial for the students.

While in Indonesia, project-based learning has not fully been done and has still used standardized test to measure the cognitive aspect. However, the previous survey undertaken, Budi Luhur elementary school employs project-based learning as the substitution of written mid-term test in semester 2. Therefore, this study aims to investigate by digging up the implementation and assessment of project-based learning at Budi Luhur elementary school.

II. LITERATURE REVIEW

2.1 Assessment

Assessment has close relationship with teaching and learning. Those components cannot be separated (Eggen dan Kauchak, 2007:476). Teachers undertake teaching and learning process then assess students' activities. Reynold, et al.(2009:2) argue that teachers spend a third of their professional time to assess students.

Assessment is crucial component in teaching and learning process. Hamzah and Koni (2012:2) explain that assessment is a measurement to collect the data on students' learning process or learning program in order to make a decision. Through assessment, teachers can gather the information about students' learning characteristics to make a decision (Reynold et al.,

2009:3). Further, Brown (2007:445) reveals that assessment measures the whole students' learning process consisting of ability, skills and learning performances.

Reynold et.al (2009:248) and Brown (2007:462) divide the assessment into two, traditional and alternative assessment. Traditional assessment refers to the standardized test or paper-pencil based test. Alternative assessment has various forms such as performance, portfolio, conference, journal, project-based learning and so on.

Lombardi (2008:6) identifies the differences between traditional and alternative assessment. The traditional assessment emphasizes on cognitive development and memorization route and product oriented. On the other hand, alternative assessment focuses on interactive and various performances, skill development related to the real life context and meaningful learning and give the opportunity to the students to have critical thinking and process oriented.

2.2. Project-based learning

Project-based learning is a learning methodology that focuses on student-centered (Grant, 2002:1). Students make a project based on their interest and ability so they will be independent learners. They do not listen to the teachers all day and memorize but they learn by doing.

Project-based learning involves students to design, solve the problem, make decision and work independently (Thomas, 2000:1). They will create a work by solving the real problem (McGrath, 2002:42). Project-based learning also can establish fun and flexible learning (Klein et al., 2009:7; Doppelt, 2003:255).

Project-based learning is also beneficial for teachers and parents. Curtis (2002) in McGrath (2002:42) finds that they are happy to see their students or children are enthusiastic in doing the projects.

The aims of project-based learning are creating fun activities, facilitating the students to learn in social context which the students can work in group, giving chance to the students to discover the knowledge by themselves so the learning will be meaningful for them, encourage the students to solve the problem and use kinds of learning sources as well do the experiment, and developing students' reflection (Seidel and Aryeh, 2002:19-20). Klein et al. (2009:7-9) adds that students can grasp the lesson by creating and

presenting the project based on their interest. They will be creative, active, and critical.

To conduct project-based learning, teachers must determine some steps. Klein et al. (2009:11) explicate the steps are deciding the objective and the skills that will be reached by addressing the project theme referring to the curriculum, determining the format of project(the final product of project), informing the timeline, designing the learning process, and assessing the project-based learning. Those steps are almost same as McGrath's (2002:42-44). The steps in employing project-based learning are discussing the topic, preparing and planning the project by making groups and informing what they will do, guiding the students in making project, evaluating and criticizing the project result, and presenting the students' work in front of their parents.

2.3 Assessment of project-based learning

Assessment of project-based learning is important to decide. Klein et al. (2009:17) address that students must know the assessment criteria in making project at beginning. When they know the assessment criteria, they can assess themselves and do the best for their project.

Rubric is one of the instruments to assess project-based learning. It can be used for the teacher to assess the students' progress in making the project and give the feedback for the students.

Reynold et al. (2009:256-258) classify rubric into two, analytical scoring rubric and holistic scoring rubric. Analytical scoring rubric provides detail and specific description on students' strength and weakness. On the other hand, holistic scoring rubric is less detail. Rubric has rating scale to indicate the assessment quality consisting of outstanding, good, average, poor or frequency comprising always, often, sometimes, seldom, never, and so on.

Klein et al. (2009:72) provides project-based learning rubric for science class. The rubric's criteria consists of the project, conceptual understanding of science, scientific process, written work, oral presentation. Each criteria has its own description (the complete rubric can be seen in Klein et al.'s book). The rating scale comprises exceeds standards (4 points), meets standard (3 points), approaching standard (2 points), and significantly below standard (1 point).

Carrol (2005:99) has different assessment from Klein et al. He does assessment of project-based

learning at Limerick University. The criteria consist of presentation, the use of visual aid, logical structure, handling objection, grabbing audience's attention and innovation. All those criteria are represented in A, B, C, and D. Each of them has different description. A refers to the excellent, B is good, C is fair, D is less satisfying, and E is poor.

2.4 The previous studies on assessment of project-based learning

Some relevant studies are conducted by some researchers on project-based learning. Doppelt investigates (2003:255-271) 54 junior high students who have low achievement. But when they do project, they have novelty and meaningful learning. Their responsibility, confidence, and learning achievement increase. Even though Dopplet's research has positive impact but it has not shown the steps in conducting project-based learning and the assessment completely.

Efstratia (2014:1258-1259) also does the project-based learning in Greece. The finding shows that project-based learning has some strength and weakness. The weakness is some teachers do not want to apply the project-based learning because they have lack experience doing it, even though it is integrated in curriculum. On the other hand, it gives the positive impact in increasing the cognitive and emotional development for the students and developing students' confidence and learning quality. The research result of this study also has not disclosed the assessment of project-based learning.

Baş (2011:2-10) undertakes the experimental research to ninth grade by applying the project-based learning. The result shows that students have good learning result and better attitude than those do not make the project. Musa et al. (2012:572) find similar result to Baş that project-based learning can develop students' soft skills. Moreover, project-based learning contributes to students' cognitive, affective, and psychomotor development (Kettanun, 2015:572-573).

Those researches focus on project-based learning and the results show that they have the strength and weakness. The researches have not disclosed the implementation and assessment with the criteria in detail.

III. RESEARCH METHODOLOGY

This study employs the case study methodology and qualitative as its approach. Cresswell (1998:36-61) argues that case study is used to explore a case which refers to a program, event, activities or an individual. Burn (2000: 459-460) and Nunan (1992: 75-79) add that case study is also used to obtain a deep understanding or portray toward a detail investigated case. This study focuses on the deep investigation on project-based learning of fifth and first graders.

3.1 Setting and Participants

The study was conducted at Budi Luhur Elementary School located at Jombang Raya Street, South Tangerang. The data sources are teacher and students of grade 1 and 5. The data consists of interview transcripts and project-based learning rubrics as well classroom observation.

3.2 Data collection procedure

According to Cresswell (2008:220), collecting data meant gathering the information to address the research questions. Some steps to collect the data are as follows:

1. Observation sheets

   Classroom observation is conducted to investigate project-based learning from planning, implementing and evaluating phases. The observation is undertaken in class 1 and 5 at science class by recording those phases.

2. Document analysis

   Project-based learning is assessed by using the rubrics. Those rubrics can be collected as data. The rubrics cover the planning, implementing and evaluating phases of project-based learning.

3. Interview transcript

   This study uses semi-structure interview. The interview is addressed to the teachers and students of grade 1 and 5.

This study employs more than one instrument to collect the data. This collection data is called triangulation. Triangulation is the process to collect the data by applying the multiple sources. It aims to build the accurate and credible data. (Sugiyono, 2013:397-399; Cresswell, 2008:266).

3.3 Data analysis and interpretation Procedure

After collecting data, the analysis and interpretation data are conducted (Cresswell, 2008:244). Sugiyono (2013:405-412) presents some procedures in analyzing the data consisting of data reduction, data display and draw the

conclusion. Data reduction means taking the important and necessary data. Data display refers to the presentation of data in many forms such as table, graph, chart, and so on. The analysis and interpretation data of this study were as follows:

1. Project-based learning rubric, interview transcripts and observation sheets are used as analysis data.
2. The data were reduced
3. Those data were displayed in table and short description
4. The data are were interpreted and concluded

IV. RESEARCH FINDING AND DISCUSSION

4.1 The implementation of project-based learning in Budi Luhur elementary school

The finding from the observation and interview shows that Budi Luhur elementary school implements project-based learning at semester 2 for substituting written mid-term test. This school applies this learning because it is applicable. Students can develop their higher order thinking such as analyzing and synthesizing skill. Moreover it also can enhance their presentation skill, bravery in expressing their idea, creativity, and teamwok. Tommi (2014:62-64) unveils that project-based learning is authentic. On the other word, project-based learning can be used to assess students' performance with interactive and innovative way as well focus on process. Written test is not suitable to measure the students' performance (Brown, 2007:462).

The other finding reveals that some steps of project-based learning are undertaken by the students and teachers as follows:

1. Making the rubric as the guidelines to measure students' learning process.

   The rubrics can be used to measure students' performance from beginning (planning) until ending (presentation) of the learning process.

2. Dividing students into some groups.

   Each group has three or four students. The division is based on the students' characteristics.

3. Explaining the materials or content for the project.

   The materials or content refer to the competency standard and based competency (goal and objective) in curriculum (KTSP).

4. Leting the students to prepare the project stuff.

Students prepare the stuff or equipment for making the project. They write what they bring to school on their diary book. The diary book is a means of the communication book between teachers and parents.

5. Conducting the project-based learning for two weeks including the presentation. Two weeks embrace the planning, implementing, and evaluating process.

6. Allowing the students to do the project based on their creativity and letting them to solve the problem in group.

   Students are not forced to memorize the lesson but they are encouraged to express their idea to solve the problem with their team by linking it to their life.

7. Giving the model how to present their final project.

   Even though they are given the example to present their project, they have a freedom to present with their own style referring to the the guidelines given to them.

8. Providing chances for the students to have the presentation exercise.

   The students have time to practice with their team in presenting their final project.

9. Assesing presentation for their project

   Although the project is made in group, they present their final project individually. This assessment emphasizes on the content and procedure when they make the project.

10. Assesing the students' behavior or attitude while making the project.

    There are some behaviour or attitude assessment such as teamwork ability, independence, confidence, tolerance, and leadership.

Those steps are almost similar to Klein et al. (2009:11) and McGrath (2002:42-44). The steps are deciding the goal, topic, theme or format; preparing and planning the project as well the schedule and learning activities; guiding the students; presenting the final projects; and assessing the process and final project.

The other finding indicates that project-based learning makes the students enthusiastic and busy to accomplish their project. They share their thought, idea, and work to make their project.

They prefer to make the project than do the written test because they can express their idea and help each other to finish their project. Doppelt (2003:255-271), Efstratia, Douladeli (2014:1258-1259), Baş (2011:2-10) and Musa et al. (2012:572) find that project-based learning has positive impact for the students. Doppelt demonstrates that project-based learning develops students' achievement, responsibility and confidence than conventional learning. Efstratia (2014:1258-1259) points out that project-based learning can enhance students' cognitive, emotion and confidence. Baş and Musa et al. prove that project-based learning can change students' attitude to be better such as team work or participation.

4.2 Assessment of project-based learning in Budi Luhur elementary school

The findings of project-based learning rubrics between grade 1 and 5 are different in format, even though those have same goal to assess students' learning progress. It can be seen that the format has not been standardized for each class in that school. Those rubrics can be seen in table 1 and 2.

Project-based learning rubric of grade 1 has four criteria: presentation, contribution, creativity, dan follow instruction. Presentation refers to students' ability in presenting their final poject. Contribution addresses students' skill to work in group, help each other, or share the idea or opinion in making the project. Creativity emphasizes on students' skill in creating their project with their original and creative thought. Follow instruction means students' skill to understand the instruction and internalize it into their project. Meanwhile, the rubric of grade 5 consists of three criteria as follows: content, presentation, and character building aspects. The character building aspects are divided into some criteria such as independence (kemandirian), confidence (percaya diri), creativity(kreatif), tolerance (saling menghormati), and leadership (kepemimpinan). The fifth graders must make two science projects: Create a source of magnet with simple objects and make windmill with simple machine, therefore they have two criteria for the content and presentation.

The rating scale of those rubric comprises excellent (4 points), good (3 points), fair (2 points) and poor (1 points). Total score for project-based learning for grade 1 is 16. It is the sum of presentation (4 points) + contribution (4 points) + creativity (4 points) + follow instruction (4 points). On the other hand, the total score for grade 5 is 36. It is the sum of content 1 (4 points) + content 2 (4 points) + presentation 1 (4 points) + presentation 2 (4 points) + independence (4 points) + confidence (4 points) + creativity (4 points) + tolerance (4 points) + leadership (4 points). Those total score will be converted into 0-100 range. For instance, if a student of grade 1 gets 14 points, she/he will get 88 (14 points is divided by 16 then multiplied by 100).

The analysis of project-based learning rubric of grade 1 shows that the presentation skill, contribution in group, creativity and ability to follow the instruction are in good level. The average of those is 3.65, 3.2, 3.6, and 3.65. The data can be seen from table 3.

The fifth graders have good presentation and follow instruction ability. The average is 3.2 and 3.25. They have fair independence, creativity and leadership in making the project with the average 2.8, 2.8, and 2.6. Students are confident and able to work in team. It can be seen from the average 3.2 and 3.1. Look at table 4 for detail information.

V. CONCLUSION

Applying project-based learning as the replacement of written mid-term test of semester 2 gives positive impact to the students. The students are happy and enthusiastic in doing the project-based learning. They can share their idea, help each other and work together in team to solve the problem. The project-based learning can develop the students' character building such as their interpersonal skill, leadership, teamwork, and bravery.

Project-based learning conducted consists of some steps such as planning, implementing, and evaluating. The process of project-based learning from beginning until ending is assessed by using the rubric. The rubric of grade 1 and 5 has slightly difference from the criteria. It occurs because the criteria in grade 5 have two projects and detail character building. Therefore, this study recommends Budi Luhur School to make the standard criteria for all classes.

A further research is also required to conduct because this study only investigates the project-based learning for science class. It will be better to scrutinize the other subjects.

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Appendixes

Table 1. Project-based learning rubric of grade 1

Criteria	Descriptors				Mark
	Excellent (4)	Good (3)	Fair (2)	Poor (1)	
Presentation	Students present fully knowledge by explaining and demonstrating the concept of way to move the magnetic toy with proper greetings followed with clear voice and eye contact.	Student is able to present less knowledge of the concept but support with good demonstration of playing magnetic toy with clear voice.	Student is able to explain rudimentary of moving the magnetic toy concept or demonstrates playing with the magnetic toy with low tone of voice.	Student is not able to explain or demonstrate the concept of pushing and pulling	
Contribution	Student is able to provide useful ideas when participating in the group; being an active leader or member when needed and try to keep others working well together.	At times, student is able to provide useful ideas when participating in the group.	Student is able to provide useful ideas when participating in the group though sometimes he/she prefers to work in solitaire	More comfortable to do works in solitaire	
Creativity	Project includes many unique yet innovative ideas and creative use of materials in unexpected way independently.	Project includes some unique ideas and several materials were used with a minimum support.	Project includes an idea but lacks originality and may have imitated other group's plan and with guidance and encouragement.	Project is finished but provides no evidence of creativity or originality.	
Follow Instructions	The project has planned carefully; understanding of all instructions is clearly demonstrated.	The project has planned carefully; understanding of all instructions is demonstrated.	The project shows little evidence of understanding of the instructions.	The project shows no understanding of the instructions.	
Score					16

Table 2. Project-based learning rubric of grade 5

Criteria	Descriptors				Mark
	Excellent (4)	Good (3)	Fair (2)	Poor (1)	
Content 1: Create a source of magnet with simple objects (cans, baloon and paper clips)	The student completely understands how to create the project, the instructions are clearly demonstrated with no guidance	The student understands how to create the project, most of instructions are demonstrated with a little guidance	The students pretty understand how to create the project, some of instructions were demonstrated with guidance	Student has not yet understood how to create the project, none of instructions were demonstrated	
Content 2: Making windmill with simple machine	The student completely understands designing the project, the instructions are clearly demonstrated with no guidance	The student understands how to create the project, most of instructions are demonstrated with a little guidance	The students pretty understand how to create the project, some of instructions were demonstrated with guidance	Student has not yet understood how to create the project, none of instructions were demonstrated	
Describe the procedure and the magnetic force created based on the project	The student is completely able to describe the procedure creating simple magnet and the change of force based on the project	The student is mostly able to describe the procedure creating simple magnet and the change of force based on the project	The student is able to describe reasonably the procedure creating simple magnet and the change of force based on the project	The students is able to describe the procedure creating simple magnet and the change of force only with guidance	
Describe the procedure for designing windmill with simple machine, and the energy transferred from the dynamo's magnet	The student is completely able to describe the procedure designing windmill with simple machine and is able to describe the energy transferred	The student is mostly able to describe the procedure designing windmill with simple machine and is able to describe the energy transferred	The student is able to describe reasonably the procedure designing windmill with simple machine and is able to describe the energy transferred	The students is able to describe the procedure designing windmill with simple machine and the energy transferred only with guidance	
Mandiri	Siswa mampu	Siswa mampu menunjukkan	Siswa telah menunjukkan	Siswa belum dapat	

Criteria	Descriptors				Mark
	Excellent	Good	Fair	Poor	
	(4)	(3)	(2)	(1)	
Content 1: Create a source of magnet with simple objects (cans, baloon and paper clips)	The student completely understands how to create the project, the instructions are clearly demonstrated with no guidance	The student understands how to create the project, most of instructions are demonstrated with a little guidance	The students pretty understand how to create the project, some of instructions were demonstrated with guidance	Student has not yet understood how to create the project, none of instructions were demonstrated	
	menunjukan sikap mandiri yang amat baik. Persiapan, perencanaan, pelaksanaan dan penyelesaian projek dilakukan tanpa bantuan guru	sikap mandiri yang baik. Perencanaan, pelaksanaan dan penyelesaian projek dilakukan dengan sedikit bantuan guru	sikap mandiri dalam persiapan, perencanaan projek. Namun pada pelaksanaan dan penyelesaian projek masih banyak membutuhkan bantuan guru	menunjukkan sikap mandiri. Dalam persiapan, perencanaan, pelaksanaan dan penyelesaian projek harus selalu dengan bantuan guru dan orangtua	
Percaya diri	Siswa mampu menunjukkan sikap percaya diri yang amat baik ketika menyampaikan pendapat pada saat pelaksanaan projek, serta pada saat mempresentasikan projek	Siswa mampu menunjukkan sikap percaya diri yang baik ketika menyampaikan pendapat pada saat pelaksanaan projek, serta pada saat mempresentasikan projek	Siswa cukup percaya diri ketika menyampaikan pendapat pada saat pelaksanaan projek, pada saat mempresentasikan projek di kelas masih memerlukan dorongan guru	Siswa belum mampu menunjukkan sikap percaya diri dalam menyampaikan pendapat pada saat pelaksanaan projek, pada saat presentasi projek harus selalu mendapat dorongan guru	
Kreatif	Siswa menunjukkan kemampuan yang amat baik dalam berkreasi pada desain projek, serta mampu memecahkan masalah dalam	Siswa menunjukkan kemampuan yang baik dalam berkreasi pada desain projek, serta mampu memecahkan masalah dalam penyelesaian projek dengan	Siswa cukup mampu berkreasi pada desain projek, kemampuan menyelesaikan masalah dalam penyelesaian projek masih memerlukan banyak bantuan guru	Siswa belum dapat menunjukkan kemampuan berkreasi pada desain projek, kemampuan menyelesaikan masalah dalam penyelesaian projek harus	

Criteria	Descriptors				Mark
	Excellent (4)	Good (3)	Fair (2)	Poor (1)	
Content 1: Create a source of magnet with simple objects (cans, baloon and paper clips)	The student completely understands how to create the project, the instructions are clearly demonstrated with no guidance	The student understands how to create the project, most of instructions are demonstrated with a little guidance	The students pretty understand how to create the project, some of instructions were demonstrated with guidance	Student has not yet understood how to create the project, none of instructions were demonstrated	
	penyelesaian projek tanpa bantuan guru	sedikit bantuan guru		selalu dengan bantuan guru	
Kerja sama dan saling menghormati	siswa menunjukkan kemampuan bekerja sama yang amat baik dengan kelompoknya, serta mampu menunjukkan sikap menghormati terhadap pendapat orang lain pada saat pelaksanaan projek	siswa menunjukkan kemampuan bekerja sama yang baik dengan kelompoknya, serta mampu menunjukkan sikap menghormati pendapat teman pada saat penyelesaian projek	siswa menunjukkan kemampuan bekerja sama yang cukup baik dengan kelompoknya, sikap menghormati pendapat orang lain terkadang masih membutuhkan pengawasan dan arahan guru	siswa belum dapat menunjukkan kemampuan bekerja sama, sikap menghormati pendapat orang lain harus selalu dengan arahan dan pengawasan guru	
Pemimpin yang baik	Siswa menunjukkan sikap kepemimpinan yang amat baik pada kelompoknya, mampu menjadi role model dan membuat keputusan pada saat penyelesaian projek	Siswa menunjukkan sikap kepemimpinan yang baik pada kelompoknya, mampu menjadi role model dan dapat membuat keputusan pada saat penyelesaian projek dengan sedikit arahan guru	Siswa menunjukkan sikap kepemimpinan yang cukup baik pada kelompoknya, kemampuan membuat keputusan pada saat penyelesaian projek masih banyak memerlukan bantuan guru	Siswa belum dapat menunjukkan sikap kepemimpinan pada kelompoknya, kemampuan memutuskan sesuatu harus selalu dengan bantuan guru	
Score				36	

Table 3. Score of science project-based learning for grade 1

No.	Name	Criteria				Score
		Presentation	Contribution	Creativity	Follow Instruction	
1.	Aud	4	2	4	4	88
2.	Mar	4	3	3	4	88
3.	Ald	4	3	4	4	94
4.	Bun	4	4	4	4	100
5.	Tris	3	3	4	4	88
6.	Ayo	3	4	3	4	88
7.	Erd	4	3	3	4	88
8.	Bil	4	4	4	3	94
9.	Dai	3	2	4	4	81
10.	Mai	4	4	4	3	94
11.	Nar	4	4	3	3	88
12.	Sat	3	3	3	3	75
13.	Ard	4	3	2	3	75
14.	Raf	1	2	3	2	50
15.	Nat	4	2	4	4	88
16.	Liw	4	4	4	4	100
17.	Chr	4	3	4	4	94
18.	Bra	4	4	4	4	100
19.	Ryu	4	3	4	4	94
20.	Kha	4	4	4	4	100
Rata-Rata		3.65	3.2	3.6	3.65	88.35

Table 4 Score of science project-based learning for grade 5

No.	Name	Criteria									Score
		Content 1	Content 2	Presentation 1	Presentation 2	Mandiri	Percaya diri	Kreatif	Kerja sama	Kepemimpinan	
1.	Kdk	3	3	3	3	3	3	3	4	2	75
2.	Chr	3	3	4	3	3	4	3	3	3	81
3.	Oyn	4	4	3	4	4	4	4	3	4	94
4.	Rno	4	3	3	4	3	4	3	3	4	86
5.	Jsu	2	2	3	3	2	4	2	2	2	61
6.	Mde	4	3	3	4	3	3	3	4	4	86
7.	Rma	3	3	4	3	2	4	2	3	2	72
8.	Rck	3	3	3	4	4	3	3	4	4	86
9.	Aurl	3	3	3	3	2	2	2	3	2	64
10.	Azr	3	3	3	3	2	2	3	3	2	67
11.	Carl	3	3	3	3	3	3	3	3	2	72
12.	Gis	4	4	4	4	3	3	3	2	2	81
13.	Lou	4	4	3	3	3	4	3	3	3	83
14.	Njm	3	3	3	3	3	3	3	3	2	72
15.	Shrn	3	3	3	3	2	3	2	3	2	67
16.	Vqn	3	3	3	3	2	3	3	3	2	69

No.	Name	Criteria									Score
		Content 1	Content 2	Presentation 1	Presentation 2	Mandiri	Percaya diri	Kreatif	Kerja sama	Kepemimpinan	
1.	Kdk	3	3	3	3	3	3	3	4	2	75
2.	Chr	3	3	4	3	3	4	3	3	3	81
3.	Oyn	4	4	3	4	4	4	4	3	4	94
4.	Rno	4	3	3	4	3	4	3	3	4	86
5.	Jsu	2	2	3	3	2	4	2	2	2	61
6.	Mde	4	3	3	4	3	3	3	4	4	86
7.	Rma	3	3	4	3	2	4	2	3	2	72
8.	Rck	3	3	3	4	4	3	3	4	4	86
9.	Aurl	3	3	3	3	2	2	2	3	2	64
10.	Azr	3	3	3	3	2	2	3	3	2	67
11.	Carl	3	3	3	3	3	3	3	3	2	72
17.	Grc	4	4	3	4	4	3	3	3	2	83
Rata-Rata		3.3	3.2	3.2	3.4	2.8	3.2	2.8	3.1	2.6	76