

Analysis of Student Ability in Answering Open Ended Final Exam Capita Selecta for Secondary Education Academic Year 2020/2021

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Abstract: Capita Selecta Learning for Secondary Education for the 2020/2021 Academic Year takes place online by implementing the Project Based Learning Model (PjBl). This research aimed to determine students' abilities in designing learning scenarios using learning media on open exam questions. The research method used ex post facto. The subjects of this research were students of the Undergraduate Study Program Class A and Class B Semester V Mathematics Study Program FKIP UNIB for the 2020/2021 academic year who took the Capita Selecta Mathematics course. at secondary education level totaling 52 people. Research instruments are test sheet, answer sheet, and assessment sheet. The results of the research show that the average score for those who answered according to the task props = 58.85%, the average score for those who answered not according to the assignment props = 17.31% and the average score for those who did not answer = 23.85%. It can be concluded that more than 50% of them can design teacher and student conversations according to the task props in open-ended assignments. Based on the results of data processing, more than half of the students can think critically, creatively and communicatively.

Keywords: Capita Selecta; Learning Scenario Design; Online Learning; Open Ended Questions; Project-Based Learning Model.

Introduction

In the 21st century, there are several important skills needed by students. These skills are very relevant to learning orientation in Indonesia, such as critical thinking and problem solving skills; Creativity and innovation; Cross-cultural understanding; Communication, information and media literacy (media, information and communication literacy) which can establish relationships and convey ideas either orally, in writing or non-verbally; Information and Communication Technology Literacy (Computing and ICT Literacy) ICT literacy includes the ability to formulate knowledge, express oneself creatively and accurately, as well as create and produce information, not just understand information; Career and life (life and career skills) Students will work and have a career in a society where the world of work requires people who are

independent, like to take initiative, are good at managing time, and have a leadership spirit (Partnership for 21st Century learning, 2015; Pujiriyanto, 2019). The six skills above can be grouped into three categories, namely learning and innovation skills which include critical thinking and problem solving, communication and collaboration, and creativity and innovation; digital literacy includes information literacy, media literacy, and ICT literacy; career and life skills include a flexible and adaptable attitude, initiative and independence, able to interact across social and cultural lines, productive and accountable (Pujiriyanto, 2019).

Based on this, teachers must be able to make plans regarding mathematics learning that will be applied to students so that students can successfully live their lives in the 21st century. One way that teachers do is apply the Project-based learning model (PjBL). The advantage of

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the PjBL Model if it is able to implement it well is that students have the skills needed in the 21st century.

Klein mentioned the characteristics of PjBL such as Leads students to investigate important ideas and tasks, Is framed around the process of inquiry, Is differentiated according to student needs and interests, Is driven by student independence, Requires the use of creative thinking, critical thinking, and information skills to investigate, conclusions about, and creating content, and connecting to real and authentic world problems (Indarti, 2016). With these characteristics in mind, teachers can plan learning experiences that produce deep understanding of important ideas in the content. Because students are the ones driving the learning, they can leverage their strengths and create projects that combine their interests, native languages, cultural backgrounds, abilities, and preferences for using different types of media. Buck Institute for Education (1999) states that project-based learning has characteristics, namely students are decision makers and create frameworks, there are problems whose solutions are not determined beforehand, students are independent in designing processes to achieve results, students are responsible for obtaining and manage the information collected, carry out continuous evaluations, students regularly review what they have done, the final result is a product and evaluates its quality, and the class has an atmosphere that is tolerant of errors and changes (Ansori, 2018).

Based on the above, the researcher applied the PjBL Model to the Capita Selekt Secondary Education Level (CapSel-SEL) subjects for the 2020/2021 academic year. The CapSel-SEL course is a mandatory course offered in the FKIP UNIB Mathematics Education Undergraduate Study Program with a weight of 3 credits. The competency that students must achieve after attending CapSel-SEL lectures is that students are expected to know mathematics learning problems that occur in middle/high school. Students are expected to be able to find solutions to overcome the problems they encounter by creating learning tools based on the material they cover (Susbiyanto et al., 2019).

In the 2020/2021 academic year the Covid-19 pandemic is still hitting the world. This causes students to study from home. Learning takes place online using Zoom, Google Classroom, WhatsApp and email facilities. The implementation of CapSel-SEL learning takes place by applying the PjBL Model. Students chose to work independently, not in groups as usual, so that the resulting learning tools were 52, in accordance with the number of students taking the CapSel-SEL course. Students from the first semester are divided into two classes. Class A is students with an odd NPM of 30 people. Class B is an even number of 22 students. The

implementation of the PjBL Model in CapSel-SEL courses during the Covid 19 period for the 2020/2021 academic year.

If students are successful in presenting reports and succeed as teachers in applying the teaching aids they have made, happiness will be seen radiating from the students' faces (Bytyqi, 2021). This is in accordance with Kursiasih et al. (2014) who stated that the positive impact of the assignment to make teaching aids is increasing students' learning motivation to encourage their ability to do work that is important and needs to be appreciated, improving problem solving abilities, making students more active and successful in solving complex problem, increasing collaboration, encouraging students to develop and practice communication skills, improving students' skills in managing resources, providing students with learning and practical experience in organizing projects and making allocations of time and other resources such as equipment to complete assignments, providing a meaningful learning experience attract students in a complex way and are designed to develop according to the real world, involve students in learning to take information and demonstrate their knowledge, then implement it in the real world, and make the learning atmosphere fun, so that students and educators enjoy learning.

Based on this, to get more accurate test results, researchers gave open assignments on the final CapSel-SEL exam. Researchers carried out the final exam simultaneously for Class A and Class B. This research aims to determine students' abilities in designing learning scenarios using teaching aids in the 2020/2021 Capita Selecta Secondary Education Level final exam assignment. The ability to design learning scenarios is really needed as preparation for becoming a teacher in the future.

Method

This research is ex-post facto, namely research conducted to examine events that have occurred and then trace them back to find out the factors that could have caused the event to occur. The subjects of this research were students from the Undergraduate Study Program Class A and Class B Semester V Mathematics Study Program FKIP UNIB for the 2020/2021 academic year who took the Capita Selecta Mathematics course at Secondary Education Level, totaling 52 people. The instruments used to collect information are the final exam sheet, final exam answer sheet, and Guideline for Assessment of Ability to Answer Open Assignments. The final exam is carried out for 150 minutes. Answers are sent to the lecturer's email. Data is processed using

average and percentage formulas. The open question sheet for the final exam is shown in Figure 1.

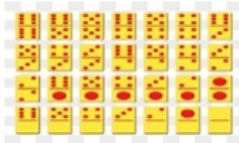
A. Look at the following picture!



Make a conversation between the teacher and students in the classroom, where the teacher is using the wall clock above as a prop, by giving an example of the calculation for learning:

1. Flat plane geometry (Junior High School Material)
2. Geometry of space (Junior High School Material)
3. Trigonometry (High School Materials)

B. Look at the following picture!



Make a conversation between the teacher and students in class, where the teacher is using Domino Cards as a teaching aid by giving examples of calculations for Mathematics in high school.

C. Make a conversation between the teacher and students in the classroom, where the teacher is using the teaching aids made by friends and relatives that have been presented on zoom, by giving examples of calculations for learning junior high or high school materials.

Figure 1. Exam assignment sheet

Table 1. The assessment guide sheet

No	Name	NPM							Question Answer		
			A1	Note	A2	Note	A3	Note	B	Note	C

This research was carried out by providing an exam sheet and then the exam results answer sheet was analyzed using an assessment guide sheet. Before being given the exam, students have been given learning using the Project Based Learning model. The assessment guide sheet appears in Table 1. The assessment method is to check each answer sheet, use the assessment guide sheet in the table, then put a mark in the AP column, if the answer uses props on the assessment guide sheet, mark the NAP column if the student's answer is not. use the props on the assessment guide sheet, mark in column B if the student does not answer. After all the answers are checked, each choice is added up, then the average value and percentage are found.

Result and Discussion

After learning using the Project Based Learning model, a final exam was carried out with three open-ended questions to determine students' abilities in designing learning scenarios using teaching aids. Implementation of the assignment guide sheet is designed for 150 minutes. The first 30 minutes everyone worked on Zoom, but because the weather was not favorable and considering that the student quota was also limited, this caused students to work offline in their

respective places. Then students send their answers to the lecturer's email, and it cannot be later than the specified time.

Giving open-ended questions produces different student answers. Of these answers, there was more than 1 correct answer with the number of students who answered correctly amounting to more than half of the total number of students. This is in accordance with the results of Munroe (2015) analysis which states that open-ended questions stimulate students to challenge themselves in looking for alternative ways to solve problems that can produce many solutions or many different methods from students. Next, the results of the students' answers that have been obtained are assessed using the assessment sheet as in Table 1. Then they are analyzed to obtain the results shown in Table 2.

Based on the contents of Table 2, it can be seen that the average score of students who answered according to the props (AP) was 58.85%, the average score of students who answered not according to the props (NAP) was 17.31%, the average score is did not answer (B) 23.85%. Answers are said to not match the props (NAP) if students answer using props that are different from the assignment guide sheet.

More than 50% of students can answer the question guide sheet according to the props provided or

in other words more than 50% of students can answer correctly. Giving open ended questions can detect students' thinking abilities. Students can design conversations between students and teachers using teaching aids such as domino cards and must master Probability Theory material well. Likewise, to use a clock display in the form of a hexagon prism, students who can design conversations between students and teachers must master the material on Planar Geometry, Spatial Geometry and Trigonometry. This means that more than half of the students can think critically, creatively and communicatively, and have problem solving abilities.

Table 2. Results of student ability analysis in answering the assignment guide sheet

Assignment	No	According to Prop (AP) (%)	Not According to Prop (NAP) (%)	Blank (B) (%)
A	1	69.23	25.00	5.77
	2	53.85	7.69	38.46
	3	63.46	5.77	30.77
B	1	42.31	46.15	11.54
C	1	65.38	1.92	32.69
Total		294.23	86.50	119.23
Average		58.85	17.31	23.85

This is in line with the research results of Ruslan & Santoso (2013) which stated that open-ended questions provide opportunities for students to provide many problem solutions with a variety of different answers so that teachers can detect students' thinking abilities. Providing open ended questions can improve students' creative thinking abilities (Hoiriyah, 2019). Apart from that, giving open-ended questions can train students in solving problems, expressing opinions, and explaining the problem-solving process in their own way so that it can improve students' problem-solving abilities (Pamungkas & Kowiyah, 2021).

In Table 2 it can be seen that the number of wall clocks with a flat, hexagon-shaped surface as a geometric support is 69.23%. This shows that students are thorough, critical, creative, and master the material well, and can communicate the teaching aids on the questions well. However, there were 25% who answered that they did not comply with the instructions. Students create a learning scenario, namely by making a circular clock as usual. This shows that students are less critical in reading matters and less creative. In question A no. 2, 53.85% were able to answer that a clock is a geometric shape in the form of a hexagon prism. However, there were 38.46% of students who did not answer. This shows that 38.46% of students were unable to change the wall clock which is often used as an example of a flat object

into a space object. This shows that students are less critical and less thorough. In question A no. 3 regarding the use of clocks as teaching aids for Trigonometry, it turned out that 63.46% of students could explain it well and accompanied by examples of calculations by arranging the clock hand according to the desired angle.

For question B, it turns out that only 42.31% were able to use domino cards as a buffer for Opportunity. During the presentation and application stage of props, some students used props in the form of coins, dice or playing cards to explain probability material. Generally, students understand the Opportunity material. It's just that it has never been read that domino cards were used as a support for Opportunity material. However, there are also those who make cards like domino cards but contain, for example, trigonometry formulas. This was done by 46.15% of students in answering questions (question B, namely making the cards like domino cards. This means that students answered not according to the props. There were 11.54% who did not answer. Figure 2 and 3 below is an example of students' answers according to props (AP) and not according to props (NAP) of question B.

For question C, 65.38% were able to re-explain the material that had been conveyed by their friends. This shows that even though learning is carried out online via Zoom, more than half of the students listen to their friends' explanations in class. Problems that often occur when studying online are loss of signal or running out of quota. Those who have difficulty can read their friends' reports on Google Classroom. It's just that the final report is not equipped with teacher-student conversations. There were 1.92% who answered by making dice as a group game tool but the material was not clear. The following is an example of a student's answer to question C.

Students' ability to answer open ended questions is influenced by the students' mathematical abilities. This is in line with the research results of Nurpratiwi & Setianingsih (2021) which states that mathematical abilities influence students' thinking processes in solving problems. Students with mathematical abilities at the stage of understanding the problem can carry out the thinking process of remembering terms, arguing, and making decisions. In answering questions in the plan implementation step, students can carry out the thinking process in terms of remembering, making arguments, and making decisions (Rakhmatdi et al., 2023). In the step of reviewing completed solutions, students can carry out the thinking process in order to remember, consider, argue and make decisions (Darmaji et al., 2019). At the planning stage, he can carry out the thinking process in terms of remembering and making decisions. In the plan implementation step, students can

carry out the thinking process in terms of remembering, considering and making decisions (Nafiah et al., 2023)

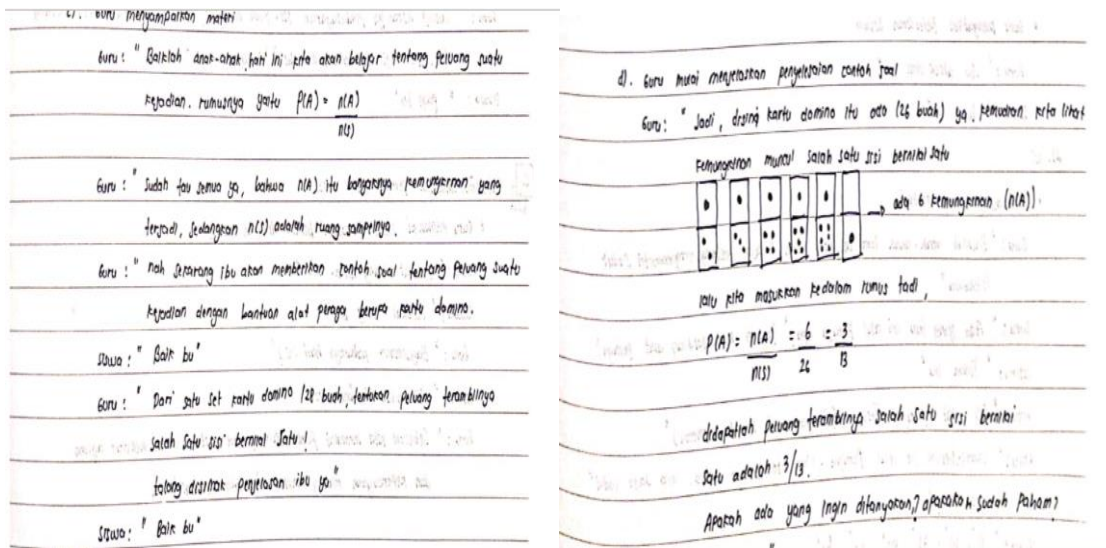


Figure 2. Example of answer according to props (AP) of question B

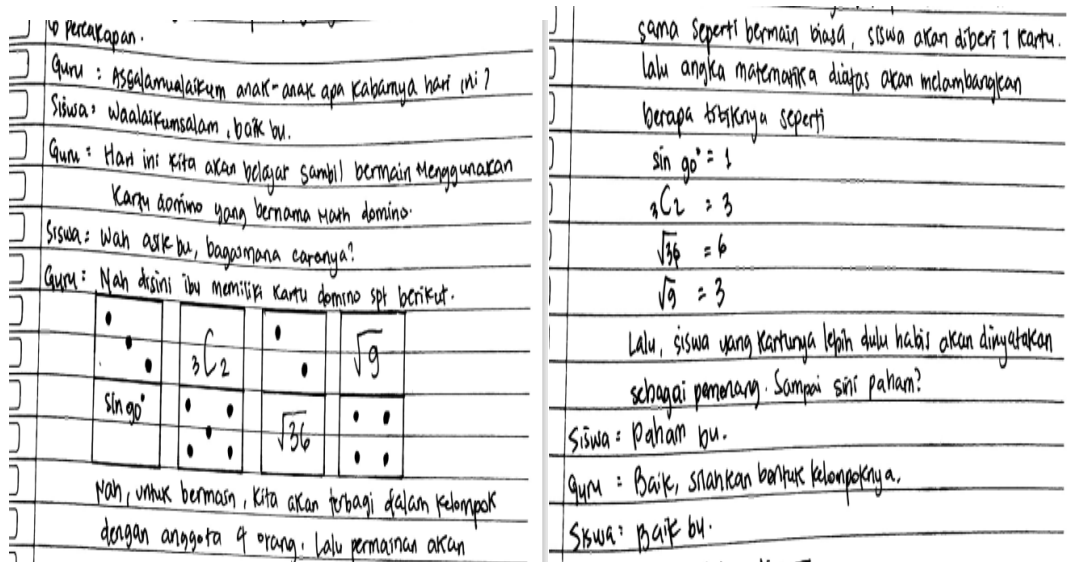


Figure 3. Example of answer not according to props (NAP) of question B

Then in the step of looking back at the completion steps completely, students can carry out the thinking process in order to remember, consider and make decisions. Students with low mathematical abilities, at the stage of understanding the problem, can carry out the thinking process in terms of making decisions, while at the planning stage they can carry out the thinking process in terms of remembering and making decisions (Ültay et al., 2021). Then at the plan implementation stage, he can carry out the thinking process in order to remember, consider, provide arguments and make decisions. Finally, in the step of reviewing the solution as a whole, he can carry out a thinking process in order

to remember and make a decision (Dias & Brantley-Dias, 2017). Looking at the explanation above, it can be concluded that there are several differences in students' thinking processes by paying attention to their mathematical abilities (Susanti et al., 2022). This means that mathematical abilities influence students' thinking processes in solving problems.

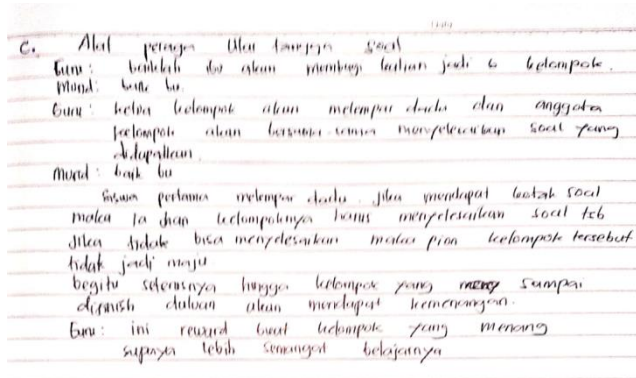


Figure 4. Example of answers to question C category NAP

Students' thinking abilities in answering the problems given are influenced by the project-based learning model that has been implemented. During learning, students are actively involved in learning to solve problems in order to complete the project. This is in line with the research results of Febrila et al. (2023) which stated that the PjBL model can train students in solving problems and teach students to more easily apply the concepts learned so that they can improve students' problem solving abilities. The PjBL model also has an impact in increasing students' creative abilities (Nafiah et al., 2023). Dias & Brantley-Dias (2017) also suggest that project-based learning can also motivate students and help students meet standards in doing well on exams that ask students to demonstrate their in-depth knowledge abilities and thinking skills.

Conclusion

The application of the PjBL Model to Courses (CapSel-SEL) helps students to develop critical and creative thinking skills, is able to solve problems, and is able to train students in communication skills, both oral and written. The diverse abilities of students cause the results of final exam assignment answers to vary. The results of the analysis showed that 58.85% of students answered according to the instructions, 17.31% answered not according to the instructions, and 23.85% answered according to the instructions did not answer. It can be concluded that more than 50% of them were able to answer the assignment according to the directions in the open-ended assignment. Based on the results of data processing, more than half of the students can think critically, creatively and communicatively.

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Author Contributions

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Conflicts of Interest

The authors declare no conflict of interest.

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