

# Analysis of metacognitive awareness in project-based learning: a study case in assessment course

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## Abstract

This study aims to analyse the metacognitive awareness in project-based learning. The purposive sampling took 75 students. This study is descriptive research with qualitative approach using MAI, student's achievement, and in-depth interview. Knowledge of cognition related with the early stage of project-based learning. Result shows that there's a different result between student's perspective about their own ability and ability measured. It indicates there is a difficulty of students in terms of identification their own abilities in this stage. Regulation of cognition related with the next syntax. This relation proofed by the result of MAI instrument and project score.

**Keywords:** 21<sup>st</sup> century learning skills, project-based learning, metacognition, metacognitif, metacognitive awareness;

## Abstrak

Penelitian ini bertujuan untuk menganalisis kesadaran metakognitif dalam pembelajaran berbasis proyek. Pengambilan sampel secara purposive sampling mengambil 75 mahasiswa. Penelitian ini merupakan penelitian deskriptif dengan pendekatan kualitatif menggunakan MAI, hasil belajar peserta didik, dan wawancara. Pengetahuan kognisi berkaitan dengan tahap awal dalam pembelajaran berbasis proyek. Hasil penelitian menunjukkan adanya perbedaan cara pandang mahasiswa tentang kemampuan diri sendiri dengan kemampuan yang terukur. Hal tersebut menunjukkan adanya kesulitan mahasiswa dalam proses identifikasi kemampuannya dalam tahap ini. Regulasi kognisi berkaitan dengan sintaks berikutnya. Hubungan tersebut terbukti dengan hasil yang diperoleh dari instrument MAI dan hasil belajar peserta didik.

**Keywords:** keterampilan belajar abad 21, pembelajaran berbasis proyek, metakognisi, metakognitif, kesadaran metakognitif;

## 1. Pendahuluan

There's a paradigm change in education in order to suit the transition of society in the 21<sup>st</sup> century. People have to solve new problems of the new world using their knowledge and skills called the 21<sup>st</sup> century learning skills (Sahin, 2009) The framework of these learning skills illustrated by Figure 1.



**Figure 1.** The 21<sup>st</sup> century learning skills framework including of learning skills as expected skill outcomes, themes, and support systems (Anonim, 2019)

Expected skill outcomes are classified into learning and innovation skills (i.e. thinking and problem-solving skills), information, media, and technology skills (i.e. information and communication skills), and interpersonal and self-direction skills (i.e. life and career skills). The students are required to master the core subjects and the 21<sup>st</sup> century themes. Physics education included in those. Assessment, curriculum, human resource development, and learning environment are the components of 21<sup>st</sup> century support system.

Education system should give an experience related to the real-world problem and an opportunity to try the interdisciplinary work to the students. Those experience will be best given along in the curriculum rather than in the separated ways. As the outcomes, students could analyse information, manage it, contribute to team, and be responsible with their responsibility (Wrahatnolo & Munoto, 2018).

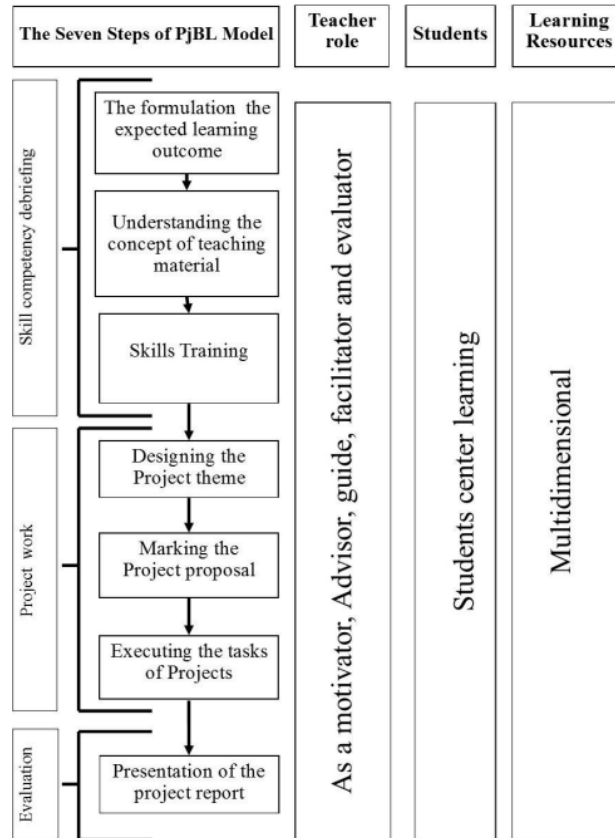
Project-based learning can be one of the best teaching approaches to achieve the goal of the 21<sup>st</sup> century skills (Devkota, Giri, & Bagale, 2017). Project-based learning could facilitate students to be engaged with the real-world project so they could have learning by doing experience. Students behaviour change, not only to follow teacher's lead but also could pursue their own questions, find the solutions, and create their own meaning. Teacher's role change, not to become the only source because students could access information globally nowadays but to design the project as the framework in learning process. The learning process allows students and teacher to discuss, debate, and exchange ideas wider. This transformation is what exactly education needs to prepare students into the next stage of their life (Boss & Krauss, 2018).

Metacognition could be defined as thinking about thinking. It means that planning, tracking, and assessing in learning process included in it. There are two major components, knowledge about cognition and regulation of cognition (Flavell, 1979). Knowledge about cognition consist of declarative knowledge (i.e. knowledge about self-abilities), procedural knowledge (i.e. knowledge about how to use strategies to achieve learning goals), and conditional knowledge (i.e. knowledge about time and reason to use the strategies). Regulation of knowledge consist of planning, information management strategies, comprehension monitoring, debugging strategies, and evaluation (Schraw, Dennison, & Rayne, 1994). To be a successful learner, student must be aware about his/her own metacognition.

## 2. Metode

This type of research is descriptive research with qualitative approach. Qualitative research is the type of research that finds out about people's experiences to understand what is important. In qualitative, it's important to have the ability to put in other people's shoes and get inside people's head (Silverman, 2020). It means that data analysis for the qualitative researcher is an attempt to summarize collected data in a dependable and accurate manner. The analysis consists of developing a general sense of the data then coding description and themes about the central phenomena.

This research has been done in Assessment Course with Project-Based Learning model in Physics Education Study Program, Universitas Negeri Malang. The implementation of Project-Based Learning model follows the syntax illustrated by Figure 2.



**Figure 2. There are seven steps of Project-Based Learning model classified into three categories (i.e. skill competency debriefing, project work, and evaluation). In skill competency debriefing, there are formulation about expected learning outcome, understand the basic materials, and train the skills. In project work, students have to design the project theme, make the proposal, then execute the project. The final step is evaluation when students have a presentation about the project report and teacher give a feedback. The role of teacher shifts from traditional paradigm as the only source of learning materials into motivator, advisor, guide, facilitator, and evaluator. Project-based learning concerned in students as the main learner who could get learning resources globally (Jalinus, Nabawi, & Mardin, 2017)**

There are sixteen meeting in the course designed with seven steps of project-based learning model. The first four meetings have been held to debrief student’s skill competency. In the 5th until 13th meeting, students work their project. Evaluation has been done in the last three meetings. Student’s metacognition analysed along with their achievement and interview. The sample technique in this research is purposive sampling, 75 students who enrol Assessment course in 2021.

### 3. Hasil dan Pembahasan

#### 3.1 Results

Student’s metacognition measured by Metacognitive Awareness Instrument (MAI) established by Schraw, Dennison and Rayne in 1994. Seventeen items of the MAI measure knowledge of cognition and regulation of cognition with true and false scale. Its distribution shown by Table 1.

**Table 1. MAI Indicators**

| Components              | Indicators                        | Item Number | Total Item | Average Result (%) |
|-------------------------|-----------------------------------|-------------|------------|--------------------|
| Knowledge for Cognition | Declarative Knowledge             | 1-8         | 8          | 93,16              |
|                         | Procedural Knowledge              | 9-12        | 4          | 72,27              |
|                         | Conditional Knowledge             | 13-17       | 5          | 79,38              |
| Regulation of Cognition | Planning                          | 18-24       | 7          | 88,39              |
|                         | Information Management Strategies | 25-34       | 10         | 85,94              |
|                         | Comprehension                     | 35-41       | 7          | 77,90              |
|                         | Monitoring                        | 42-46       | 5          | 93,75              |
|                         | Debugging Strategies              | 47-52       | 6          | 84,38              |

Student’s achievement measured by the project that has been done by students. As the project, students have to doing the assessment to measure the concept understanding, problem solving, and critical thinking of the students in senior high school. The projects evaluated in cognitive, psychomotor, and affective aspect shown by Table 2. Test also conducted in the 4<sup>th</sup> to know the correlation of project-based learning early stage with indicators of metacognitive awareness and got result 69,92.

**Table 2. Project Evaluation**

| Aspect      | Indicators              | Average Score |
|-------------|-------------------------|---------------|
| Cognitive   | Data Collection         | 82            |
|             | Materials               |               |
|             | Final Report            | 84            |
| Psychomotor | Permission Process      | 80            |
|             | Data Collection Process | 85            |
| Affective   | Teamwork                | 75            |
|             | Presentation            | 70            |
|             | <b>Average Score</b>    | <b>79,33</b>  |

The result of data analysed with descriptive analysis to describe each variable refers to Table 3. In-depth interview was conducted to make a deeper analysis.

**Table 3. Research Variable Descriptive Category (Purwanto, 2019)**

| Number | Score | Category  |
|--------|-------|-----------|
| 1      | <50   | Very Low  |
| 2      | 50-62 | Low       |
| 3      | 63-74 | Average   |
| 4      | 75-86 | High      |
| 5      | >87   | Very High |

### 3.2 Discussion

There are 2 major components in MAI, knowledge for cognition and regulation of cognition. Knowledge for cognition divided into knowledge about self-abilities, how to use strategies to achieve learning goals, and knowing the time and reason to use the strategies. It has correlation with the early stage of project-based learning which are students has target to formulate the expected learning outcome, understand the concept of teaching materials, and

train their skills. In Assessment Course, they have to debrief their skills competency (i.e. principle and standards of assessment; the difference among assessment of learning, assessment for learning, and assessment as learning; test and non-test; concept understanding, problem solving, and critical thinking of students; assessment in cognitive, psychomotor, and affective aspect; as well as basic preparation of data collection materials). The average result of knowledge of cognition from MAI is 81,60% and categorized in high category. Meanwhile, from the test conducted in the 4th meeting to know the mastery of initial competence before students do work project has the average score of 69,92 which could be categorized as average. There's a different result from this stage. In-depth interview was conducted to know the reason. Based on the interview result, there's a different perception of some materials from students that leads into hard identification of their own abilities.

The next step of project-based learning is project work then evaluation. In project work, students design the project theme (i.e. choose the testee and time), mark the project proposal (i.e. deal with the school permission), and executing the tasks of projects (i.e. give the test to testee, analyse, and make a final report). Teacher actively become motivator, advisor, guide, facilitator, and evaluator to make students have a better understanding of knowledge processing while doing the projects. In evaluation, students present the project report and got the feedbacks. Those stage related with the regulation of cognition which consist of planning, information management, strategies, comprehension monitoring, debugging strategies, and evaluation. The average result of regulation of cognition from MAI is 86,05% and categorized in high category. Student's project has the average score of 79,33 which could be categorized as high too.

## **4. Simpulan**

### **4.1 Conclusion**

Metacognitive awareness is important for the students to know better about their ability and what aspects have to be improved. Knowledge of cognition related with the early stage (i.e. skill competency debriefing) of project-based learning. There's a different result between student's perspective about their own ability and ability measured by the test. It indicates there's a difficulty of students in terms of identification their own abilities in this stage. Regulation of cognition related with project work and evaluation in project-based learning. This relation proofed by the result of MAI instrument and project score that has been conducted in the same category.

### **4.2 Suggestion**

Further study is needed to know better understanding about the hard identification of student's own abilities based on the difference result from metacognitive awareness of students and their real ability in some aspects.

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