



The Influence of Authentic Assessment on Students' Attitude and Psychomotor in Biology Course with the Implementation of Project Based Learning

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Abstract: This research was conducted to analyze the difference of attitudes and psychomotor of students at the implementation of authentic assessment in PjBL model (treatment group) compared to that at the implementation of inauthentic assessment in PjBL model (control group). This quasi experiment research used pretest-posttest *nonequivalent control group design*, involving 54 university biology education students in the second semester of 2015/2016. The statistical test used ANCOVA with the significance level of 5% ($p < 0.05$). The results of this research show that students' attitudes toward Biology material after the implementation of authentic assessment in PjBL model have a difference of 9, 59% higher compared to that after the implementation of inauthentic assessment in PjBL model. The implementation of authentic assessment in PjBL has an effect on students' psychomotor with a difference of 11, 19% higher compared to that at the implementation of inauthentic assessment in the PjBL model. It can be concluded that authentic assessment has a better effect on students' attitudes toward biology material and students' psychomotor compared to those at the implementation of inauthentic assessment in the PjBL model.

Keywords: Attitudes to biology material; Authentic assessment; *Project Based Learning*; Psychomotor.

1. Introduction

The goal of the empowerment of skills through learning strategies or learning models is to improve the quality of education (Tyas *et al.*, 2015). Autonomy and motivation can be realized by empowering the skills. Educators are obliged to always empower various skills and potentials of students. The skill empowerment has been done from school level to higher education, for example the thinking skills, which becomes the challenges of the 21st century (Greenstein, 2012).

Thinking skills are required for learners to be able to solve problems and improve their learning results, particularly cognitive learning results (Pambudiono *et al.*, 2015). In addition to the thinking skills, related to cognitive learning results there are some other aspects which need to be paid attention too. The other aspects also play a critical role in learning. These aspects are, such as, students' attitude and psychomotor (Sanjaya, 2014).

Attitude plays an important role in determining the students' learning success although it cannot be directly observed (Jain, 2014; Walgito, 2003; Widoyoko, 2014). Attitude is related to the reflection of a person value. The empowerment of good attitude and cognitive aspects in learning can develop students' psychomotor (Sudijono, 2013; Widoyoko, 2014). High positive attitude in the learning process can improve students' motivation, confidence, and investment in learning (Kpolovie *et al.*, 2014; Reid, 2006).

Psychomotor learning results in learning have a role in assisting students to become skillful and confident individuals in their lives (Sudijono, 2013). Psychomotor not only facilitates the students practically but also motivates the students to be creative and innovative (El-Sayed and El-Sayed, 2012). Because of the essential role of psychomotor and attitude aspects, both of these aspects need to be empowered.

The empowerment of psychomotor and attitude aspects of learning can be designed by educators. In empowering attitude and psychomotor aspects, educators require time because it can affect individuals both personally and in groups (Jain, 2014). Educators can try a variety of ways and strategies to empower students' attitude and psychomotor aspects successfully (Ushida, 2005). One way to empower the attitude and psychomotor aspects is by implementing authentic assessment.

Authentic assessment differs from non-authentic assessment (traditional). Authentic assessment is conducted to provide the students with immediate feedback or to show the process and actual learning results (Corebima, 2004; Gronlund, 1998; Sanjaya, 2014). Authentic assessment can improve thinking skills, uncover concepts and processes effectively and realistically, and it is applied through critical and creative strategies (Herrington and Herrington, 2006; Pantiwati, 2013).

Authentic assessment has an advantage in learning. For students, authentic assessment can demonstrate a complete understanding of the material, connect their learning and their experience, improve high order thinking skills, accept responsibility, communicate and evaluate performance (Johnson, 2002; Muller, 2012). Thus, the application of authentic assessment in learning can empower students' attitude and psychomotor.

The application of authentic assessment in learning should have a clear pattern (based on particular model/strategies) in order to empower students' attitude and psychomotor (Silberman, 2009). Thus, the role of educators and the assessment process becomes clear. Authentic assessment can be applied in a learning model that has been widely reviewed and used by learning practitioners. One learning model that can be used in the application of authentic assessment is Project Based Learning (PjBL) model (Gulbahar and Tinmaz, 2006).

The implementation of PjBL begins with *Start with the Essential Question, Design a Plan for the Project, Create a Schedule, monitor the Students and the Progress of the Project, Assess the Outcome, Evaluate the Experience* (The George Lucas Educational Foundation, 2005). The syntax of PjBL has some advantages in empowering students' attitude and psychomotor, that is, the students are able to be responsible in groups, pay attention to the real world, and develop real skills (Akinoglu, 2008; Chu et al., 2011; Griva et al., 2010; Neo and Neo, 2009; Olatoye and Adekoya, 2010; Ozdemir, 2006; Purnawan, 2007; Ravitz, 2008; Tammim and Grant, 2011; Wurdinger et al., 2007).

In this research, the empowerment of students' attitude and psychomotor was done with the application of authentic assessment in PjBL learning model. The main objective of this research was to analyze the differences in students' attitude and psychomotor in the treatment class (using authentic assessment) and in control class (without authentic assessment). This research suggested that students who used authentic assessment had better attitude and psychomotor than those who did not use it.

2. Material and Method

This quasi experiment research used nonequivalent pretest-posttest control group design. This research used PjBL model accompanied with authentic assessment which was compared to PjBL model without authentic assessment. The authentic assessment was in the form of project reports, learning journals (project journals and lecture journals), portfolio (project portfolio and lecture portfolio), practically reports supported by self-assessment, as well as assessment by peers, educators, and community. The research design can be seen in Table 1.

Table-1. Quasi-experiment of Pretest-posttest nonequivalent Control Group Design

Group	Pretest	Learning strategies	Posttest
Control	O1	X1	O2
Treatment	O3	X2	O4

Notes :

X1 = PjBL Model without authentic assessment

X2 = PjBL Model using authentic assessment

O1 and O3 = the pretest score

O2 and O4 = the posttest score

The population of this research was all students of biology education Program in Teacher Training and Education Faculty of Sriwijaya University, South Sumatera, Indonesia in the second semester of the 2015/2016 academic year. The samples of this research were 52 fourth semester students, who were divided into two classes; 24 students were in the treatment class, and 28 students were in the control class.

The instruments used to measure the students' attitude were questionnaire of attitude toward the subject matter that had been developed in the form of multiple choice tests. The attitude in this research means the attitude toward the biological material. While the psychomotor was measured using an observation sheet of student performance. The scores obtained from the instrument were converted into a score with the scale of 0-100.

The data were in the form of scores from the pretest and posttest of attitude and psychomotor. Normality test and homogeneity test were carried out before the hypothesis testing. The hypothesis testing was done by using ANCOVA test at significance level of 5% ($p < 0.05$).

3. Results

3.1. Data of Students' Attitude toward the Subject Matter

The results of the effect of the implementation of learning strategies on students' attitude in relation with biological materials are shown in Table 2.

Table-2. Summary of ANCOVA on Students' Attitude

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power ^b
Corrected Model	2778.395 ^a	2	1389.198	33.157	.000	66.314	1.000
Intercept	1565.576	1	1565.576	37.367	.000	37.367	1.000
preattitude	2085.507	1	2085.507	49.776	.000	49.776	1.000
Learning Strategy	664.779	1	664.779	15.867	.000	15.867	.974
Error	2052.981	49	41.898				
Total	322343.889	52					
Corrected Total	4831.376	51					

Table 2 shows that learning strategies have a significant effect ($p = 0.000$). These results suggest that learning strategies have an effect on students' attitude toward biological material. The PjBL with authentic assessment has a better effect on students' attitude than the PjBL without authentic assessment with a difference of 9, 59%. In addition to the attitude aspect, a hypothesis testing toward students' psychomotor was also carried out.

3.2. Data of Students' Psychomotor

The implementation of learning strategy was also conducted to determine its effect on students' psychomotor. The results of the effects of learning strategy on students' psychomotor can be seen in Table 3.

Table-3. Summary of ANCOVA Test on Student's Psychomotor

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power ^b
Corrected Model	1283.461 ^a	2	641.730	16.967	.000	33.935	1.000
Intercept	5291.782	1	5291.782	139.915	.000	139.915	1.000
Prepsycho	165.715	1	165.715	4.382	.042	4.382	.537
Learning Strategy	1162.869	1	1162.869	30.746	.000	30.746	1.000
Error	1853.248	49	37.821				
Total	417467.348	52					
Corrected Total	3136.709	51					

The results of ANCOVA test presented in Table 3 show that there is a significant effect ($p = 0.000$) of learning strategy on students' psychomotor. The PjBL group with authentic assessment had a better effect as much as 11, 19% toward the psychomotor than the PjBL group without authentic assessment.

4. Discussion

The results of this research show that the treatment class (PjBL with the application of authentic assessment) has more effect than the control class (PjBL model without authentic assessment) in empowering the attitude toward the subject matter. Similar results are also obtained by Doppelt (2003), stating that authentic assessment (portfolio analysis, observation of classroom activities, interviews with learners) can improve attitude performance significantly. The research by Schuyten and Ferla (2007) in science education at Ghent University proved that there was a change in *self-efficacy beliefs* and attitude towards statistical material as a result of authentic assessment (group work project).

The improvement of students' attitude after the application of authentic assessment in this research occurred because the application of authentic assessment gave a deeper learning experience, for example, students were responsible for their projects, they dealt with the community activities directly, and they dared to make a choice in assessing their performance. Similar to what has been said by Johnson (2002) and Muller (2012) that the authentic assessment played a role in strengthening competencies such as connecting their learning with their experiences, with their world and even with the wider society, as well as accepting responsibility and making choices.

Changes in attitude can be realized if authentic experiences are used to explain and raise the awareness of the attitude (Andresen *et al.*, 2000). In this research, learning experience was gained from authentic tasks given. Authentic learning experience provides students with extensive insight and belief. Authentic learning experience makes students able to think and to have a certain attitude. Theoretically, learning experience explains one's view of the learning process in all situations and areas of life. Authentic learning experience plays a role in helping students face their learning difficulties. Learning experience can be obtained from direct experience, critical reflective experience, and consequences of an action (Kolb, 2015).

Related to the students' low attitudes in control class, it is caused by the fact that the students are only assigned to do tasks in the form of project reports that should be submitted at the end of the learning process. This type of learning provides less learning experience compared to that in the treatment class. Little learning experience lowers

the students' motivation to behave towards the learning material. The decrease in students' motivation is due to the lack of variety of learning activities that provide authentic experiences. The research by [Alexiou and Paraskeva \(2013\)](#) proved that after the students filled out and assessed the e-portfolio in addition to discussion (experiential learning), it was proved that it could increase the students' motivation and confidence to actively learn and improve their competence. [Gensel \(2016\)](#) stated that creating and assessing a portfolio (experiential learning) could strengthen motivation because it could reduce the pressure for learners.

The results of this research also show that the treatment class (model PjBL model with the application of authentic assessment) has more effect than the control class (PjBL model without authentic assessment) in empowering students' psychomotor. Similar research results, such as that conducted by [Basoeki \(2007\)](#) showed that authentic tasks in the forms of student worksheets had a significant effect on students' cognitive, attitude and psychomotor learning results. The research by [Mintah \(2003\)](#) reported that authentic assessments (lecturer observation, self-observation, peer observation, checklist, and portfolio and essay assignment) positively improved students' *self-concept*, motivation, and psychomotor.

The improvement of psychomotor in this research is caused by the application of authentic assessment that makes the students skillful before dealing with the community activities. Thus, they will also be skilful in assessing their own performance. In addition they can also be skillful in communicating and evaluating their own performance. [Johnson \(2002\)](#) stated that authentic assessment played a role in empowering competencies, such as connecting students' learning with their experiences, their world and their wider society, as well as making them able to collaborate in doing tasks, and learning to evaluate the level of their own performance.

In the control class the students' psychomotor is lower than that of in the treatment class. The authentic assessments (portfolio, journal study) evaluated by themselves, colleagues, and the community are not carried out in the control class. The absence of this assessment activity makes the students less motivated in doing their projects. It results when performing motoric activities the students do the work without any target. In learning, improved motivation can increase the students' performance. Similarly, [Bahri and Corebima \(2015\)](#) stated that the students who were motivated in learning would give their full attention on learning, read learning material, understood it, and used a variety of learning strategies.

The empowerment of attitude and psychomotor of the students occurred in the treatment class shows that authentic assessment plays an important role in the implementation of PjBL learning model, because the authentic assessment provides more experience toward students' attitude and psychomotor. [Herrington and Herrington \(2006\)](#) reported that qualitatively students liked the elements used in the authentic assessment (context, the students' role, authentic activity), so that they had a better understanding of the material in the interactive multimedia program. The implementation of authentic assessment can also motivate students to give good attitude toward learning material and to show good performance (psychomotor). Similar results also occurred in the previous research. The research of [Gensel \(2016\)](#) found that making and assessing the portfolio (authentic assessment) could develop motivation, so that it could improve metacognitive skills and attitudes toward lectures.

Student learning results can be improved by giving them motivation [Rehman and Haider \(2013\)](#). Motivation is a person's desire to act, to behave intensively, and to achieve real achievement. Motivation explains the reasons for someone to do a job, to keep a job, and to complete tasks ([Pintrich, 2003](#)). Motivation can be regarded as a useful intrinsic factor as an extrinsic factor. Intrinsic factor is a person's attention or desire about the field of learning and oriented to follow the learning. Extrinsic factors are associated with the educators, teaching methods, facilities and other learning conditions ([Winkel, 2004](#)). Students' intrinsic motivation can increase if they have the options and the opportunity to take responsibility as well as optimal experience. Extrinsic motivation is one way to achieve the objectives and are often affected by external factors such as reward or punishment ([Santrock, 2007](#)).

Motivation is an important element for both intrinsic and extrinsic learning. The pleasure of studying in school is not possible without sufficient motivation to learn. Students with high motivation have better academic performance than those having low motivation ([Tella, 2007](#)). The research by [Kusurkar et al. \(2013\)](#) proved that the quality of motivation was important in determining the students' performance through good learning strategies and strong efforts. Students who pay attention to their learning will have positive motivation and attitude toward learning. Low motivation will make it difficult for students in determining their learning objectives, choosing, using methods, techniques as well as strategies and evaluating their learning. One effective way to motivate students is by involving them into mysterious learning world ([Oguz and Ataseven, 2016](#)). In line with these results, educators are suggested to improve the students' motivation to obtain good attitudes towards learning, strong efforts, and good performance.

Based on the results of this research, authentic assessment plays a role in the learning process because it can empower students' attitude and psychomotor. Authentic assessment plays a role in providing learning experiences and motivating the students to behave and to give good performance. The teachers are recommended to use authentic assessment in learning, either by using the PjBL model or other models.

5. Conclusion

Based on the results and discussion of this research, it can be concluded that the application of authentic assessment has an effect on students' attitudes toward biology learning material as well as on better psychomotor compared to the application of non-authentic assessment in PjBL learning model. The application of authentic assessment in the PjBL learning model has an effect on the attitude toward the biological learning material with a difference of 9, 59% compared to the application of non-authentic assessment in the PjBL learning model. The application of authentic assessment in the PjBL learning model has an effect on psychomotor with a difference of 11, 19% compared to the application of non-authentic assessment in PjBL learning model. The application of authentic assessment has an important role in learning because it provides learning experience and better motivation for students. Further researchers can investigate the effect of authentic assessment in other learning models and analyze their effectiveness on other learning achievements on different populations.

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