



The Effectiveness of Psychomotor Evaluation Using Peer Assessment in the Practicum Activities

Haris Munandar*, Safrina Junita

Department of Primary School of Teacher Training Education Universitas Bina Bangsa Getsempena.
Jl. Tanggul Krueng Lamnyong No. 34 Rukoh, Banda Aceh 23112 Indonesia

*Email: haris@bbg.ac.id

DOI: 10.24815/jpsi.v6i3.24797

Article History: Received: December 12, 2021 Revised: May 10, 2022
 Accepted: May 18, 2022 Published: June 27, 2022

Abstract. Practical activity is a series of learning processes related to the assessment of students in the psychomotor domain. A large number of students in a classroom challenged many teachers in conducting skills assessments for students. This study aims to determine the effectiveness of the psychomotor evaluation using peer assessment in the practicum activities. The Method in this research is descriptive quantitative. This research was conducted by adjusting the results of psychomotor evaluation in the practical activities between direct observation and peer assessment. The research was conducted in natural science practicum activities, specifically on plant reproduction material. The study involved 60 college students of the Department of Primary School of Teacher Training Education as the research sample. The effectiveness of psychomotor evaluation using peer assessment techniques can be seen from the suitability of the results of psychomotor evaluation using peer assessment techniques and the results of direct observation. Based on the results of the research, there is a suitable average score of the psychomotor evaluation which is conducted by the peer assessment technique with the average score of the direct observations made by the researcher which is 91.4 and 90.4. The level of suitability of the two average values reached 98.90%. This shows that the implementation of psychomotor evaluation using peer assessment is effective in the practicum activities.

Keywords: Psychomotor Evaluation, Peer Assessment, Practicum Activities

Introduction

The assessment process is an activity to get feedback on the success of an action. One form of assessment is an assessment of the skills or psychomotor aspects. The psychomotor domain is related to learning through physical movements, reflex movements, basic movements, skilled movements and expressive movements (Rahmat, 2017). Costa (2015) explains that The Psychomotor aspects must be developed as early as possible, for example, from pre-school age through efficient and effective activities. The psychomotor assessment tools used to measure the psychomotor domain are performance tests that have been mastered by students, such as simulation tests, identification tests, and performance tests.

Psychomotor evaluation is closely related to physical activity and specific knowledge (Lisenchuk, et al., 2019). The psychomotor aspects of students are related to the performance of students in doing a learning activity. Among the psychomotor aspects that can be measured during the implementation of learning are practical activities, especially natural science practicum. Practicum implementation is also useful in

developing the students' skills that are required (Tülüce, 2016). Psychomotor aspects can be developed in several ways, for example increasing the frequency of activities that involve remembering, planning, and real experiences (Fotiadou, 2017). A person's skill level greatly determines his performance in carrying out every activity, one of which is practicum activities. Skills in making decisions, skills in carrying out fast and directed executions, as well as skills in using time efficiently in carrying out activities are very important things in psychomotor evaluation (Szabo, et al., 2020).

The teacher problem in the practical assessment is the difficulty in conducting the psychomotor assessment process in practical activities that are attended by a large number of students, both in terms of time efficiency and also the objectivity of the assessment process. Therefore the teacher needs an appraisal strategy that allows every student to participate in the assessment process between them. One of the methods that can assist the teachers in assessing the performance of students in practical activities is by using peer-assessment techniques. Peer assessment is an assessment between students by asking students to assess each other related to the achievement of competencies. The important aspect of implementation practicum in schools today is how to conduct the right assessment process that can be a benefit for every student. Dudung (2018) explains that assessment of the results of student practicum in which is only doing by the teacher has several shortcomings. These deficiencies include the difficulties experienced by the teacher to pay attention to the evaluation of practicum results for each of their students. This causes the attention of the teacher to be missed on the assessment results of practicum for some students.

Peer assessment techniques can help students to learn the process and stages of assessment and can improve students' skills in evaluating the learning process (Seifer, 2019). The use of peer assessment can ease the task of teachers to assess group processes. When students do not understand what the teacher explains, students prefer to ask their friends rather than ask the teacher. The use of peer assessment is important because collaborating and working in groups is an integral part of learning science. Assessing students is new or unusual for each student, peer assessment means making decisions based on individual responsibilities that benefit in their learning group. In the peer assessment students are trained to communicate, write and report what they have found in the learning (Ulvik, 2017). One of the substantial factors that can influence the peer assessment process is the level of details that determines the results performed (Li, 2019).

The innovation in this research is the information about an effective way in educational evaluation, especially in the psychomotor domain by using peer-assessment techniques. The formulation of the problem in this study is related to how the effectiveness of psychomotor evaluation using peer assessment techniques in science practicum activities. This study aims to determine the effectiveness of psychomotor evaluation using peer assessment techniques in the activity of natural science practicum. The benefit of this research is the implementation of peer assessment techniques that can assist the teachers in conducting comprehensive assessments, in which the psychomotor evaluation using peer assessment techniques can also increase the responsibility aspect of students in doing the practicum.

Methods

The research method in this study uses a descriptive quantitative method because the discussion will describe the use of peer assessment techniques during the implementation of practical activities. The subjects in this study were all the college students in the Department of Primary School of Teacher Training Education in

Universitas Bina Bangsa Getsempena Banda Aceh who took elementary science learning courses in the fourth semester. Total sample of this research are 60 college students in the Department of Primary School of Teacher Training Education. The college students were divided into two practical classes with 30 college students for each class. The division aims to easier the observation process, in which the distribution process is conducted based on the student ID number.

This research was conducted in a science practicum activity, where the science practicum activity is one of the topics studied in the elementary science learning course. College students first learn the concepts that will be practiced, then they will do the practical activities in the laboratory room according to the concepts that have been studied. Researchers will provide instructions on assessment techniques that will be used during practicum activities that are using peer-assessment techniques. All students were divided into 4 practicum groups, each group consisting of 8 students. In its implementation, every 4 people from each group will do a practicum first and will be assessed by 4 other people. After they finish doing the practicum, they will take turns being an appraiser of their colleagues who previously assessed them (Ulvik, 2017). The flow of peer assessment implementation based on this research is as figure 1:

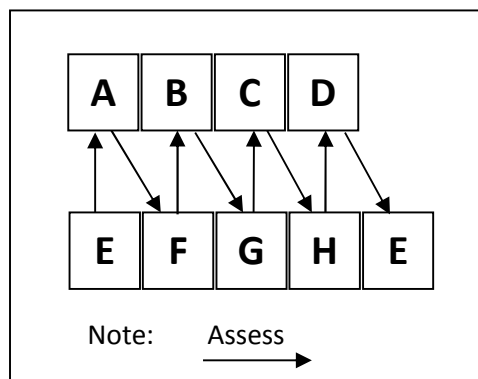


Figure 1. Flow of Peer Assessment Implementation

Each college student will assess his other friends according to the peer assessment flow in Figure 1. To inform the effectiveness of the psychomotor assessment process using peer assessment techniques, the researcher is also conducting the psychomotor assessment. Researchers assessed the performance of the college students doing practicum by using the same psychomotor assessment sheets in science practicum activities. The results of the assessment will first be added up for each aspect being assessed, they will be converted into a percentage. The effectiveness of the psychomotor assessment process using peer assessment techniques can be seen from the suitability of the assessment results from college students with the results of direct observations of researchers as a whole in practicum activities (Ulvik, 2017). Assessment of the work of students is conducting regularly and continuously so that the increase in the ability of students can be known to lead to a particular competency. The assessment scale is used to assess the performance of students or assess the quality of the implementation of aspects of skills that are observed on a certain scale, for example using a scale of 1 to 5. The process of calculating effectiveness is to use a Likert scale score.

The instrument used in this study was a psychomotor evaluation sheet using peer assessment techniques which contained 5 aspects of activities and 14 indicators. The material that is practiced is about plant reproduction. Each practicum activity is adjusted to the stages contained in the practicum module and the assessment is conducted by peer assessment following the indicators that have been developed (Sönmez, 2017).

After obtaining the overall results of the two assessment processes in the 5 measured aspects, the percentage of suitability is then calculated. The result of the percentage of suitability is then converted to the psychomotor evaluation score conversion table to see the criteria of the level of suitability. The result of this percentage of conformity becomes information for researchers to determine the effectiveness of the implementation of psychomotor evaluation in science practicum activities, the results of the percentage of the suitability of the two assessment processes can be seen by calculating the percentage of conformity of the two assessment results, namely the average value of the peer assessment technique and also from direct observation.

The data analysis technique was carried out to determine the effectiveness of the psychomotor evaluation process using the peer assessment technique through the psychomotor evaluation sheet, which was carried out in 4 stages, there are (1) calculating the average score of each aspect assessed, (2) adding up the average score for each aspect assessed, (3) matching the suitability of the results obtained from the assessment using peer assessment techniques with the assessment conducted by researchers through observation activities, and (4) interpret the level of conformity between the two assessments qualitatively to determine the effectiveness of the assessment criteria such as: 86 to 100 (excellent), 71 to 85 (very good), 51 to 70 (good), 21 to 50 (poor), and 0 to 21 (very poor) (Sriyati, 2016).

Results and Discussion

The implementation of psychomotor evaluation during practical activities is conducting peer-assessment techniques. The college students assess the performance of their colleagues in a practicum group, where each college student will rate one of their colleagues in parallel. Researchers also assessed each college student during the practicum implementation through the observation process using the same indicators used by each college student in assessing their colleagues. Both processes aim to see the suitability of assessments made by college students and also the assessments made directly by the researcher. The level of suitability of the two results obtained is an indicator of the effectiveness of using the peer assessment technique in this study. Assessment is a decision-making process from information obtained by measuring learning outcomes using media in tests and non-tests, including Assessment for measure the psychomotor. The implementation of the assessment uses a measuring instrument or what is often called an instrument (Pujawan, 2020). Psychomotor activities greatly affect student activities in terms of communication and interaction with each other in carrying out every activity they have planned. Psychomotor activities can also develop the level of understanding between individual students and other students and increase the ability to communicate with each other, so that the assessment process will be very relevant if carried out by each other (Szabo, et al., 2020). So that peer assessment techniques are very likely to be carried out in activities related to psychomotor evaluation

The implementation of the assessment in the science practicum activity is focused on 5 aspects of the assessment with 14 indicators, starting from the preparation stage of the practicum implementation to the contribution stage after the implementation of the practicum activity. The material that is practiced is about the parts of a flower. Each practicum activity is adjusted to the stages contained in the practicum module and the assessment is conducted by peer assessment following the indicators that have been developed. The results of the assessment that have been conducted during the practicum implementation include 5 aspects of assessment, there are (1) practicum implementation plan, (2) Self-performance in conducting a practical activity, (3) time management during practicum activities, (4) Interpretation of practicum results, and (5) contributions after practicum activities. The results obtained from the two assessment processes are then calculated the average value and to know the suitability of the two average values that have been obtained. The results of psychomotor evaluation using peer assessment techniques and the direct observation results made by researchers in science practicum activities can be seen in the Table 1.

Table 1. Details of Results for Each Aspect

Aspect	Results of Peer Assessment Techniques	The Direct Observations Result
Practicum implementation plan	100	100
Self-performance in conducting a practical activity	89	88
Time management during practicum activities	86	86
Interpretation of practicum results	93	90
Contribution after practicum activities	89	88
Average Value	91.4	90.4

Based on the results in Table 1, informed us which the level of suitability of the psychomotor evaluation process by using peer assessment techniques and the results of direct observations made directly by researchers in science practicum activities with the highest level of suitability is known in the aspects of the practicum implementation plan. At this stage the assessment process is conducted by using 3 indicators, there are (1) skills to prepare the necessary tools, (2) skills to prepare the necessary substances, and (3) skills to use practicum work procedures in following what will be practiced. The average value obtained in the psychomotor evaluation by peer assessment in the science practicum and the results of observations by researchers obtained the same average value, that 100. These results were obtained because the assessment process was still very easy to do, in which every student who would do a practicum first was assessed for their skills in preparing the tools, materials, and practicum worksheet to be used so that the assessment process was conducted by peers and the assessment was conducted by researchers through observation activities can be obtained easily. This is also because the completeness of tools, materials, and practicum worksheets are the initial requirements for participating in the science practicum activities, it's means that every student who cannot complete these requirements is not allowed to take part in the science practicum activity. This part is also including to the introduction stage. The introduction stage at the beginning of the practicum is very important as initial knowledge of what to do. At this stage,

students will conduct the work preparation and planning related to the practicum activities. it is as mentioned by Lisenchuk (2019) the psychomotor process is closely related to physical activity and specific knowledge.

The next aspect of assessment is the aspect of self-performance in conducting a practical activity. The assessment process implemented by using 5 indicators, there are (1) skills to use practicum tools, (2) skills to use the substance that will be practiced, (3) skills to complete data and pictures from observations, (4) skills to record the observations result in the available tables, and (5) skills in observation, and finishing the practicum stages. Based on the information is obtained that the average value obtained on the psychomotor evaluation by peer assessment is 89, while the average value obtained through the results of direct observations of researchers is 88. The result in this aspect gives us the information that practical activities can increase students' insight in terms of knowledge and skills (Maulana, 2018). The results of the psychomotor evaluation on the aspect of time management during practicum activities are conducted through an assessment of the two indicators used, there are (1) skills to manage the time during practicum activities and (2) skills to complete the stages of practicum activities regularly. The average value obtained on the psychomotor evaluation by peer assessment was 86, this value is also the same as that obtained by researchers through direct observation activities.

The next aspect that is assessed is the interpretation of practicum results, this aspect is related to the skills of students in narrating the results of practicum activities. The indicators used in this aspect are (1) skills to complete the results and discussion from observational data and (2) skills to conclusion observations data. The average value obtained on the psychomotor evaluation by peer assessment was 93, while the average score obtained through the direct observations of researchers was 90. The last aspect that is measured is the contribution after practicum activities, in this case, the indicators used are (1) skills in cleaning the place and practicum tools that have been used and (2) skills to keep all equipment that has been used. The average value obtained on the psychomotor evaluation by peer assessment was 89, while the average score obtained through the direct observations of researchers was 88.

Based on the results from calculating the percentage of conformity that informed us that the level of suitability between the implementation of psychomotor evaluation using peer assessment techniques and the results of direct observations made by researchers is 98.90% with excellent criteria. The effectiveness of the psychomotor evaluation process using peer assessment techniques can be seen from the suitability of the assessment results from college students with the results of direct observations of researchers as a whole in practicum activities.

The discussion in these results indicate that the implementation of psychomotor evaluation using peer assessment techniques is effective in science practicum activities because it can be used in the assessment process that involves a large number of students. The psychomotor evaluation process using peer assessment techniques will make it easier for educators to carry out the assessment process, especially assessments in the psychomotor domain. Alzaid (2017) explains that the evaluation of practicum by using peer assessment is conducted with the participation of all students, where each student must mutually evaluate the performance of their peers through a written direction and report the results of their assessment to the teacher as feedback from the

assessment process. The psychomotor evaluation process using peer assessment techniques will make it easier for teachers to do the assessment process, especially assessments in the psychomotor domain. The results of this study match with the research that has been done in which the research was conducted on the college students of the Department of Psychology at King Saud University of the 2015-2016 academic year.

The result obtained is peer assessment as an evaluation standard that has suitability with the assessment objectives desired by the teacher in terms of emphasizing the importance of student participation in the evaluation process. Peer assessment is an important part of promoting more participatory learning (Alcarria, 2018). Peer assessment techniques can lead to more consistent knowledge and reasoning because the assessor is directed to the guidelines that have been prepared in advance. Performance appraisal will increase a certain subjectivity on the part of the workmate it must have a certain rubric to make corrections. Performance evaluation and correction are conditioned by a profile of the examiner who can make good demands or provide useful feedback to other students. Peer assessment techniques can provide positive learning outcomes in terms of students' social aspects (Panadero, 2019). The achievement of learning objectives at a high level of understanding presents complex evaluations in situations with a large number of students, where evaluation tools are used. In general and collaborative. Performance appraisal will increase a certain subjectivity on the part of the workmate it must have a certain rubric to make corrections. Performance evaluation and correction are conditioned by a profile of the examiner who can make good demands or provide useful feedback to other students. The social impact of peer assessment techniques is adding a sense of responsibility in conducting the assessment (Zhou, 2020).

Thus research indicates the importance of implementing a psychomotor assessment process using peer assessment techniques. Peer assessment aims to describe an assessment process that encourages future learning and reduces any difficulties that may occur. Psychomotor observation requires coordinated action between each party, the approach, and methodology established in the skills aspect must conform to traditions and constraints in educational research (Viscione, 2017). The peer assessment technique is a formative assessment that directs students to collaborate in the assessment process. The use of peer assessment techniques can emphasize the use of higher-order thinking skills, and can also develop social skills and create a sense of responsibility and personal empowerment of students. Peer assessment is based on performance (performance-based assessment), so that in the peer assessment learning process also occurs, students can develop cognitive skills and social skills (Alzaid, 2017).

Conclusion

Based on the results of the research above, it can be concluded that there is suitability between the psychomotor evaluation conducted with the peer assessment technique and the results of the direct observations made by the researcher. The level of suitability between the implementation of psychomotor evaluation using peer assessment techniques and the results of direct observations made by researchers is 98.90% with excellent criteria. The effectiveness of the psychomotor evaluation process using peer assessment techniques can be seen from the suitability of the assessment results from college students with the results of direct observations of researchers as a whole in

practicum activities. These results indicate the effectiveness of peer assessment techniques in science practicum activities, in which the use of peer assessment techniques in the practical assessment process can make it easier for teachers to do the comprehensive assessments.

References

- Alcarria, R., Bordel, B., Andrés, D.M., & Robles, T. 2018. Enhanced peer assessment in mooc evaluation through assignment and review analysis. *International Journal of Emerging Technologies in Learning*, 13(1):206-219. <https://doi.org/10.3991/ijet.v13i01.7461>.
- Alzaid, J.M. 2017. The effect of peer assessment on the evaluation process of students. *Canadian Center of Science and Education*, 10(6):159-173. <https://doi.org/10.5539/ies.v10n6p159>.
- Bruno, A. & Aversana, G.D. 2017. Reflective practicum in higher education: the influence of the learning environment on the quality of learning. *Journal of Assessment and Evaluation in Higher Education*, 43(3):348-358. <http://dx.doi.org/10.1080/02602938.2017.134482>.
- Costa, H.J.T., Barcala, F.R., Abelairas, G.C., & Arufe, G.V. 2015. The influence of a structured physical education plan on preschool children's psychomotor development profiles. *Australasian Journal of Early Childhood*, 40(2):68-77. <https://doi.org/10.1177/183693911504000209>.
- Dudung, A. 2018. *Penilaian psikomotor*, Depok: Karima.
- Fotiadou, E.G., Neofotistou, K.H., Paraskevi, F.G., & Tsimaras, V.K. 2017. The effect of a psychomotor education program on the static balance of children with intellectual disability. *Journal of Strength and Conditioning Research*, 31(6):1702-1708. <https://doi.org/10.1519/JSC.0000000000001612>.
- Li, H., Xiong, Y., & Vincent, H. 2019. Does peer assessment promote student learning? a meta-analysis. *Journal of Assessment and Evaluation in Higher Education*, 45(2): 193-211. <https://doi.org/10.1080/02602938.2019.1620679>.
- Lisenchuk, G., Zhigadlo, G., Tyshchenko, V., Odynets, T., Omelianenko, H., Pyptiuk, P., Bessarabova, O., Galchenko, L., & Dyadechko I. 2019. Assess psychomotor, sensory-perceptual functions in team-sport games. *Journal of Physical Education and Sport (JPES)*, 1(2):1205-1212. <https://doi.org/10.7752/jpes.2019.02175>.

- Maulana, P. & Rusilowati, A. 2018. The development of psychomotor assessment instrument long jump on penjaskes subjects of class VIII. *Journal of Research and Educational Research Evaluation*, 7(2):163-173. <https://doi.org/10.15294/jere.v7i2.24602>.
- Panadero, E. & Alqassab, M. 2019. An empirical review of anonymity effects in peer assessment, peer feedback, peer review, peer evaluation and peer grading. *Journal of Assessment and Evaluation in Higher Education*, 44(8):1253-1278. <https://doi.org/10.1080/02602938.2019.1600186>.
- Pujawan, I.K.A.A., Parmiti, D.P., & Astawan, I.G. 2020. Assessment instrument of social attitude and science learning outcomes of grade IV elementary school. *Jurnal Ilmiah Sekolah Dasar (JISD)*, 4(4):605-613. <https://dx.doi.org/10.23887/jisd.v4i4.26580>.
- Rahmat, A., Shahril, M.I., & Salimin, N. 2017. The assessment of psychomotor domain among reserve officers training team (palapes). *Journal of Fundamental and Applied Sciences*, 9(65): 1389-1397. <http://dx.doi.org/10.4314/jfas.v9i6s.103>.
- Seifer, T. & Feliks, O. 2019. Online self-assessment and peer-assessment as a tool to enhance student-teachers' assessment skills. *Journal of Assessment and Evaluation in Higher Education*, 44(2):169-185. <https://doi.org/10.1080/02602938.2018.1487023>.
- Sönmez, V. 2017. Association of cognitive, affective, psychomotor and intuitive domains in education, sönmez model. *Journal of Educational Research*, 5(3):347-356. <https://doi.org/10.13189/ujer.2017.050307>.
- Sriyati, S., Permana, A., Arini, & Purnamasari, M. 2016. The effectiveness of peer assessment in assessing student performance ability in biology practicum activities. *Proceeding Biology Education Conference*, 13(1):372-376.
- Szabo, D.A., Neagu, N., Ardelean, M., & Sopa, I.S. 2020. Psychomotor evaluation of athlete and non-athlete children. *Physical Education, Sport and Kinetotherapy Journal*, 59(1):56-69. <https://doi.org/10.35189/dpeskj.2020.59.1.6>.
- Tülüce, S.H. & Çeçen, S. 2016. Scrutinizing practicum for a more powerful teacher education: a longitudinal study with pre-service teachers. *Journal of Educational Sciences: Theory & Practice*, 16(1):127-151. <https://doi.org/10.12738/estp.2016.1.0207>.
- Ulvik, M., Helleve, I., & Smith, K. 2017. What and how student teachers learn during their practicum as a foundation for further professional development. *Journal of Professional Development in Education*, 44(5):638-649. <https://doi.org/10.1080/19415257.2017.1388271>.

Viscione, I., D'Elia, F., Vastola, R., & Sibilio, M. 2017. Psychomotor assessment in teaching and educational research. *Athens Journal of Education*, 4(2):169-178. <https://doi.org/10.30958/aje.4-2-5>.

Zhou, J., Zheng, Y., & Tai, J. 2020. Grudges and gratitude: the social-affective impacts of peer assessment. *Journal of Assessment and Evaluation in Higher Education*, 45(3):345-358. <https://doi.org/10.1080/02602938.2019.1643449>.