INQUIRY LEARNING MODEL AND TEAMS ASSISTED INDIVIDUALIZATION ON PRESSURE MATERIALS TO IMPROVE SCIENCE PROCESS SKILLS AND STUDENT LEARNING OUTCOMES

Juni Angkowati  
SMP Negeri 1 Paringin, Kabupaten Balangan, Kalimantan Selatan, Indonesia

*Corresponding author: juniangkowati@gmail.com

Abstract: The low level of student process skills in the learning process can have an impact on the level of student understanding which can lead to low student learning mastery. Especially the pressure physics material in class VIII involves a lot of practicum activities. If the activity is omitted and only lecture methods and assignments are given, then students' understanding can be low because the absorption capacity of each student is different. The solution to fix these problems, the teacher applies learning using the inquiry learning model and Teams Assisted Individualization (TAI) to improve teacher activity, student process skills in practicum, and student learning outcomes. This research is classroom action research (CAR) with three cycles. Cycle I and cycle III consisted of two meetings while the second cycle consisted of three meetings. Based on the results of the study, it can be concluded that the teacher's activities in the application of the inquiry learning model and TAI have been carried out by 85.71% in the first cycle, in the second cycle by 92.86, and in the third cycle by 92.86% with a very good category. Practical process skills through the application of inquiry learning models and TAI in the first cycle is 90%, in the second cycle is 97%, and in the third cycle is 98% with a very good category. Student learning outcomes in the first cycle of learning completeness is 84.62%, in the second cycle is 92.31%, and in the third cycle is also 92.31%.

Keywords: science process skills, learning outcomes, inquiry, teams assisted individualization.

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*Abstrak dalam bahasa Indonesia pada bagian akhir halaman jurnal.*
Intruduction

Minister of Education and Culture Regulation Number 22 of 2016 concerning Standards for Primary and Secondary Education explains that the learning process in educational units is carried out interactively, inspiring, fun, challenging, motivating students to participate actively, and providing sufficient space for initiative, creativity, and independence according to talent, interests, and physical and psychological development of students. Graduate competency standards have been stated in the Regulation of the Minister of Education and Culture Number 20 of 2016 concerning Competency Standards for Elementary and Secondary Education Graduates. In the Permendikbud, graduate competency standards consist of qualification criteria for students’ abilities that are expected to be achieved after completing their study period in education units at the primary and secondary education levels. Its achievement is carried out by monitoring and evaluation activities to ensure whether graduates at the education unit level are in accordance with graduate competency standards. Monitoring and evaluation activities must be carried out regularly, the results of which will be input in the improvement of the next graduate competency standard.

Graduate competency standards are the main reference for the development of content standards, process standards, educational assessment standards, educators and education personnel standards, facilities and infrastructure standards, management standards, and financing standards. So that the government expects graduates from primary and secondary education to have critical and creative thinking skills so that they can be used for the next level and can be accepted by the community (Putra et al., 2021).

The fact that researchers found, especially at the junior high school level, especially at SMPN 1 Paringin in science subjects, most of the students did not have critical or creative thinking skills even though the facilities and infrastructure were very adequate, such as libraries and laboratories. The problems encountered by science teachers in class VIII were mostly physics. Students are very difficult to understand material related to physics formulas, especially pressure material which has a very broad scope of material. Students find it very difficult to relate concepts and facts related to pressure, even though there are many in everyday life.

The content or scope of the material pressure relates to the practical and application of pressure problems for solids, liquids, and gases. In previous years’ learning, teachers had never applied practicum because they thought it was a waste of time, so that students' learning completeness was only 40% and 60% had not been completed, while students' activities during the learning process did not seem enthusiastic. If a solution is not found, then student learning becomes meaningless.

In connection with the problems in the pressure material, the teacher held discussions with other science teachers to solve these problems. After analyzing the learning process of the previous year’s pressure material, the results of the discussion decided to apply the inquiry learning model which was combined with the TAI learning model. In line with Siarta’s research (2012) concluded that the inquiry learning model can improve student achievement, and the research of Sudarman (2012) which concluded that the guided inquiry learning model can improve the understanding of concepts and the performance or skills of students' biological processes. So the researcher is optimistic that the inquiry learning model can improve the process skills and learning outcomes of students at SMPN 1 Paringin.

The inquiry learning model was first developed by Richard Suchman in 1962 who stated that the nature of learning is an exercise in thinking obtained from questions. Piaget defines the inquiry model as learning in which students get information from their own experimental experiences. Students can connect their own discoveries with other students and compare something they have found themselves with others (Putra, 2013; Af‘idayani et al., 2018). The learning process by applying the inquiry model is more meaningful, because inquiry emphasizes
the development of cognitive, affective, and psychomotor aspects in a balanced way (Hosnan, 2014; Rahayu et al., 2018).

This study combines the inquiry learning model and TAI in one action because in the matter of pressure, students do a lot of experiments and apply physics formulas so that it is hoped that the practicum process skills and student learning outcomes will increase. The inquiry learning model has the advantage that teaching is student-centred, students gain investigative knowledge because they are directly involved in the discovery process.

**Method**

This research procedure uses a classroom action research design whose steps follow the path of the Mc Model research. Taggart (Depdiknas, 2004). The stages are planning, action, observation, and reflection. The subjects of this study were class VIII-A as many as 26 people with 6 male students and 20 female students. This research is planned in three cycles. Cycle I and cycle III have two meetings. Data analysis techniques used in this study are as follows.

1. The data obtained from the results of the teacher's activity observation sheet in the learning process were analyzed by the formula (Purwanto, 2010).

\[ S = \frac{R}{N} \times 100\% \]

Information:
- \( S \) = Searched percent value
- \( R \) = Total teacher activity score
- \( N \) = Teacher activity maximum score

2. Data on students' process skills in conducting practicals were analyzed using a calculation formula (Purwanto, 2010).

\[ NP = \frac{R}{SM} \times 100\% \]

Information:
- \( NP \) = Percentage value per indicator of science process skills
- \( R \) = The number of scores obtained on the indicators of science process skills
- \( SM \) = Maximum score on science process skills indicator

3. The data analysis technique of learning outcomes to determine students complete individually and classically uses the following formula.

Individual completeness

\[ KI = \frac{SS}{SMI} \times 100\% \]

Information:
- \( KI \) = Individual completeness
- \( SS \) = Student learning scores
- \( SMI \) = Ideal maximum score
- \( 100\% \) = Fixed number

Classical completeness

\[ KK = \frac{JST}{JS} \times 100\% \]

Information:
- \( KK \) = Percentage of classical completeness
- \( JST \) = Number of students who completed
- \( JS \) = Total number of students
Results and Discussion
Physics science material about pressure is a broad material and requires a lot of proving activities and has a lot to do with everyday life. The pressure material has many applications of pressure formulas that must be understood by students. So far, the teacher uses the assignment method by providing various kinds of practice questions. It turns out that student learning completeness is less than 50%, and students' process skills are low because there are no activities to prove the theory and concept of pressure by students. So that the student learning process is not successful because students do not have competence in the pressure material.

Based on previous teaching experience, the teacher then changed the conventional learning method by using the inquiry and TAI learning models to improve process skills and student learning outcomes.

Science-Physics material for class VIII in the even semester, namely "pressure" includes broad material that requires application and high-level thinking or HOTS. So that all materials are understood and mastered by students, the teacher combines two learning models in the learning process, namely the inquiry learning model and the TAI learning model. Where the teacher has never applied before.

Based on observations during the learning process from cycle I to cycle III, the teacher and observer observed the teacher's activities in the application of the inquiry and TAI learning models, students' process skills, especially practical skills, and student learning outcomes obtained the following comparison.

1. Teacher Activities
The teacher's activities observed were the implementation or not the implementation of the syntaxes in the inquiry learning model and the TAI learning model. Based on the results of observations, the percentage score for the first cycle was 85.71% in the very good category, the second cycle was 92.68% in the very good category and the third cycle was 92.86% in the very good category. Based on the results of the percentage scores for each cycle, the teacher's activities from cycle I to cycle III were categorized as very good, meaning that the teacher had implemented the syntax of the inquiry and TAI learning model correctly and seriously.

2. Science Process Skills
Process skills that are carried out by students are the skills to do practicum. The practicum is carried out by students in groups, so the assessment made by the observer is a group assessment. Based on the results of observations showed that in the first cycle the percentage of process skills was 90% with good category, the second cycle was 97% and the third cycle got the percentage result of 98%.

The average assessment of all aspects of practicum skills, namely preparing tools and materials, conducting practicum, writing observations, interpreting observations, and presenting practicum results from cycle I to cycle III of the five groups can be seen in the following figure.
Information:
1. Prepare tools and materials
2. Doing practicum
3. Writing observations
4. Interpreting observations
5. Presenting practical results

All groups collaborated very well so that the results of group practicum skills were also very good.

3. Student Learning Outcomes

The percentage comparison of student learning outcomes from cycle I to cycle III can be seen in the following figure.

Based on the diagram data above, there is an increase in students' classical mastery from cycle I to cycle III and has met the indicators of success, although the average value of the class from cycle I to cycle II there is an increase while in cycle III there is a decrease. This is because the gaseous pressure material in cycle III is classified as a difficult material compared to the solid and liquid pressure material.

During the implementation of learning during the application of the inquiry and TAI learning models, the teacher encountered several obstacles, namely the time management was not maximized, the practical tools for the practice of solids pressure were very urgent to prepare so that the teacher was a bit overwhelmed when entering cycle II. When the implementation of the TAI learning model in the first cycle was not neat because the teacher did not clearly explain the activities.
Based on the findings of the data above, the research to improve process skills and student learning outcomes using the inquiry and TAI learning models meets the criteria of the success indicators and is declared successful.

The success of this research is stated from the data analysis of the findings during the learning process, namely: 1) The teacher's activities have been very good during the learning process. 2) Process skills of students in practicum are good during the learning process. This finding is in line with the results of research from Uswatun and Rohaeti (2015) who concluded that inquiry learning can improve process skills in critical thinking and scientific attitudes of seventh grade students of SMPN 14 Yogyakarta and students of SMPN 1 Piyungan. 3) Completeness of classical student learning outcomes has exceeded 80%. Meanwhile, five students who did not complete the action in cycle I, cycle II, and cycle III received additional assignments according to the students' material incompleteness. These results are in line with research by Aksela and Boström (2012) which states that the inquiry learning model is proven to increase students' self-confidence, encourage students' interest in studying physics because so far the physics material is considered the most difficult among other science materials. These results generally illustrate that the inquiry learning model combined with TAI is able to improve student achievement in science subjects in general and physics in particular.

Conclusion
Based on the results of research and discussion after applying the inquiry and TAI learning models during the learning process as many as three cycles, the following conclusions can be drawn:
1. Teacher activities in the application of the inquiry and TAI learning models have been carried out by 85.71% in the first cycle, in the second cycle by 92.86, and in the third cycle by 92.86% in the good category.
2. Practical process skills during the implementation of the inquiry and TAI learning models in the first cycle by 90%, in the second cycle by 97%, and in the third cycle by 98% with good categories.

The classical completeness of student learning outcomes after applying the inquiry and TAI learning models in the first cycle was 84.62%, in the second cycle it was 92.31%, and in the third cycle it was also 92.31%.

References


PERPADUAN MODEL PEMBELAJARAN INKUIRI DAN TEAMS ASSISTED INDIVIDUALIZATION PADA MATERI TEKANAN UNTUK MENINGKATKAN KETERAMPILAN PROSES SAINS DAN HASIL BELAJAR SISWA

Juni Angkowati
SMP Negeri 1 Paringin, Kabupaten Balangan, Kalimantan Selatan, Indonesia

Submit: 26 Februari 2022   Accepted: 3 Oktober 2022

*Corresponding author: juniangkowati@gmail.com

Abstrak: Rendahnya keterampilan proses siswa dalam proses pembelajaran bisa berdampak pada tingkat pemahaman siswa yang dapat menyebabkan rendahnya ketuntasan belajar siswa. Terutama materi fisika tekanan di kelas VIII banyak melibatkan kegiatan praktikum. Apabila kegiatan tersebut dihilangkan dan hanya metode ceramah dan penugasan yang diberikan, maka pemahaman siswa bisa rendah karena daya serap setiap siswa berbeda. Solusi untuk memperbaiki permasalahan tersebut, guru menerapkan pembelajaran dengan menggunakan model pembelajaran inkuiri dan teams assisted individualization (TAI) untuk meningkatkan aktivitas guru, keterampilan proses siswa dalam praktikum, dan hasil belajar siswa. Penelitian yang dilakukan adalah penelitian tindakan kelas (PTK) dengan tiga siklus. Siklus I dan siklus III terdiri dari dua pertemuan sedangkan siklus II terdiri dari tiga pertemuan. Berdasarkan hasil penelitian dapat disimpulkan bahwa aktivitas guru dalam penerapan model pembelajaran inkuiri dan TAI sudah terlaksana sebesar 85,71% pada siklus I, pada siklus II sebesar 92,86, dan pada siklus III sebesar 92,86% dengan kategori sangat baik. Keterampilan proses praktikum melalui penerapan model pembelajaran inkuiri dan TAI pada siklus I sebesar 90%, siklus II sebesar 97%, dan pada siklus III sebesar 98% dengan kategori sangat baik. Hasil belajar siswa pada siklus I ketuntasan belajar sebesar 84,62%, pada siklus II sebesar 92,31%, dan pada siklus III juga sebesar 92,31%.

Kata kunci: keterampilan proses sains, hasil belajar, inkuiri, teams assisted tndividualization.