



Using Transcript Based Lesson Analysis to Analyze Students' Critical Thinking Skills on Hydrostatic Pressure

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Abstract: This study aims to analyze the profile of students' critical thinking skills that appear during hydrostatic pressure learning with the discovery learning model in junior high school. The critical thinking skill indicator used is based on the Paul and Elder version. The method used in this research is descriptive qualitative. This research was conducted in one of the junior high schools in Sumedang Regency, West Java. The research subjects consisted of 16 students from class VIII. The instruments used are observation and video recording during the learning process. The collected data were analyzed using Transcript Based Lesson Analysis (TBLA). The results showed that during the learning process eight elements of reasoning and critical thinking skills could be observed, but the percentage was still small. The introductory session found four indicators of critical thinking skills activity with a percentage of 30.53%. In group discussion activities found eight indicators of critical thinking with a percentage of 40.27%. And in the closing session found five indicators of critical thinking skills activity with a percentage of 32.29%. The low achievement indicators of students' critical thinking skills are caused because students are still not accustomed to expressing what is on their minds and the teacher cannot still ask questions that encourage students to think. Activity analysis and dialogue during learning can be used as reflection material for teachers to evaluate and improve on further learning to make it better.

Keywords: TBLA, discovery learning, critical thinking skills, hydrostatic pressure.

Abstrak: Penelitian ini bertujuan untuk menganalisis profil keterampilan berpikir kritis siswa yang muncul pada saat pembelajaran tekanan hidrostatik dengan model discovery learning di SMP. Indikator keterampilan berpikir kritis yang digunakan berdasarkan versi Paul & Elder. Metode yang digunakan dalam penelitian ini adalah deskriptif kualitatif. Penelitian ini dilaksanakan di salah satu SMP di Kabupaten Sumedang Jawa Barat. Subjek penelitian terdiri dari 16 siswa kelas VIII. Instrumen yang digunakan yaitu observasi dan rekaman video audio selama proses pembelajaran. Data yang terkumpul dianalisis dengan menggunakan Transcript Based Lesson Analysis (TBLA). Hasil penelitian menunjukkan selama proses pembelajaran 8 elemen penalaran keterampilan berpikir kritis dapat teramati, namun persentase masih kecil. Pada sesi pendahuluan ditemukan 4 indikator aktivitas keterampilan berpikir kritis dengan persentase 30,53 %. Pada kegiatan diskusi kelompok ditemukan 8 indikator berpikir kritis dengan persentase 40,27 %. Dan pada sesi penutup ditemukan 5 indikator aktivitas keterampilan berpikir kritis dengan persentase 32,29 %. Rendahnya ketercapaian indikator keterampilan berpikir kritis siswa disebabkan karena siswa masih kurang terbiasa mengemukakan apa yang ada di pikirannya serta masih kurangnya kemampuan guru dalam memberikan pertanyaan yang menggali siswa untuk berpikir. Analisis aktivitas serta dialog saat pembelajaran dapat digunakan sebagai bahan refleksi bagi guru untuk melakukan evaluasi serta perbaikan pada pembelajaran selanjutnya agar lebih baik.

Kata kunci: TBLA, pembelajaran discovery, keterampilan berpikir kritis, tekanan hidrostatik..

▪ INTRODUCTION

The success of learning is not determined by the grades or final results of students, but by the process when learning takes place students are comfortable, happy, and have 4 characteristics (collaborative, communicative, critical, and creative), (Barry, 2012; Frydenberg, M., & Andone, 2011; Boholano, H, 2017; Binkley, 2012). Fun, innovative, and challenging learning is learning that leads to a 21st-century model school. Modern schools are formed based on the basic principle of simultaneous achievement of quality and equality (Sato, 2014). One of the skills that must be developed is critical thinking.

Critical thinking skills are starting to be noticed by the government and are considered important in line with the needs of the 21st century. So critical thinking skills are starting to be applied in every school along with the 2013 curriculum (1). Critical thinking skills are the dominant thinking skills that are needed in the 21st century (2). Critical thinking skills need to be developed, especially in the world of education so that students can compete globally. Critical thinking skills are a generator for the birth of new ideas and innovations as the basis for creating new superiors both comparatively and competitively in global competition (Martincová & Lukešová, 2015). Critical thinking is thinking that has a purpose (proving something, interpreting an idea, solving a problem), but critical thinking can be a collaborative, non-competitive endeavor (Facione, 2016). Critical thinking ability is the ability of students to think and actively solve various problems through their knowledge and intellectual abilities (Adiwiguna et al., 2019). Meanwhile, according to Paul et al., (2019), critical thinking is a way of thinking about various subjects, content, or problems in which thinkers improve the quality of their thinking by skillfully taking over the structures inherent in thinking and applying their intellectual standards. Critical thinking skills are important to be taught so that students have the capital to analyze problems so that students can apply their ideas in the application of technology, and scientific developments, and find solutions to solving problems they face every day.

Paul & Elder divide critical thinking components into 3 aspects, namely; (1) elements of reasoning, (2) intellectual standards of reasoning, and (3) intellectual character of reasoning (Paul et al., 2019). To clarify in the assessment, these aspects are specifically used as eight indicators of critical thinking ability for intellectual standards of reasoning and are described with thirty explanations of the appropriate elements of reasoning. Here are the eight standards of intellectual reasoning: (1) Delivering Goals; (2) Asking Questions; (3) Collecting and presenting Data/Information; (4) Identifying and explaining Concepts; (5) Thinking from various points of view/ being open; (6) Presenting Assumptions to form a point of view; (7) Making Conclusions; (8) Presenting the implications of the problem.

The analytical technique used is Transcript Based Lesson Analysis (TBLA). TBLA is a technique of lesson study that is used to analyze situations in the learning process. Learning analysis using TBLA is very good because the conversations that occur between teachers and students can be made in as much detail as possible (Murzanita et al., 2021). In line with the statement according to the (Amintarti et al., 2020) model TBLA is believed to be able to provide in-depth input on learning based on dialogue that occurs to open up problems that occur in the classroom. TBLA can be used to analyze thinking skills and evaluate student learning outcomes during the learning process.

The results obtained from the analysis of three science lessons in West Java by Nusantara, Shibata & Hendayana (Hajar, 2019) show that in general learning is still dominated by teacher explanations and student short answers simultaneously and students' dependence on teachers is so great in learning. These facts and statements are reinforced by the experience of 11 years of teaching researchers including during the PPJ period, based on observations and research it was found that in general learning is still dominated by teacher explanations and short student answers simultaneously and the dependence of students on teachers is so great. in learning. Conversations in class that occur during learning are often one-way, teachers are more active in conveying their knowledge material in the form of explanations or lectures. Learning activities do not provide opportunities for students to be active in learning to elaborate on their conceptual understanding. In addition, students are not directly involved in solving problems through certain phenomena related to the concept of science. Based on the problems above, the researchers conducted a study that aims to determine the profile of students' critical thinking skills in learning the hydrostatic pressure theme using the discovery learning model at SMPN 7 Sumedang.

▪ **METHOD**

This research is qualitative research, which is an in-depth study to get a complete picture of what is observed (Fraenkel et al., 2012). This method was chosen because the researcher wanted to get a picture of students' critical thinking skills during the learning process. In a special natural context and by utilizing various scientific methods (Moleong, 2004). The type of qualitative descriptive research used in this study was intended to obtain in-depth and comprehensive information about science learning activities at SMP Negeri 7 Sumedang.

The object of research is stated as a social situation of research that wants to know what is happening in it. In the object of this research, researchers can observe in depth the activities of people (actors) in certain places (Afifuddin & Ahmad, 2009). The object of this research is the transcript of teacher-student conversations during the science learning process in class VIII A of SMP Negeri 7 Sumedang. The subjects of this study were teachers and students of class VIII A of SMP Negeri 7 Sumedang in science learning on the topic of hydrostatic pressure.

The data collection method is in what way and how the necessary data can be collected so that the final results of the study can present valid and reliable information (Bungin, 2008). Data collection methods used in this study include interviews that take place during the activities of making learning designs (plan), do (implementation), and reflection (see). Documentation methods include taking photos, and videos during learning and making transcripts of conversations during learning. In qualitative research, the instrument or research tool is the researcher himself (Sugiyono, 2015). Qualitative researchers as human instruments have the function of setting the focus of research, selecting informants as data sources, collecting data, assessing data quality, analyzing data, interpreting data, and making conclusions based on their findings.

The study was conducted by observing science learning in 16 grade VIII A students with the topic of hydrostatic pressure at a State Junior High School in Sumedang, West Java, Indonesia in the second semester of the 2021/2022 academic year. Research data in the form of learning transcripts collected through recorded conversations and videos. Learning analysis was carried out using Transcript Based

Lesson Analysis (TBLA). TBLA aims to determine the characteristics of learning (Arani, 2017). Transcript analysis is an important method for studying learning in the classroom, both online and offline (Van Booven, 2015). Communication in learning, both synchronous and asynchronous, can be transcribed, and data analyzed using the TBLA method (Winarti, 2021). The validity of the data in this study was carried out in several steps, such as re-checking, an extension of observations, and triangulation. In this study, the triangulation used is source triangulation, according to Patton (Moleong, 2004), triangulation with sources means comparing and checking back the degree of trustworthiness of information obtained through different times and tools in qualitative research.

The steps of this research are (1) Planning research lessons, including designing research questions, determining learning objectives, determining concrete methods, planning learning designs, and developing learning designs, and (2) Implementation of learning, including observation, reflection, transcription, and (3) Learning analysis through full transcript obtained through audio and video recordings. Students' critical thinking skills during learning were analyzed using TBLA which were identified from critical thinking skills indicators according to Paul & Elder (2019). The analysis process begins by transcribing all student conversations during learning, then coding the dialogues based on indicators of critical thinking skills. Based on the results of this coding, was found the percentage of students' critical thinking activities, the percentage of statements of students' critical thinking skills, and the types of critical thinking skills that emerged during the learning process. Collecting data through observation helps researchers to understand the student learning process in depth.

▪ **RESULT AND DISSCUSSION**

Learning the topic of Hydrostatic Pressure in Junior High School

Learning is carried out directly with an inquiry approach and practicum method with a duration of 120 minutes or 3 hours of lessons. Students were divided into 4 groups, each consisting of 4 students, two boys, and two girls. At the beginning of the lesson, the teacher conveys the apperception of the learning that has been done the previous week, namely the pressure on solids. Communication between teachers and students went well, then the teacher showed pictures of the dam and a video of when the dam's floodgates were opened. Students enthusiastically answered questions from the teacher, but when allowed to ask questions the students were still silent. The question and answer ended with the teacher conveying the learning objectives, namely to investigate the factors that affect hydrostatic pressure.

In the core activity, students are given two practical activities, namely: (1) investigate the effect of depth on pressure and (2) investigate the effect of density on pressure. Before carrying out the practicum, the teacher distributes worksheets and asks students to read activity 1 for 5 minutes first, then students are allowed to ask questions if some things or instructions are not understood. The teacher allows students to ask questions, but students answer no questions. Before starting the practicum activities, students are required to discuss and answer predictive questions related to what will happen in the practicum activities, after finishing the new students are invited to take tools and materials for the 1st practicum activity. Students practice the 1st activity and discuss solving the existing questions in worksheets. The teacher goes around to guide

the practicum activities of the whole group and provides assistance and answers to group questions that still do not understand what to do and fill out. Here it can be seen that students start to dare to ask questions when they are in small groups, not in classical learning. In this 1st practicum activity, students are given a plastic bottle that has been given 4 holes which are then closed, the bottle is filled with water which is then opened and the distance of the water spread is recorded. From here it can be seen that the deeper the water depth, the greater the hydrostatic pressure.



Figure 1. Practicing the effect of depth on hydrostatic pressure

After all, groups have finished the 1st practicum, the teacher invites students to first read the practicum instructions for the 2nd activity and answer the prediction questions. The second practicum activity aims to prove the effect of density on hydrostatic pressure. Each group was given two plastic bottles, each with one hole of the same depth. The two plastic bottles are filled with two different liquids, namely water, and cooking oil. When the manhole cover is opened, students measure the distance the liquid is emitted. As a result, water has a longer emission distance than cooking oil, here it can be seen that water which has a density of 1000 kg/m^3 has greater pressure than cooking oil which has a density of 800 kg/m^3 , so it is concluded that the density of the liquid is proportional with the hydrostatic pressure. Students are allowed to look for references on the internet related to density. Each group takes turns using a laptop connected to the internet provided by the teacher.



Figure 2. Practicum on the effect of density on hydrostatic pressure



Figure 3. Students are looking for references related to the density of water and the density of cooking oil

In practicum activities, students only investigate two factors that affect hydrostatic pressure, while the third factor, namely gravity, they get from the teacher's explanation through the pressure formula relationship. Next, students were asked to present the results of their practicum, group 2 presented the first practicum activity and group one presented the second practicum activity, the other two groups were asked to provide questions and responses to the presenting group.



Figure 4. Group presentation

Students' Critical Thinking Skills During the Learning Process

The results of the analysis of students' critical thinking skills are based on the Transcript Based Lesson Analysis (TBLA) which refers to the indicators and sub-indicators of critical thinking skills according to Paul and Elder (2019). The results showed that of the 8 elements of reasoning and critical thinking skills according to Paul and Elder during learning, the percentage was still small.

Table 1. Students' Critical Thinking Activities

Learning Activities	Number of Critical Thinking Indicators (Paul & Elder, 2019)	Frequency of Critical Thinking Statements (%)
Opening	4	30.53
Group Discussion	8	40.27
Closing	5	32.29

Table 1 shows in the preliminary session found 4 indicators of critical thinking skills activity with a percentage of 30.53%. In group discussion activities found 8 critical thinking indicators with a percentage of 40.27%. And in the closing session found 5 indicators of critical thinking skills activity with a percentage of 32.29%.

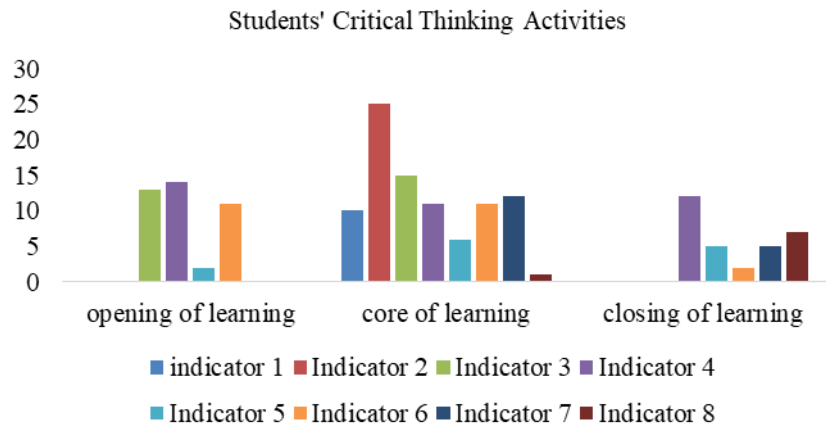


Figure 5. Students' critical thinking activities

Based on the analysis of the transcripts during the implementation, a graph of the number of words was obtained as shown in Figure 6. This graph shows the conversation sessions between the teacher and students during the lesson, the top of the graph is the teacher's conversation session and the bottom of the graph is the student's conversation session. Teacher and student conversations are timed for each word that is formed as described (Amintarti et al., 2020), The horizontal line that limits the teacher and student conversation sessions on the graph is an indexing conversation recorded on the full transcript. This index is also the time sequence (in minutes) when learning occurs. The following can be seen in the analysis of the number of conversations between teachers and students.

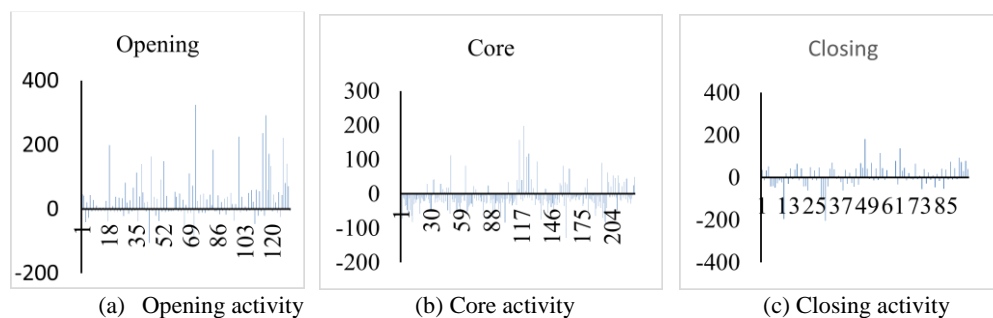


Figure 6. Teacher-Student Conversation Analysis

In the opening activity, there are 4 visible critical thinking indicators, namely indicators 3. Collecting and presenting Data/Information, and indicators 4. Identifying

and explaining concepts, and indicators 5. Thinking from various perspectives/ being open, indicators 6. Thinking from various points of view/ be open. At the beginning of learning, the teacher still dominates the conversation so that very few students' critical thinking skills appear.

In the core activity, namely group discussion activities, all eight critical thinking indicators have been seen, although some still appear with a very small frequency, namely the 8th indicator, which is conveying the implications of the problem, here students still need to explore their abilities to convey the impact of the problems of learning carried out. In the core activity, students are actively involved in the discussion so the teacher here only acts as a facilitator. In the closing activity, again the teacher who became the leader in learning can be seen from the graph of the teacher's conversation has increased again. With the increase in the number of teacher conversations, the indicators of critical thinking skills that appear to have decreased again are only 5 indicators, with the lowest indicator being indicator number 6. Delivering Assumptions to form a point of view. When the teacher talks more, the opportunity for students to express what is on their minds is limited.

Closed questions are often asked by teachers throughout the lesson from the beginning of the lesson to the end of the lesson. This causes students' answers to answer briefly. Furthermore, observations during the learning process and data from several research results show that in science class, asking questions is the most important activity (Biggers, 2018). However, not all teacher questions can motivate students to carry out scientific investigations. The types of questions that are often asked by teachers are mostly "remember" and "understand" levels or are still at the LOTS level. Furthermore, more questions were asked by teachers, not by students (Biggers, 2018; Matra, 2014).

The teacher's questioning skill is a fundamental problem in this research. As long as the questions are only at a lower level of thinking, the teacher will have difficulty evaluating student achievement, and their thinking skills will not develop. However, when questions are more inquiry-based, communication between students can be more intensive, and their critical thinking skills can be further developed (Taat et al., 2020). Meanwhile, learning designs are more student-centered, such as allowing students to share ideas, convey reasons, and reflect on understanding learning topics through various strategies and making their communication skills better (Bature & Atweh, 2019).

▪ CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that of the 8 elements of reasoning and critical thinking skills according to Paul and Elder during learning, the percentage is still small. In the introductory session, one indicator of critical thinking skills activity was found with a percentage of 47%. In group discussion activities found 4 critical thinking indicators with a percentage of 80%. And in the closing session, there were no critical thinking activities. Of the 30 intellectual standards that match the indicators of critical thinking skills, 27 can be seen. Students' critical thinking ability is influenced by internal and external factors. Internal factors related to student personality and student comfort in the learning process. External factors include teacher guidance, peer influence, clarity of material including clarity of

worksheets, and diversity of learning activities. The low achievement indicators of students' critical thinking skills are caused by the teacher's ability to ask questions that are still not honed so that students are not explored to think critically. The teacher also does not give enough time for students to make conclusions from the material that has been presented. This study also illustrates that research on students' critical thinking skills still needs to be done. By using other learning methods, which are by the characteristics of students and learning materials. Transcript analysis can reveal students' critical thinking skills. More than that, this analysis is also able to provide an overview of the trajectory of students' understanding during the learning process. Analysis of student activities and dialogue with students or students with teachers during learning is needed not only to analyze student skills or activities but can also be used as reflection material for teachers to evaluate and improve further learning to make it even better. Therefore, transcript analysis can be recommended as a technique to reveal students' abilities and/or skills through their conversations during the learning process. Hopefully, this research can be the basis for further research to improve learning better.

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