*23 (2), 2022, 701-711*

**Jurnal Pendidikan MIPA**

e-ISSN: 2550-1313 | p-ISSN: 2087-9849

http://jurnal.fkip.unila.ac.id/index.php/jpmipa/

# Profile of Students' Critical Thinking Skills on the Concept of Pressure through Collaborative Sharing and Jumping Task

**Yuyu Rahayu*, Asep Supriatna, Riandi, & Sumar Hendayana**

Department of Science Education, Universitas Pendidikan Indonesia, Indonesia

**Abstract:** This study aims to analyze the profile of critical thinking skills students in science learning with collaborative learning design sharing and jumping tasks. Indicators of critical thinking skills used are based on Ennis (1985). The method used is descriptive qualitative. Lesson design sharing & jumping tasks consist of three core activities: sharing task 1, sharing task 2, and jumping task. The instruments used are observation and audio recording of the learning process. Data were analyzed by Transcript Based Lesson Analysis (TBLA). The results of the analysis show that the collaborative learning design of sharing and jumping tasks can bring up students' critical thinking skills. The profile of students' critical thinking skills in sharing task 1 activities found 6 indicators with the highest percentage at 58%, on sharing task 2 found 12 indicators with the highest percentage at 100%, and jumping task found 9 indicators with the highest percentage at 75%.

**Keywords:** lesson design, critical thinking skills, TBLA, sharing & jumping task.

***Abstrak:*** *Penelitian ini bertujuan untuk menganalisis profil keterampilan berpikir kritis siswa dalam pembelajaran IPA dengan desain pembelajaran kolaboratif sharing and jumping task. Indikator keterampilan berpikir kritis yang digunakan berdasarkan Ennis (1985). Metode yang digunakan adalah deskriptif kualitatif. Lesson design sharing & jumping tasks terdiri tiga kegiatan inti: sharing task 1, sharing task 2, dan jumping task. Instrumen yang digunakan yaitu observasi dan rekaman audio proses pembelajaran. Data dianalisis dengan Transcript Based Lesson Analysis (TBLA). Hasil analisis menunjukkan bahwa pembelajaran kolaboratif sharing and jumping task dapat memunculkan keterampilan berpikir kritis siswa. Profil keterampilan berpikir kritis siswa pada kegiatan sharing task 1 ditemukan 6 indikator dengan presentase tertinggi 58 %, pada sharing task 2 ditemukan 12 indikator dengan presentase keterampilan berpikir kritis tertinggi 100 %, dan pada jumping task ditemukan 9 indikator dengan presentase tertinggi 75 %.*

***Kata kunci:*** *lesson design, keterampilan berpikir kritis, TBLA, sharing & jumping task.*

## ▪ INTRODUCTION

To be able to compete with other nations, Indonesia must have quality human resources (HR). One indicator of the quality of human resources in the world is the PISA (Program for International Student Assessment) event. Unfortunately, in this PISA event, Indonesia's achievements are not encouraging, Indonesia is still in a lower ranking than other countries. PISA (Program for International Student Assessment) is a tool to measure the average scientific literacy ability of students in a country. Scientific literacy requires students to identify to be able to understand and interpret issues related to science so that they can make decisions based on the scientific evidence obtained (Kemdikbud, 2017), this of course requires students' critical thinking skills. Critical thinking is defined as the skill to draw reasonable conclusions based on evidence, logic, and intellectual honesty.

Yuyu Rahayu
*Email: yuyu2002007@upi.edu

DOI: http://dx.doi.org/10.23960/jpmipa/v23i2.pp701-711
Received: 07 April 2022
Accepted: 18 June 2022
Published: 09 July 2022

Critical thinking in the educational environment is an important issue and the development of critical thinking skills should be one of the main goals for educators at all levels (Gelder, 1965). Critical thinking skills at this time are very much needed, so that children in the future when they receive information do not immediately believe it, are not easily influenced, and always check the truth of the information obtained. Critical thinking is reflective thinking on what decisions to do(Ennis, 1985), which results in interpretation, analysis, and inference (Facione, 2011). Students who already have critical thinking skills before deciding and assessing information will analyze, evaluate, and relate it to the evidence and arguments they have (Dwyer et al., 2014). Critical thinking is part of the skills of the metacognitive process that is used to produce logical solutions to the problems found (Yu et al., 2015). Critical thinking ability is a type of high-level cognitive activity involving skills related to logical reasoning and problem-solving. Critical thinking is defined as an agreement on cognitive dimensions in the form of interpretation, evaluation, analysis, explanation, and self-regulation (Liu et al., 2014).

Science learning is identical to the implementation of scientific experiments, the application of the scientific method which is believed to make an important contribution to developing the thought process (Rahmayanti et al., 2021). The results obtained from the analysis of three science lessons in West Java by Nusantara, Shibata & Hendayana (2017) showed that in general learning is still dominated by teacher explanations with short student answers simultaneously and students' dependence on teachers is so great in learning. From preliminary research conducted by researchers regarding the science learning process in one of the junior high schools in Sumedang district. Learning that is carried out is more providing information or only in the form of knowledge transfer that is conveyed by the teacher to students without involving activities that can show why the knowledge is important for them to learn, this is done on the grounds of pursuing the achievement of curriculum targets. These results indicate that the learning carried out is not by the objectives of science learning, namely to train students to develop thinking processes. Based on the above, the teacher must strive to design learning that can foster students' critical thinking skills that are motivating and fun so that the learning process is not boring and more meaningful.

Some research results on critical thinking skills can be grown with learning strategies, for example, According to (Anwar & Arif Hidayat, 2017) states that students' critical thinking skills activities can be grown with collaborative learning. Collaborative learning through sharing activities and jumping tasks that are currently felt to have significant value, not only when students are discussing activities but also when students do activities that show each other's learning, so that there is a mutual learning relationship between students, mutual respect differences and arguments and get a good response when asking for help (Zahn et al., 2012).

Concepts in science learning are not all suitable to be taught with collaborative learning, the concepts being taught must have characteristics that make students think and the possibility of having different perceptions and beliefs. The difference will only occur in concepts that have more submicroscopic forms that require a mental model to perceive them, differences in perceptions of a concept will allow students to think critically, and creatively and be able to communicate with each other to have individual conclusions. Collaborative learning will be carried out if you want to solve challenging

problems together with different perspectives. Collaborative learning occurs when students depend on each other due to differences in knowledge and perspectives (Kaendler et al., 2015). Challenging problems given to students with different knowledge and perspectives will provide opportunities to contribute to their respective ideas and perceptions.

One of the science materials suitable for collaborative learning is the concept of pressure. This concept of pressure is often found by students in real life, so students need to understand it so that they can solve problems related to the concept of pressure in real life. The concept of pressure is abstract and is a challenge for the teacher, to formulate what kind of learning design should be presented to students so that the concept of pressure is easier to understand. Based on the results of the analysis that has been described, researchers are interested in conducting research on "Profile of Students' Critical Thinking Skills on the Concept of Pressure Through Collaborative Sharing and Jumping Tasks". It is hoped that the learning activities in this research can facilitate the growth of students' critical thinking skills.

## ▪ METHOD

### Participants

The population in this study were seventh-grade junior high school students, while the samples taken were 12 eighth-grade students at one junior high school in Sumedang Regency. This sample was taken randomly according to the teaching task given to the researcher. This research was conducted in the New Normal Covid 19 Era, at that time only 50% of the students were allowed to study in class the total number of classes.

### Research Design and Procedures

The method used in this research is the development method with the Didactical Design Research (DDR) research design which consists of three research stages, namely: The first stage is Didactic Situation Analysis Before, during, and after learning (Suryadi, 2013). The stage before learning begins with preliminary study research related to the situation or situation during learning, the researcher conducts learning at the begin,ning of the 2nd semester of learning on the pressure material on solids, and the results of the audio recording of the learning are then analyzed using the TBLA method, by analyzing the results of the audio recording transcripts during learning. From some of the findings of the preliminary study regarding students' critical thinking skills that emerged during learning, the researchers then arranged lesson design lessons for the next material using the collaborative learning model of sharing and jumping tasks. The results of the design are then validated by competent parties, in this case, the research supervisor. From the validation results, the revised learning design was then rearranged according to the suggestions for improvement given.

The second stage is the stage of analyzing the didactic situation during learning, namely implementing a validated learning design. This activity was carried out at the beginning of February 2022 with the material pressure on liquids, during the study the researchers were assisted by 2 observers to observe ongoing learning activities which included student responses and teacher anticipation during learning. The next stage is the analysis of the didactic situation after learning, at this stage, the researcher and the observer reflect on the learning that has been done with the main focus of the discussion in this reflection session, namely how students learn. The results of the input from the

observers are then used as material for improving the preparation of design lessons in the next lesson. The next step is to analyze students' critical thinking skills during learning with the TBLA method through transcripts of student and teacher dialogues in voice recordings during learning.

**Instruments**

The instrument used by this researcher, the first is the Observation Sheet, this Observation Sheet aims to observe the learning process. The observation sheet used is in the form of a table consisting of a time column, learning activities, and incident notes. The second is an audio recording during the learning process, the results of this recording will be analyzed using the TBLA (Transcript Based Lesson Analysis) method, namely dialogue analysis related to the construction of student knowledge as the main information material which is more accurate and comprehensive from the research subjects (teachers & students) (Rahayu et al., 2020). The third instrument is the Student Worksheet (students' worksheet). LAPD as a learning media contains sharing tasks and jumping tasks that must be done by students during the learning activity stage. The results of the students' worksheet that have been filled out by students will be a source of additional information, to strengthen the results of the research carried out.

**Data analysis**

This research is qualitative. The data analysis carried out in the didactic design research consists of 3 stages of research analysis, the second is the analysis of the Didactic Situation Before Learning. Before developing the lesson design, data analysis was carried out based on a preliminary study in the form of a literature review to obtain essential material and material limitations related to the science topic in the discussion of the concept of pressure. The second is the analysis of the didactic situation during learning, namely the reflection made by the teacher during the implementation of the lesson design in the form of anticipation made by the teacher on the responses given by students during learning, both those that had been predicted previously and student responses that were not previously predicted by the teacher. Analysis during learning is done by analyzing students' critical thinking skills. The third is a didactic situation analysis after learning, which is a didactic analysis that connects the initial lesson design with the conditions at the time of lesson design implementation based on reflections after learning carried out by the teacher together with the observer. The analysis was carried out to see how the predictions of student responses and teacher anticipation before the implementation of lesson design, how the dialogue occurred during sharing and jumping tasks, and how the learning process that occurred using lesson design sharing & jumping tasks under pressure materials could foster students' critical thinking activities. in the learning process. Before analyzing students' critical thinking skills activities, the researchers transcribed all learning recording data based on audio recorded data during learning. Then the transcript results were analyzed based on Ennis's (1985) critical thinking indicators and analyzed using Transcript Based Lesson Analysis (TBLA).

## ▪ RESULT AND DISSCUSSION

Sharing and jumping task collaborative learning designs are designed based on preliminary studies from the results of observational analysis of student learning

activities in class. The results of the analysis show that the learning carried out is in the form of conventional learning using the lecture and question and answer method which only emphasizes the aspects of remembering and understanding which are lower order thinking skills. So as a solution, students need a learning design that can cope with the diverse abilities of students from high to low. One of the designs that can be used is the jumping and task collaborative learning design.

The learning design made consists of three main activities, namely sharing task 1, sharing task 2 and jumping task. The compiled design is equipped with problems or issues presented, predictions of student responses, anticipation or teacher assistance that is useful as teacher readiness in overcoming student learning difficulties that will arise during the learning process. The following describes the core learning activities in the form of sharing task 1 and sharing task 2 and the final activity in the form of jumping task. Sharing task 1, At this stage students are invited to observe a demonstration of a tool in the form of a bottle that is given 2 holes with different heights, students are given the opportunity to give predictions and give reasons about the hole that will emit the farthest water. Sharing task 2, At this stage students in groups carry out practical work with students' worksheet guidelines to find out the factors that affect the amount of hydrostatic pressure, at this stage students are given the opportunity to collaborate and discuss with fellow students in one group or outside the group, then ends with a presentation the results of their activities are conveyed through posters in front of the class. Jumping task, at this stage students are presented with real-life problems, this problem is expected to provide opportunities for them to express their ideas and ideas in accordance with the hydrostatic pressure concept studied previously to provide solutions to the problems presented

The following are 12 indicators of critical thinking skills according to Enis (1985); 1) focus on the question; 2) analyze arguments/statements; 3) ask or answer explanations or challenges; 4) consider sources; 5) observe and consider the results of observations; 6) Deduce and consider the results of the deduction; 7) induce and consider the results of induction; 8) consider; 9) identify terms and consider the definition of the form and content of the strategy; 10) identify assumptions; 11) decide on the action to be taken; and 12) interact with other people. In the learning process, not all indicators appear at every stage of learning. The results of student conversation analysis related to students' critical thinking skills in the learning process using transcript analysis can be seen in Table 1

**Tab. 1.** Student critical thinking activities

| **Learning Activities** | **Number of Critical Thinking Indicators (Ennis, 1985)** | **Frequency of Critical Thinking Statements (%)** | **Number of Students Showing Critical Thinking Activities (%)** |
|---|---|---|---|
| sharing task 1 | 6 | 25 | 58 |
| sharing task 2 | 12 | 40 | 100 |
| jumping task | 9 | 37 | 75 |

If we present the data in graphical form, the image of the data can be shown in Figure 1.

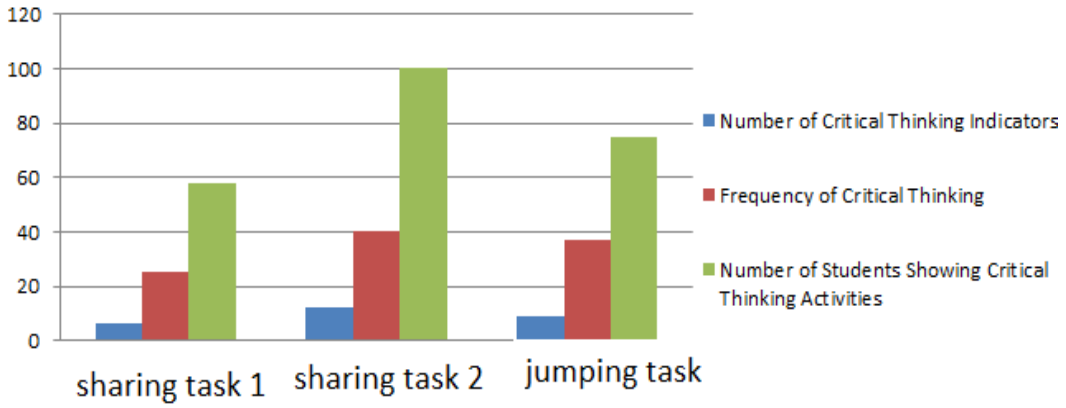


**Figure 1.** Graph of students' critical thinking activities at each learning phase

From table 1 and figure 1 above, it can be seen that there is an increase in students' critical thinking skills activity in proportion to the increasing number of critical thinking indicators, and more students doing critical thinking activities. This increase occurred from the activity of sharing task 1 to sharing task 2, but then the activity of students' critical thinking skills decreased in the activity of jumping task.
The percentage of the frequency of students' critical thinking statements is in line with the number of students talking in the learning process, in the sharing task phase 1 the teacher dominates the number of conversations in the class. In this phase the teacher conducts demonstrations and questions and answers between the teacher and students. This activity has the potential to build critical thinking skills in terms of predicting the results of demonstrations, student observation processes, and asking or answering questions. The following is a graph of the frequency of occurrence of students' Critical Thinking Skills in sharing task 1.

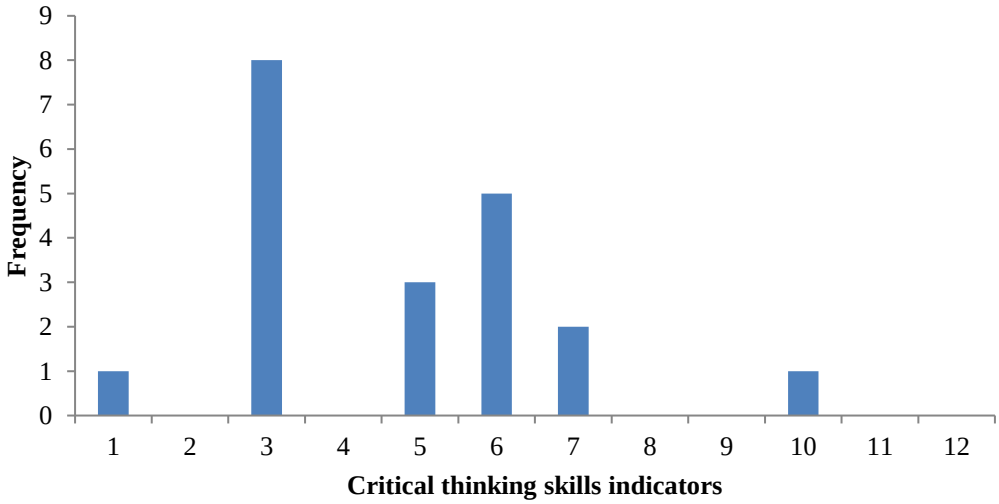


**Figure 2.** Students' critical thinking in the sharing task phase 1

From Figure 2, it can be seen that only 6 indicators appear at the sharing task 1 stage, namely indicator 1) asking or answering questions or challenges; 3) ask or answer explanations or challenges; 5) observe and consider the results of observations; 6)

conclude and consider the results of the withholding; 7) induce and consider the results of induction; and 10) identify assumptions. Meanwhile, students who issued statements on critical thinking skills were only 7 students out of 12 students or as many as 58% of the total number of students.

In sharing task 2 students do practicum in groups, in this activity they collaborate in groups to explore practicum tools to look for factors that affect the magnitude of hydrostatic pressure. The practical tool used is the Hartl plane.

**Figure 3.** Hartl plane

From this Hartl plane, students are expected to know the relationship between pressure and water depth and density. The following table shows the frequency of occurrence of students' Critical Thinking Skills in sharing task 2.

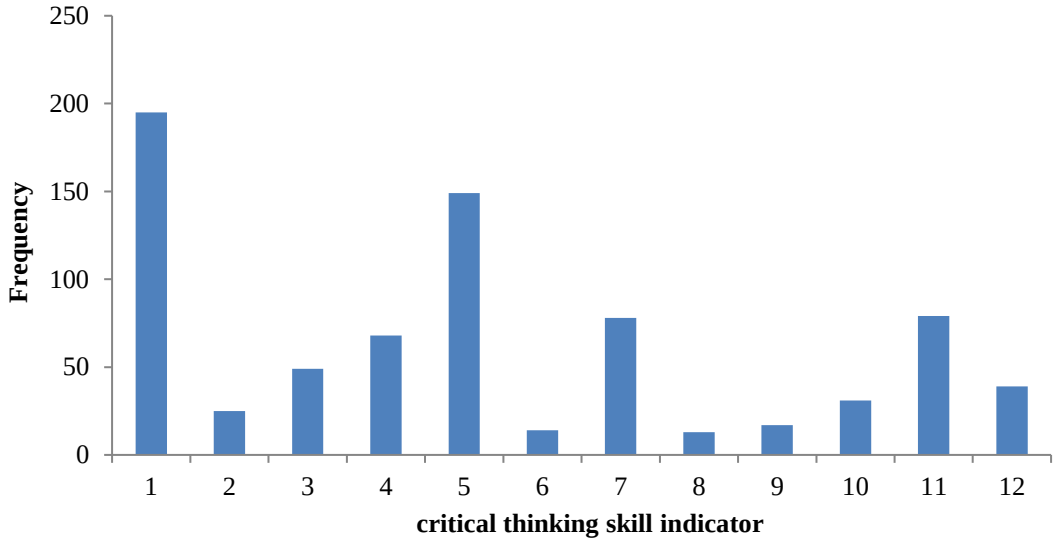


**Figure 4.** Students' critical thinking in the sharing task phase 2

From Fig. 4, it can be seen that all indicators appear when students enter the phase of sharing task 2 learning activities. The emergence of all indicators of students' critical thinking skills in this learning is caused in this activity students have a lot of discussion when exploring tools according to students' worksheet instructions. In this activity, students talk more while the teacher only talks a few times to guide students if they have

difficulty doing practicum. Guiding questions and inquiry questions expressed by the teacher when facilitating class discussions helped students to have productive discussions and provided explanations which meant they were helped in carrying out critical thinking activities. So that interaction between students, teachers, and materials is needed to build students' critical thinking skills. This is in line with the statement that there must be interaction between teachers and students, students and students, and students with materials so that the learning process improves (Rahmawati 2021).

In the jumping task phase the number of occurrences of critical thinking skills decreased again, data on the emergence of students' critical thinking skills in the jumpink task session is shown in the table below.

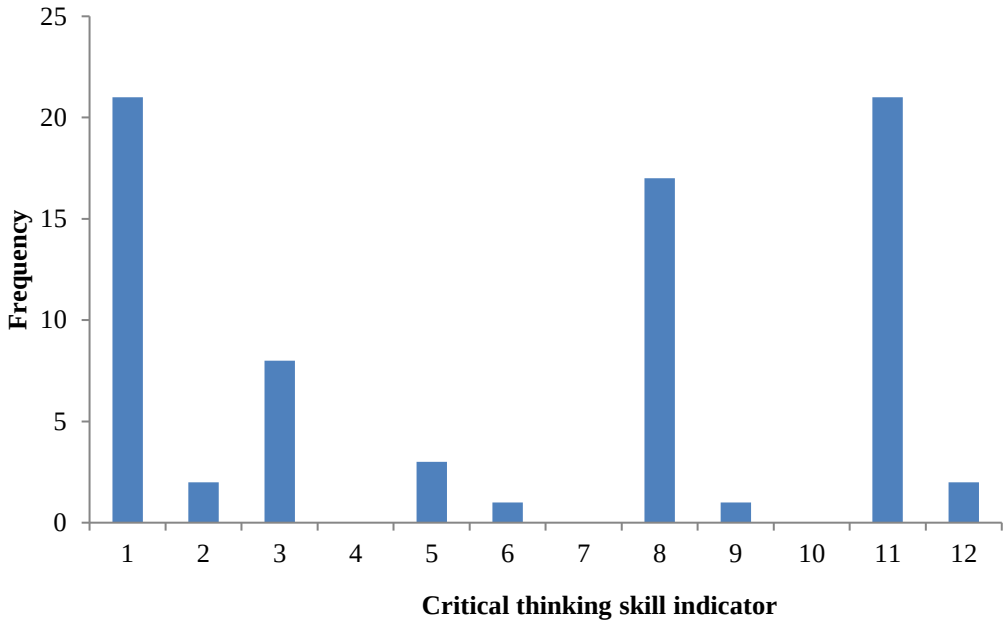


**Figure 5.** Students' critical thinking in the jumping task phase

Based on Figure 5, it can be seen from 12 indicators, only 9 indicators appear in this phase, namely indicators 1,2,3,5,6,8,9,11 and 12. The details of these indicators are 1) asking or answering questions or challenges; 2) Analyze arguments/statements; 3) ask or answer explanations or challenges; 5) observe and consider the results of observations; 6) conclude and consider the results of the withholding; 8) Considering; 9) Identify terms and consider definitions regarding form, strategy, and content; 11) Decide what action to take and 12) Interact with other people. Meanwhile, students who issued statements on critical thinking skills were only 9 students out of 12 students or as much as 75% of the total number of students.

The decrease in the percentage of students' critical thinking skills in the jump-starting phase occurs due to reduced student talk, in this phase students are required to think more about applying the concepts to the problems presented, they only occasionally speak to ask for advice from groupmates or teachers regarding solutions to the problems given. If we look at the learning process in each activity session, that the number of learning activities carried out by students is able to bring up many indicators

of critical thinking. This shows that learning activities are a means to build students' critical thinking skills. For example, in group discussion activities, students do more than just ask and answer. They exchanged information with each other, confirmed the correctness of each member's answers, and drew conclusions. This activity succeeded in building and improving critical thinking skills more. While in the jumping task activity, only reinforcement is carried out by the teacher and students think more in solving problems. If students feel they understand and do not need to ask, then in this activity fewer indicators of critical thinking skills appear. This is in line with the statement that learning activities are the basis for achieving learning goals and outcomes.

## ▪ CONCLUSION

From the results of the research that has been done, it can be concluded that Collaborative Learning Sharing And Jumping Task can build students' critical thinking skills. In order for learning to be carried out well, there are several things that must be considered, namely: before learning, make a lesson design lesson first accompanied by predictions of student responses that may appear during learning and anticipation of pedagogical didactics that will be carried out by the teacher from student responses; arrange students' worksheet which involves many student activities to work in groups; and finally presents problems that require students to think about applying the concepts learned so that learning is more meaningful. Transcript analysis is able to 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. Therefore, transcript analysis can be recommended as a technique to reveal students' abilities and/or skills through their conversations during the learning process.

## ▪ REFERENCES

Anwar, B., Munzil, & Hidayat, A. (2017). Pengaruh Collaborative Learning Dengan Teknik Jumping Task Terhadap Keterampilan Berpikir Kritis Dan Hasil Belajar Siswa. (The Effect of Collaborative Learning With Jumping Task Techniques on Critical Thinking Skills and Student Learning Outcomes. Journal of Science Learning). Vol. 1 (2), p. 15-25.Jurnal Pembelajaran Sains. Vol. 1 (2), hlm. 15-25.

Danora, Y. (2020). Development Of Lesson Design Sharing & Jumping Tasks to Grow Activities of Student's Critical Thinking Skills in Redox Reaction Learning (Doctoral dissertation, Universitas Pendidikan Indonesia).

Dwyer, C. P., Hogan, M. J., Harney, O. M., & O'Reilly, J. (2014). Using interactive management to facilitate a student-centred conceptualisation of critical thinking: a case study. Educational Technology Research and Development, 62(6), 687-709.

Ennis, R. H. (1985). A logical basis for measuring critical thinking skills. Educational Leadership. Vol. 43 (2), hlm. 44-48.

Facione, P. A. (2011). Critical thinking: What it is and why it counts. Insight assessment, 2007(1), 1-23.

Gelder, T. V. (2005). Teaching critical thinking: Some lessons from cognitive science. College teaching, 53(1), 41-48.

Hendayana, S., Suryadi, D., Karim, M., Sukirman., et al. (2006). Lesson Study: Suatu Strategi untuk Meningkatkan Keprofesionalan Pendidikan

Lesson Study: A Strategy to Improve Educational Professionalism (IMSTEP-JICA Experience). Bandung: FMIPA UPI and JICA.

Hesse, F.W., Pea, R., Zahn, C., & Krauskopf, K. (2012). How to improve collaborative learning with video tools in the classroom? Social vs cognitive guidance for student teams. Computer-Supported Collaborative Learning 7(2), 259–284.

Jones, A., Buntting, C., Hipkins, R., McKim, A., Conner, L., & Saunders, K. (2012). Developing students' futures thinking in science education. Research in Science Education, 42(4), 687-708.

Kaendler, C., Wiedmann, M., Rummel, N., & Spada, H. (2015). Teacher competencies for the implementation of collaborative learning in the classroom: A framework and research review. Educational Psychology Review, 27(3), 505-536.

Kemendikbud. (2017). Panduan Implementasi Kecakapan Abad 21 Kurikulum 2013 Di Sekolah Menengah Atas. (Ministry of Education and Culture. (2017). Guidelines for Implementing 21st Century Skills 2013 Curriculum in Senior High Schools). Minister of Education and Culture, 1–42.

Liu, O. L., Frankel, L., & Roohr, K. C. (2014). Assessing critical thinking in higher education: Current state and directions for next-generation assessment. ETS Research Report Series, 2014(1), 1-23.

M. Frydenberg and D. Andone, "Learning for 21 st Century Skills," in International Conference on Information Society, pp. 314–318

Nusantara, F., Shibata,Y., & Hendayana, S. (2017). Uncovering Teacher's Question in Guiding Student Students in Learning Science Appling a Transcript-based Lesson.

Psycharis, S. (2008). The relationship between task structure and collaborative group interactions in a synchronous peer interaction collaborative learning environment for a course of Physics. Education and Information Technologies, 13(2), 119-128.

Rahayu, D. S., Rahmawan, S., Hendayana, S., Muslim, M., & Sendi, S. (2020). Pattern of Analysis Students' Knowledge Construction Using Transcript-Based Lesson Analysis. 438(Aes 2019), 140–144. https://doi.org/10.2991/assehr.k.200513.032

Rahmayanti, E., Hendayana, & Riandi, R. (2021). Students' Critical Thinking Skill In Learning Physical and Chemical Changes Througn Hybdrid Learning. In Prosiding Seminar NAsional & Internasional .

Ratnasari, Supriatna, A, & Hendayana, S. (2020). Critical Thinking Development in Collaborative Learning : Case study of Transformer Topic through Lesson Study at Junior High School, ICEIT:50–54.

Solehudin. (2021). Pembelajaran Kolaboratif Sharing and Jumping Task Pada Topik Pencemaran Lingkungan Untuk Menumbuhkan Aktivitas Keterampilan Berpikir Kritis Siswa SMP. (Collaborative Learning Sharing and Jumping Tasks on the Topic of Environmental Pollution to Grow Critical Thinking Skills Activities for Junior High School Students). Thesis. Indonesian education university.

Supriatna, A., & Hendayana, S. (2020, February). Critical Thinking Development in Collaborative Learning: Case study of Transformer Topic through Lesson Study at Junior High School. In Proceedings of the 2020 9th International Conference on Educational and Information Technology (pp. 50-54).

Suryadi, D. (2013). Didactical Design Research (DDR) dalam Pengembangan Pembelajaran Matematika. In Prosiding Seminar Nasional Matematika dan Pendidikan Matematik (Didactical Design Research (DDR) in the Development of

Mathematics Learning. In Proceedings of the National Seminar on Mathematics and Mathematics Education) (Vol. 1, Issue 1). Makalah pada Seminar UNNES, tidak diterbitkan.

Yu, K. C., Lin, K. Y., & Fan, S. C. (2015). An exploratory study on the application of conceptual knowledge and critical thinking to technological issues. International Journal of Technology and Design Education, 25(3), 339-361.