



## Profile of conceptual photosynthesis and creative thinking: Study of 7<sup>th</sup>-grade students

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### ABSTRACT

Profile of students' creative thinking and conceptual understanding is essential to create an initial description of students' competencies in overcoming their learning difficulties. The research aims to describe profile of concept understanding and creative thinking skills of 7th grade students of all SMP Negeri (public junior high school) in Rasau Jaya sub-district, Kubu Raya Regency, West Kalimantan, Indonesia in photosynthesis content. The research uses qualitative descriptive method. The sampling technique employs disproportionate stratified random sampling. Samples consist of 143 students of 7th grade from three SMP Negeri in Rasau Jaya Sub-district, Kuburaya Regency, West Kalimantan, Indonesia. The data collection technique utilizes creative thinking skill test in the form of an essay with fluency, flexibility, originality, and elaboration aspects. Students' concept understanding test is in the form of four-tier diagnostic test. Data analysis employs descriptive statistics with percentage of creative thinking and conceptual understanding in categories of understanding, partial understanding, misconception, and not understanding. The creative thinking skill percentage of SMPN students in Rasau Jaya, Indonesia in the originality and flexibility aspect is in a fairly creative category, whereas in the elaboration and fluency aspect the category is still less creative. The highest percentage of students' conceptual understanding is misconception of 45.25% and followed by an understanding of 30.64%, not understand of 13.2%, and partial understanding of 10.97%. The obtained data give evidence that natural sciences (IPA) learning knowledge among junior high school students, especially concept understanding and creative thinking, is still low. Therefore, teachers could develop students' creative thinking skills so their concept understanding could be improved.



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## INTRODUCTION

Current education sector have a task of improving human resource quality (Widiana & Jampel, 2016). Education quality can determine a nation's advancement (Shahroom & Hussin, 2018). Quality education equips students with thinking skills (Zubaidah, Fuad, Mahanal, & Suarsini, 2017). One of mostly-trained student skills to achieve the goals of 21<sup>st</sup> century education is creative thinking skills (Moon, 2008). Critical, logical, and creative thinking skills have a correlation to cognitive skills and assist students to acquire more understanding on concept being studied (Koray & Koksal, 2009).

Creative thinking skills aim to synthesize ideas, produce new ideas, and determine the effectiveness of the existing ideas (Sumarni & Kadarwati, 2020; Zubaidah, Fuad, Mahanal, & Suarsini, 2017). Students who are taught and provided with creative activities through learning process that involves creative activities and higher thinking skills are better than students who learn without creative activities (Rochmad, 2018). Creative thinking is helpful in determining new solution for unpredicted difficulties or problems (Ulger, 2014). Creative thinking skill is a basic of science (Hadzigeorgiou1, 2012). Hence, it must be trained through learning, especially in science learning (Zubaidah, Fuad, Mahanal, & Suarsini, 2017).

Science teaching in Indonesia mostly focuses on memorizing the science concepts (Prayitno, Corebima, Susilo, Zubaidah, & Ramli, 2017). Students' ability to determine, manage, solve, self-control, and implement learning activities will also determine students' understanding on the concepts (Sholikhan, 2017). Students who do not understand the concept is an indication that they are unable to re-elaborate their previously-understood concepts (Kristiani, Ristanto, & Lisanti, 2020; Istiyani, Muchyidin, & Rahardjo, 2018). Moreover, the lack of understanding of concept evaluation demand is one of factors of low students' concept understanding (Sholikhan, 2017). Science concept understanding is an important skill to master the essence of science (Mariana & Praginda, 2009). Through science learning, students are required to understand basic components of science and technology and connect to daily life experiences outside the school (Gömleksiz, 2012).

Natural sciences are a science that relates to symptoms and things that are systematic, regularly compile, and generally accepted in the form of a collection of observation and experiment results (Sele, 2019). One of contents that contain a concept deemed as difficult by teachers and students is photosynthesis (Ulfa, Anggraeni, & Supriatno, 2017). Photosynthesis is a biochemical processes occurred in a plant that involves several enzymes. It is a process of formation of organic compounds in the form of glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) and oxygen (O<sub>2</sub>) from inorganic compounds of carbon dioxide (CO<sub>2</sub>) and water (H<sub>2</sub>O) that assists by light energy from autotrophic organism (Cambpell, 2014). The photosynthesis content basically invites students to understand a transformation process of an abstract energy, the capturing and utilization of light energy that will be kept in the form of chemical energy that occurs in chloroplast through various processes to form a starch and release oxygen (Supriatno, 2013).

Students' creative thinking in Indonesia is generally low due to the students that are not required to involve in thinking process during the learning activities (Nurhamidah, 2018). A research on creative thinking skills in light content on students of Grade VIII of SMP Xaverious Lubuklinggau City that uses thorough creative thinking observation that includes four creative thinking skill indicators found that the students achieved a less creative category (Arini & Asmila, 2017). A preliminary study in science learning found that creative thinking skills of students in SMP in Kediri, Indonesia is still low (Zubaidah et al, 2017). Based on creative thinking test results with score range of 0-100, the average total score in creative thinking indicator is 18.03. Score for each creative thinking indicator is also low. Creative thinking indicators along with score obtained are: (1) flexibility (18.75), (2) originality (12.05), (3) elaboration (16.28), and (4) fluency (15.90) (Fuad, Zubaidah, Mahanal, & Suarsini, 2015). Moreover, the students' concept understanding is also in low category. Based on research

results of Istiyani, Muchyidin, & Rahardjo, (2018) 24.1% are understand the concept, whereas 6.2% are guessing or have no self-confidence on the answer, 22.2% did not understand the concept, and 47.5% experience misconception. It is due to students who must receive learning that discuss concepts to be tested yet they have difficulty in abstracting the concept. There are various factors affecting the low achievement of the natural sciences (IPA) learning. First, teachers are not optimal in obtaining students' prior knowledge in teaching process and do not link concepts or topics to be taught to students' real world. Moreover, students receive less guidance to connect their knowledge and implement concept taught (Widiana & Jampel, 2016).

The profile of students' creative thinking skills and concept understanding is essential to create initial description on students' competences to overcome their learning difficulties. The research data can be utilized as a consideration to evaluate learning process, especially in IPA learning in students of all SMPN in Rasau Jaya Sub-district. The research aims to describe the profile of concept understanding and creative thinking of students of all SMPN in Rasau Jaya Sub-district, Kubu Raya Regency, West Kalimantan, Indonesia.

## METHODS

### Research Design

The research type used was descriptive research. It used quantitative approach, which is descriptively describing an event that becomes a center of attention and based on quantitative data (Yuliani, Dharmono, Naparin, & Zaini, 2018). It illustrated the result of creative thinking skills and concept understanding test given to students of grade VII in IPA learning, especially photosynthesis content in all SMP in Rasau Jaya Sub-district for academic year of 2019/2020.

### Population and Samples

The research population included 7<sup>th</sup> grade students in three SMPNs in Rasau Jaya Sub-district, Kuburaya Regency, West Kalimantan, Indonesia. Sampling technique employed was disproportionate stratified random sampling. The number of population was obtained according to the table (Sugiyono, 2016) of determination of number of samples from population with error rate of 1%, 5%, and 10%. Therefore, samples were determined by dividing the number of population by total population and multiply by the number of errors of 10%. The total population was 303 students and with error of 10% the number of samples taken was 143 students. The samples consisted of 90 students from SMPN 1 Rasau Jaya, 42 students from SMPN 2 Rasau Jaya, and 11 students from SMPN 3 Rasau Jaya. The calculation result is presented in Table 1.

**Table 1.**

Results of sample calculation with error of 10%

SMP	Population	Results of Sample from Error of 10%
1	192	91
2	88	41
3	23	11
Total	303	143

### Instrument

The research employed two types of instrument. Creative thinking skill measurement used essay and students' concept understanding test was in the form of four-tier diagnostic test. The test was in the form of essay test referring to creative thinking skill indicators from Munandar (Amtiningsih, Dwiastuti, & Sari, 2016). The Four-tier diagnostic test is a development from three-tier multiple choice diagnostic test (Zaleha, Samsudin, & Nugraha, 2017). The four-tier diagnostic test has several benefits, namely: (1) differentiate trust level of

an answer and reason chosen by students; thus, they could look deeper for their conceptual understanding strength, (2) diagnose misunderstanding experienced by students, (3) determine parts of content that requires more emphasizes, and (4) plan better learning to assist in reducing students' misunderstanding (Irsanti, Khaldun, & Hanum, 2017; Fariyani, Rusilowati, & Sugianto, 2015). The instruments had been validated and the validity test indicated that 8 of 11 questions in the essay test questions were valid, whereas 13 of 20 questions in the four-tier diagnostic test were valid. The reliability test results suggested that the coefficient of the four-tier diagnostic test question was 0.874 with category of very high, while the essay question was 0.687 with high category. Hence, both questions could be used as the research instruments. The essay test was prepared in accordance with creative thinking indicators based on photosynthesis content studied by 7<sup>th</sup> grade students. Examples of indicator and creative thinking test questions are presented in Table 2.

**Table 2.**  
Examples of indicator and creative thinking test questions in photosynthesis content

Creative Thinking Indicator	Question Indicator	Test Question
Fluency	Identify differences between light reaction and dark reaction	Name 3 differences of photosynthesis based on light reaction and dark reaction.
Flexibility	Identify an event that will occur if photosynthesis does not occur in plants	If photosynthesis does not occur in plants, what will happen to life on earth?
Originality	Identify source of light other than the sun that could make plants photosynthesize	If you do a photosynthesis experiment and the weather is cloudy, name sources of light other than the sun that could help the plants photosynthesize.
Elaboration	Create a concept map or chart in photosynthesis process stages	Photosynthesis is a process of making food molecules. There are several elements involve in the process. Create a concept map or chart in photosynthesis process stages!

A good diagnostic test should provide an accurate description on misconception experienced by students based on information on mistake made (Diani, Alfin, Anggraeni, Mustari, & Fujiani, 2019). The four-tier diagnostic test is a development of three-tier multiple choice test (Fariyani, Rusilowati, & Sugianto, 2015). The first stage consists of questions and answer choices as the common multiple-choice test. The second stage contains confidence level about the answers in the first stage. The third stage comprises relevant principles that justified response in the first stage. The fourth stage contain confidence level about answer in the third stage (Pujayanto, et.al, 2018). Example of indicators and concept understanding test questions are presented in Table 3.

**Table 3.**  
Examples of indicator and concept understanding test questions in photosynthesis content

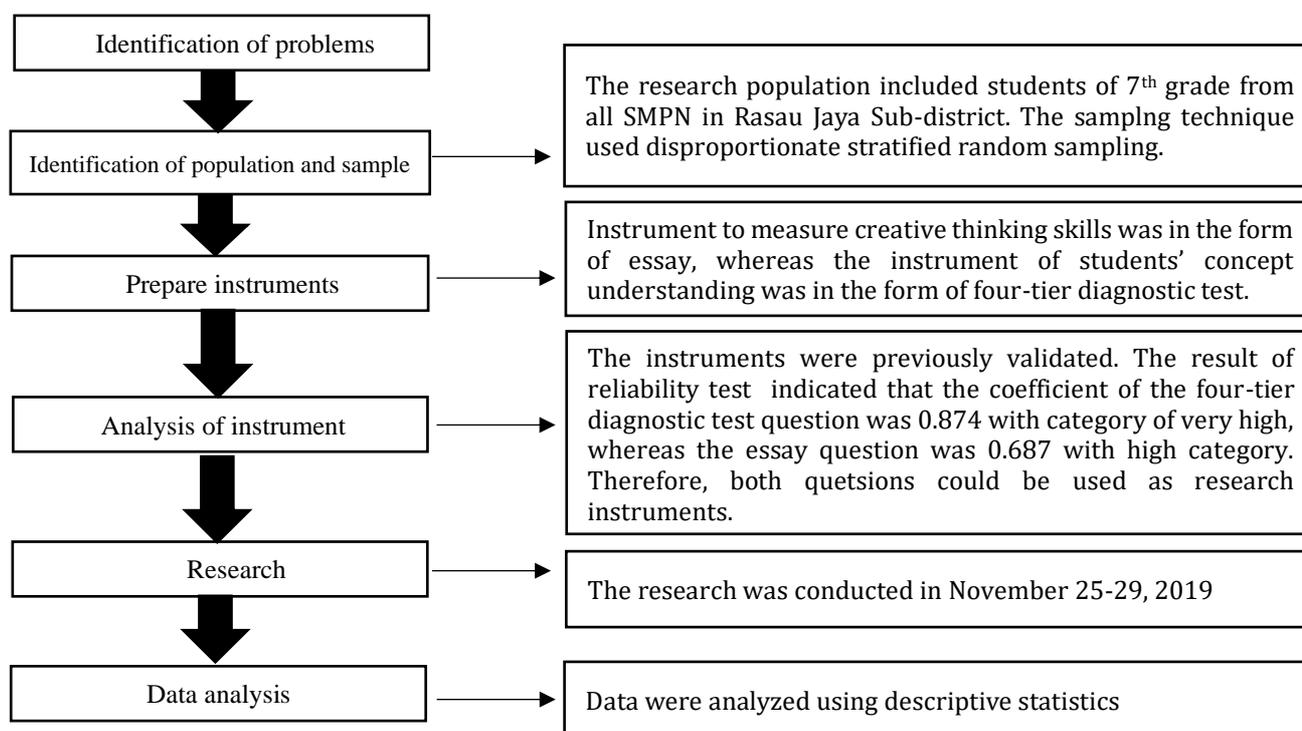
Indicator	Cognitive	Test question
Understand the chemical equation for photosynthesis	C1	2) Which of the following equation represents the whole process of photosynthesis is... a. glucose + oxygen + water $\xrightarrow[\text{Sunlight}]{\text{Chlorophyll}}$ carbon dioxide b. carbon dioxide + water $\longrightarrow$ glucose + oxygen

			<p>c. carbon dioxide + water <math>\longrightarrow</math> energy + glucose + oxygen</p> <p>d. glucose + oxygen <math>\longrightarrow</math> energy + carbon dioxide + water</p> <p>3) Are you sure of your answer ...</p> <p>b. Yes I'm sure</p> <p>c. No, I'm not sure</p> <p>3) Your reason...</p> <p>a. Glucose burnt by oxygen produce carbon dioxide and water</p> <p>b. Water with the help of light energy will trigger the first process in the photosynthesis and produce glucose (food) and oxygen</p> <p>c. Photosynthesis could occur without sunlight</p> <p>d. Solar energy is used to supply chemical energy. Energy captured by chlorophyll will be used to break down water molecules</p> <p>4) Are you sure with your answer ...</p> <p>a. Yes, I'm sure</p> <p>b. No, I'm not sure</p>
Determine plant organelles that capture light	C3	<p>1) Organelle in the plant that capture light is...</p> <p>a. chloroplast</p> <p>b. stroma</p> <p>c. carotene</p> <p>d. cytoplasm</p> <p>2) Are you sure with your answer...</p> <p>a. yes, I'm sure</p> <p>b. No, I'm not sure</p> <p>3) Your reason...</p> <p>a. plant organelle that capture light is chloroplast as it located in thylakoid membranes</p> <p>b. plant organelle that capture light is stroma since it contains certain compounds and enzymes</p> <p>c. plant organelle that capture light is carotene as it is an organic pigment that determine plant color</p> <p>d. plant organelle that capture light is cytoplasm since it contains organs to capture light.</p> <p>4) Are you sure with your answer...</p> <p>a. yes, I'm sure</p> <p>b. No, I'm not sure</p>	
Determine results of photosynthesis process in light reaction	C1	<p>1) Photosynthesis process in light reaction produces...</p> <p>a. carbohydrate</p> <p>b. oxygen (O<sub>2</sub>)</p> <p>c. water (H<sub>2</sub>O)</p> <p>d. ATP and NADPH</p> <p>2) Are you sure with your answer...</p> <p>a. Yes, I'm sure</p> <p>b. No, I'm not sure</p> <p>3) Your reason...</p> <p>a. Photosynthesis process is a process of carbohydrate formation</p> <p>b. Oxygen produced in the photosynthesis process is immediately released as a byproduct of photosynthesis</p>	

- c. Water is useful in the light reaction photosynthesis process
  - d. ATP and NADPH produced will be utilized to form glucose
- 4) Are you sure with your answer...
- a. Yes, I'm sure
  - b. No, I'm not sure

## Procedure

This research procedure was used to direct the research steps in problem raised. The research started with research population and sample determination. The next step was preparing creative thinking instrument with essay questions and concept understanding instrument with four-tier diagnostic test. Once the instruments completed, instrument validity and reliability test carried out. Instruments that met the validity and reliability criteria will be used in the research. The research implemented by conducting a test on creative thinking skill question test and concept understanding of 7<sup>th</sup> grade students in photosynthesis content. Following the test, the results were collected for analysis. Figure 1 illustrates the research procedure diagram.



**Figure 1.** Research Procedure

## Data Analysis Techniques

Data collection technique used in the research was in the form of students' creative thinking skill test. The test was an essay test and each question contained fluency, flexibility, originality, and elaboration aspects. As regard students' concept understanding test the four-tier diagnostic test form was used. The results of concept understanding test could identified students who experienced concept understanding (understand), partial understanding, misconception, and not understanding.

The data analysis used was descriptive statistics. The students' creative thinking test results were analyzed using percentage formula from (Purwanto, 2002) where scores obtained

by students are divided by maximum score and multiplied by 100%. Calculation of average students' creative thinking skills used (Sugiyono, 2012), which is by dividing total score of students' creative thinking (total score) by number of students. A conversion from percentage to qualitative category was a modification from (Ekawati & Sumaryanta, 2011) as presented in Table 4.

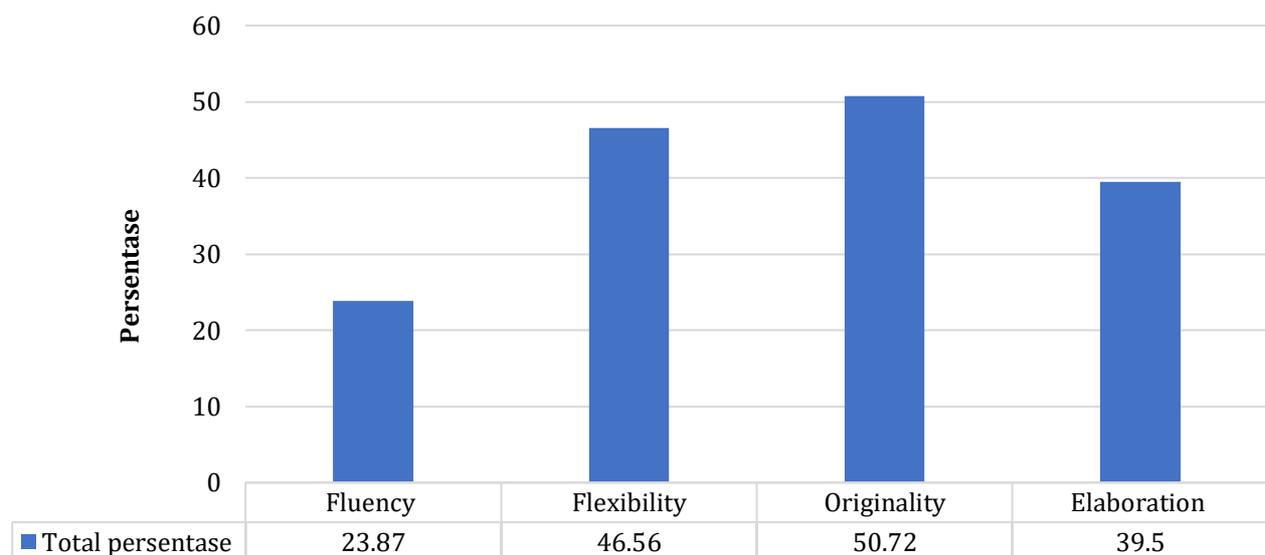
**Table 4.**  
Conversion of creative thinking skill percentage

No	Percentage obtained	Category
1	81% - 100%	Very creative
2	61% - 80%	Creative
3	41% - 60%	Fairly creative
4	21% - 40%	Less creative
5	0% - 20%	Not creative

## RESULT AND DISCUSSION

The research was conducted to analyze the initial profile of creative thinking skills of students in three SMPNs in Rasau Jaya Sub-district in IPA learning. Creative thinking skills aim to synthesize ideas, produce new ideas, and determine the effectiveness of the existing ideas (Sumarni & Kadarwati, 2020). In this research, students answered question developed according to the creative thinking aspects, namely: fluency, flexibility, originality, and elaboration (Nurhamidah, 2018).

The highest creative thinking percentage of SMPN students in Rasau Jaya Indonesia, in overall, was in the originality aspect of 50.72% with category of fairly creative and followed by Flexibility aspect of 46.56% with fairly creative category, Elaboration aspect of 39.5% with less creative category, and Fluency aspect of 23.87%. The overall creative thinking percentage could be seen in Figure 2. The originality aspect received higher score than fluency and flexibility aspects. It indicated that students had sensitivity and awareness on daily problems (Nurhamidah, 2018).

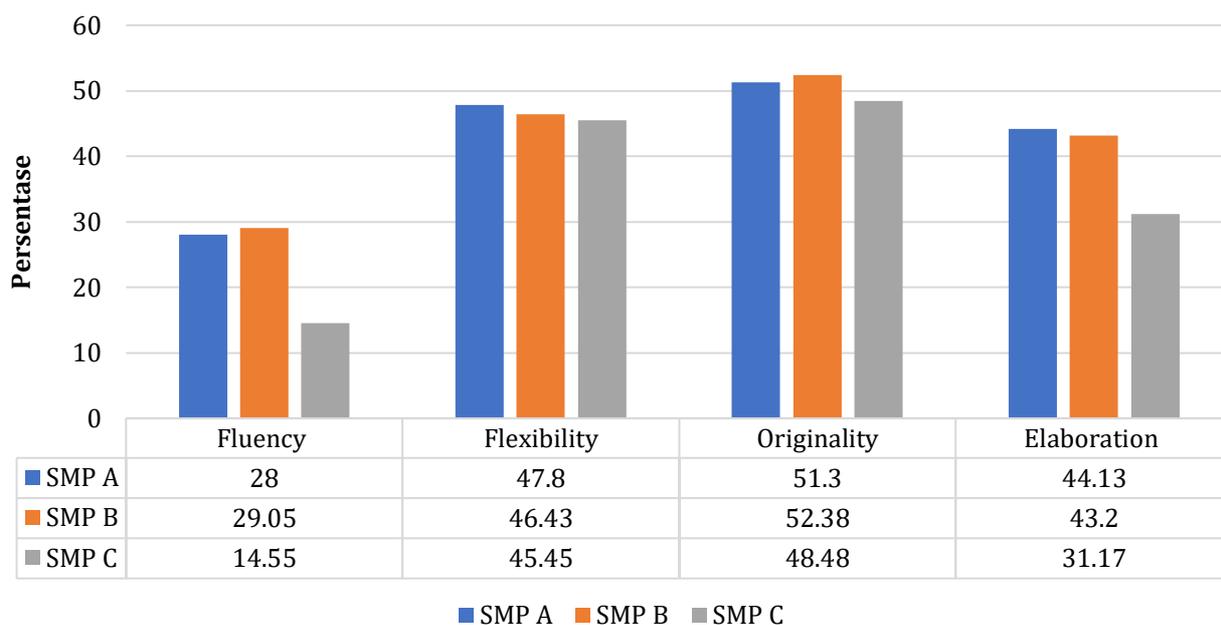


**Figure 2.** Percentage in creative thinking skill indicators of SMPN students in Rasau Jaya Sub-district, Indonesia.

The result of creative thinking skill test given to 7<sup>th</sup> grade students in photosynthesis content in SMPN in Rasau Jaya, Indonesia was varied. The highest creative thinking skill score

obtained by students of SMPN A Rasau Jaya was 81.82 and the lowest was 0 with average score of 42.97. The highest creative thinking skill score attained by students of SMPN B Rasau Jaya was 72.73 and the lowest was 13.64 with average score of 43.02. In SMPN C Rasau Jaya the highest score was 59.09 and the lowest score was 18.18 with average score of 34.71.

The SMPN A Rasau Jaya achieved the highest score in the originality aspect of 51.3% and followed by flexibility aspect of 47.8%, elaboration aspect of 44.13%, and fluency of 28%. The highest percentage in SMPN B Rasau Jaya was found in the originality aspect of 52.38%, followed by flexibility aspect of 46.43%, elaboration aspect of 43.2%, and fluency aspect of 29.05%. In the SMPN C the highest percentage attained was in originality aspect of 48.48% and followed by flexibility aspect of 45.45%, elaboration aspect of 31.17%, and fluency aspect of 14.55%. The percentage of students' creative thinking skills is illustrated in Figure 3.



**Figure 3.** Percentage of creative thinking skill indicators of SMPN students in Rasau Jaya Sub-district, Indonesia.

Originality is an ability to produce ideas or different ideas (Munandar, 2004). Originality aspect was an aspect with the highest percentage achieved by SMPNs in Rasau Jaya with fairly creative category. Question no. 5 presented a problem where students were asked to think of an idea and elaborate the idea using their knowledge. Most students gave short answer to the question, such as lamp, flashlight, and candle. It suggested that students had sensitivity and awareness to daily problems (Nurhamidah, 2018).

Flexibility indicates by students' ability to write several alternative answers that are logic and relevant to problems given related to text procedure from various different perspectives (Dariman, 2019). The flexibility aspect or think flexibly included in fairly creative category. Question No. 3 was about what will happen in life on earth if photosynthesis does not occur in plants. The flexibility students' answer in the question was life on earth will perish since photosynthesis in plants produces oxygen and glucose; therefore, no photosynthesis means no oxygen and glucose. Students who met the flexibility indicator referred to type of question asked based on strategies used in submitting problems. It means that students asked questions by modifying and adding information provided (Kontorovich, 2011).

Elaboration indicates by student behavior that able to explain several logical details in the existing ideas (Dariman, 2019). The elaboration aspect or think in detail was also in fairly

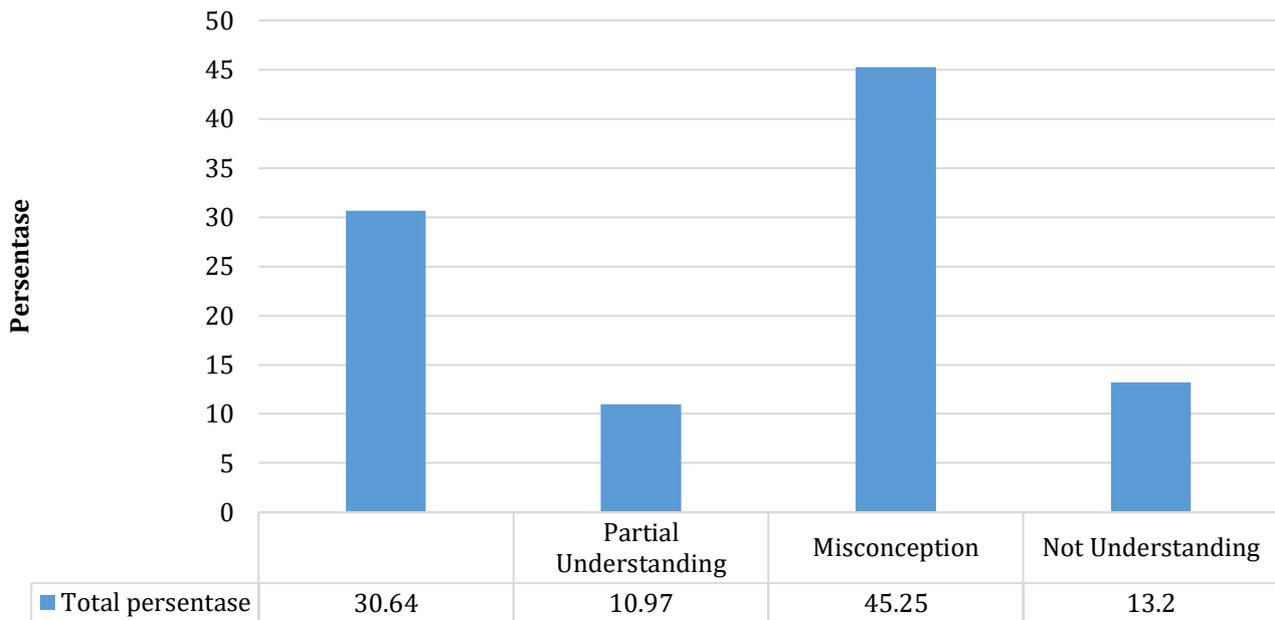
creative category. Some students were capable of elaborating questions given. In question no. 8 students were asked to create a concept map or chart on photosynthesis process stages. Students who could elaborate the photosynthesis stage chart correctly were in creative category in the elaboration indicator. Since students could gradually solve the problem they could learn to elaborate during problem solving and correct the answer by considering whether or not the answer is in accordance with the determined steps. As a consequence, students could possess good elaboration skill (Rindah, Dwiastuti, & Rinanto, 2019)

The fluency aspect or ability to think fluently shows by students' behavior that asks many questions, answers a number of questions, and fluent in conveying ideas (Munandar, 2004). The fluency aspect was in the lowest category in three SMPNs in Rasau Jaya, which was in less creative category; in fact SMPN C Rasau Jaya was in the not creative category. Most students were less capable of answering questions and conveying ideas. For example, in a question that asked students to differentiate light reaction to dark reaction most students were not fluent in distinguishing both reactions. The fluency indicator is a creative thinking aspect that is in the lowest level compared to flexibility and originality (Siswono, 2011).

Thinking skills include in the instruments to achieve educational goal of student ability to solve high level problems (Rahman, 2017). The difference in the score level could describe a less than optimum creative thinking skills (Sigit, et.al, 2019). It also indicates that students do not have creative thinking skills. The research results suggested that students' creative thinking skill in IPA learning was not maximal as there were low-percentage creative thinking aspects in the three tested schools. Referring to the preliminary study in science learning, students' creative thinking skills in SMPs in Kediri, Indonesia was still low (Zubaidah, et.al, 2017).

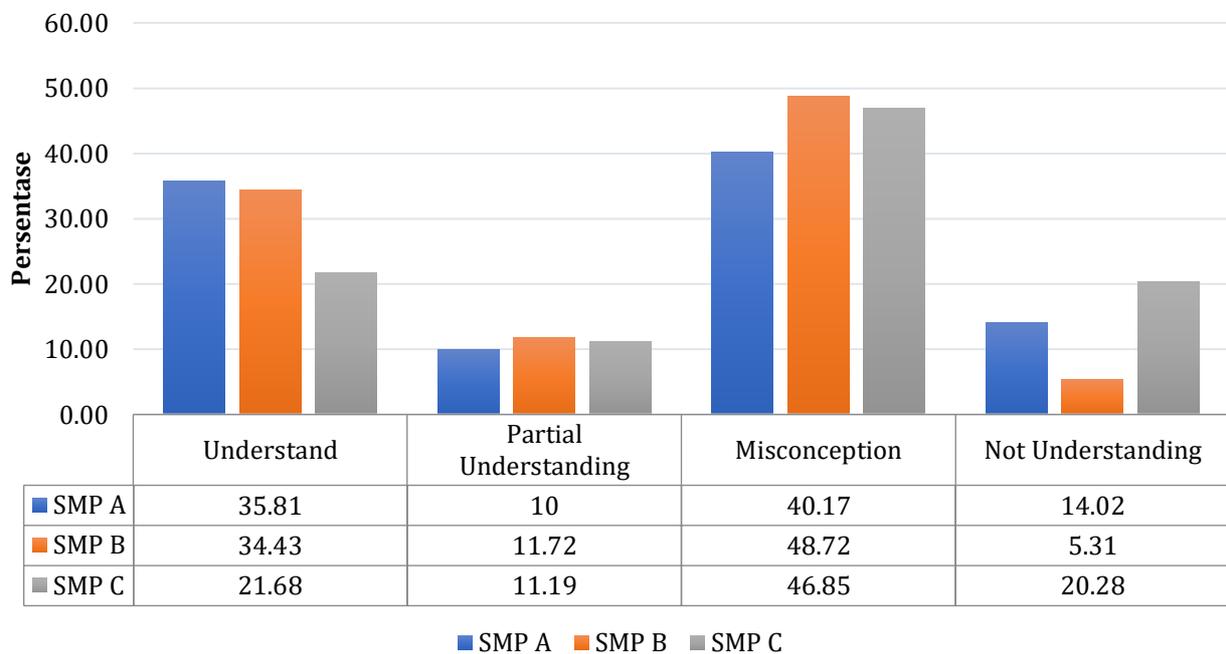
The cognitive observation results indicated that the percentage of students' creative thinking skill at SMPN A was slightly different to students at SMPN B; both schools, however, included in the fairly creative category. The creative thinking skill of students at SMP 3, on the other hand, was 34.71% or in the less creative category. The average score of students creative thinking skill in cycle 1 was generally in fair category; however, it had not achieve the success criteria set (Widiana & Jampel, 2016). Another research finding showed that most teachers deemed creative thinking as a basic competence to be developed in school level and should be applied in every knowledge domain and school subject (Daskolia, Dimos, & Kampylis, 2012). A study on creative thinking or creativity bears numerous limitations, as it is a multi-aspect phenomenon (Siswono, 2011). Based on observation it is likely due to students' habit that depends on their fellow group members during a practice; therefore, only students who have interest and are serious who will work on the test instruments. Moreover, it might be due to students' inabilities in terms of their unfamiliarity to student-centered learning, uncommon questions, less understanding on prerequisite contents, less creativity, and students' activities and involvement in the learning process (Sumarni & Kadarwati, 2020). The varied students' creative thinking skill requires a learning condition that involves learning experience so that creative thinking potential could develop. One effort to improve creative thinking skill is by creating a learning environment that involves students' real learning experience (Yusnaeni, Susilo, & Zubaidah, 2017). Freedom of expressing ideas and problem solving during a project could explore students' creative thinking (Suryandari, et.al, 2018). Through creative thinking skills, students could modify, reuse, or create an idea or new product (Rahardjanto, Husamah, & Fauzi, 2019).

Overall, the highest percentage of students' concept understanding in SMPN in Rasau Jaya, Indonesia was students experienced misconception of 45.25% and followed by understand aspect of 30.64%, not understanding aspect of 30.64%, and partial understanding aspect of 10.97%. The concept understanding percentage is depicted in [Figure 4](#).



**Figure 4.** Percentage of concept understanding of SMPN students in Rasau Jaya, Indonesia.

The highest percentage of students who understood the concept was found at SMPN A Rasau Jaya of 35.81%. The highest percentage of students with partial understanding was found at SMPN B Rasau Jaya of 11.72%. In terms of students with misconception, the highest percentage was found at SMPN B Rasau Jaya of 48.72%. The highest percentage of students who did not understand the concept was also found at SMPN B Rasau Jaya of 20.28%. The percentage of each school could be seen in [Figure 5](#).



**Figure 5.** Percentage of students' concept understanding at SMPN 1, 2 and 3 Rasau Jaya, Indonesia.

Several researchers opine that as students learn basic concept well, it will influence their future learning and that prior misconception sometimes prevents interpretation as well as acquisition of new knowledge and even misconception (Andersson, 1986). Based on

interpretation results, all students experienced higher misconception compared to other aspects. SMPN B Rasau Jaya experienced the highest percentage score at misconception and partial understanding aspects. SMPN A Rasau Jaya had the highest percentage score at understand aspect. Regarding the not understanding aspect, the highest percentage obtained by SMPN C Rasau Jaya. The highest misconception was for question no. 3, 4, 6, 8, and 11.

Students are said to have concept understanding if they could explain the concept or they could re-express anything that have been communicated to them (Kristiani et al, 2020; Istiyani et al., 2018; Anintia, Sadhu, & Annisa, 2017). Understand is a category where students could answer a question correctly, they are sure that the answer is correct with a correct reason, and they are sure with the reason. Question items no. 1, 5, 2, and 13 were questions with the most correct answer by students. Based on the question chart, the highest understand category was in question no 1 where 80% of the students of SMPNs in Rasau Jaya understood the concept of chemical equation of photosynthesis and they had high certainty level on the answer. They also provided reason for the answer that water with the help of light energy will trigger the first process in photosynthesis and produce glucose and oxygen.

Misconception is someone's conception that is inconsistent with knowledge recognized by the experts (Yunanda et al., 2019; Anintia et al., 2017). The misconception category is when students answer a question with a wrong answer and reason but they are certain that the reason is correct. Question items no 3, 4, 6, 8, and 11 had the highest misconception by students among the four students' understanding level category. According to the chart, the highest misconception was for question no. 8 where 58% of students experienced misconception in the indicators of photosynthesis experiment. The students incorrectly deemed water in the test tube reduce due to evaporation and provided wrong reason. The correct concept is that water in the test tube reduces because it is used for photosynthesis.

Partial understanding is that students' answer has incomplete conception. Students answer a question inconsistently. For example, students answer a question correctly but they are not sure with the answer; the reason, however, is correct and they are certain with the reason, or students answer a question incorrectly and they are not sure with the answer; the reason, however, is correct and they are sure with the reason. It indicates that students are aware of the concept but they are uncertain whether the concept is acceptable by the experts or not (Djamahar, Ristanto, Sartono, & Darmawan, 2020; Anintia et al., 2017). Question items that experienced the most partial understanding included no. 5, 2, and 9, 6. In question no. 5, most students experienced misconception and question items in this question received the highest partial understanding category. 20% of SMP students in Rasau Jaya, Indonesia experienced partial understanding in question no. 5. In the question, students gave incorrect answer, they were sure with the answer yet their reason was correct and they were certain with the reason. Based on the answers, students answered the question inconsistently; thus, students' answers experienced incomplete conception.

Not understanding is students who do not understand the concept. It means students cannot connect what they learn with how the knowledge will be used or utilized ((Noviyanti, Rusdi, & Ristanto, 2019; Anintia et al., 2017). Students answer a question yet they do not understand the question. For example, students answer the question incorrectly, they are sure about the answer with incorrect reason, and they are not sure with the reason or on the contrary, students answer the question, the reason is incorrect, and they are not sure with the answer as well as the reason. Question items that had the most not understanding category were no. 7, 6, and 4. 21% of the students of SMPNs in Rasau Jaya Indonesia did not understand the concept in question no. 7. Students' answers indicated that they did not understand about the photosynthesis experiment.

The highest percentage of the students' concept understanding test result was in students had misconception in working on the questions. Most students answered the

questions incorrectly yet they were sure with the answer. Hence, most students experienced misconception. It was due to the low students' ability to solve the questions that was related to the lack of understanding of the content and low motivation to learn. Students' misconception will disturb their acquisition of new knowledge (Fariyani, Rusilowati, & Sugianto, 2015). Students' misconception also related to a mismatch in the concept (Yunanda, Susilo, & Ghofur, 2019; Zulfia, Susilo, & Listyorini, 2019). The low scientific ability is likely related to misconception due to five factors, namely: students, teachers, textbooks, context, and teaching method (Suparno, 2005). Misconception assessment is crucial for effective science teaching (Peşman & Eryilmaz, 2010). If students have trouble in understanding one of the concepts, they will have difficulty in the related subject as well (Kauffman, 1988). Referring to the problem teachers, prior to learning activity, must motivate students to be actively involved in reading process and express their ideas so it will be easier for them to understand the studied content (Tetindra, Safilu, & Parakkasi, 2016). Wulandari (2016) found that contribution of creative thinking skill to concept understanding was 29.16% indicating that the higher the creative thinking skill the higher the concept understanding. Understanding of a concept in problem solving could trigger creative mindset in students.

## CONCLUSION

Data obtained gave evidence that science education learning knowledge among students of junior high school, especially concept understanding and creative thinking, was still low. Overall, the highest creative thinking percentage of students of SMPNs in Rasau Jaya Indonesia was in originality aspect of 50.72 % with fairly creative category. It followed by Flexibility aspect of 46.56 % with fairly creative category, Elaboration aspect of 39.5 % with less creative category, and Fluency aspect of 23.87 %. The highest percentage of concept understanding of students of SMPNs in Rasau Jaya, Indonesia was students who experienced misconception of 45.25% and followed by understand aspect of 30.64%, not understanding aspect of 13.2%, and partial understanding aspect of 10.97%. Students' creative thinking skill and concept understanding profile is important to create initial description on students' competences in coping with their learning difficulties. The research data could be utilized as a consideration for evaluating learning process, especially science education in students of SMPNs in Rasau Jaya sub-district. Further research could aim at finding an appropriate learning method; thus, students are motivated to achieve higher understanding and improve science education interest.

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