

ELEMENTARY STUDENTS' CREATIVE THINKING SKILLS IN SCIENCE IN THE MALUKU ISLANDS, INDONESIA

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Abstract. Learning that encourages the development of students' creative thinking needs to be maximized since the level of primary education, including in the disadvantaged, outermost, and frontier regions that is referred to 3T areas (*terdepan, terluar, tertinggal*) in Indonesia is still categorized as underdeveloped that requires special attention. The main objective of this research was to diagnose students' creative thinking skills for four components including fluency, flexibility, originality, and elaboration on students in the islands. The study was conducted on 161 students sitting in fourth grade from 6 elementary schools. The unique thing why this research was conducted because the research location was one of the Maluku Islands, which has abundant sea, air and land in terms of natural resources and is one of the areas that borders directly with Australia, so it can be predicted students' creative thinking skills will be good. However, the analysis results report that students' creative thinking skills were still very low and thus require comprehensive learning improvement to improve students' creative thinking skills. It was hoped that good creative thinking skills of students will support better regional development in the future.

Keywords: 3T areas, creative thinking skills, elementary students, island, Maluku Islands, science learning.

Introduction

Education today needs to prepare students to live tomorrow. Education in the 21st century seeks to produce superior generations who are ready and able to follow the dynamics of the times. Along with that, education is strived to create an advanced generation that has more various creative and competent professional thoughts than its predecessors. Students' creative thinking is one of the important goals of education (Yang et al., 2016; Lin & Ying-Wei Wu, 2016). This thinking is very useful to produce various products and is capable to overcome various complex social or environmental phenomena problems today (Hargrove,

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2013). Education aims to produce creative human beings (Fazylova & Rusol, 2016). Thus, access to education is not only aimed at developing the cognitive dimension for understanding concepts alone, but is able to make a major contribution to prepare life skills needed at this time. Science learning can be a way to build the creative thinking of elementary students. Creativity or what is known as creative thinking is intended to produce innovative ideas to construct an original product, in this case containing new concepts, new methods, and a new system (Chen et al., 2019).

According to Lynn Newton and Douglas Newton (2010) creative thinking is important to produce understanding, produce action plans, produce various alternative interpretations, understand an event, solve problems, and even avoid lies in solving problems. Creative thinking is an expression of divergent thinking. The divergent thinking can be assessed by four factors namely fluency (number of answers), flexibility (answer categories), originality (answer uniqueness) and elaboration (subtlety and ornamental answers). These four categories are the psychometric approach developed by Joy Paul Guilford as the father of world creativity (Allen & Lieberman, 2010). Chang et al. (2015) mentioned creative thinking tests that are in line with psychometric approaches have been developed namely Guilford (1950) and Torrance (1965).

Students need to have 7 important life skills known as 7C, namely: 1) critical thinking and problem solving, 2) communication, 3) collaboration, 4) computing and information and communications technology, 5) careers, 6) cross-cultural, and 7) creativity and innovation (Trilling & Fadel, 2009). The policy of curriculum change in Indonesia from the previous Kurikulum Tingkat Satuan Pendidikan (school-based curriculum) to 2013 curriculum has also been carried out by the national education ministry in order to prepare graduates to develop and be able to answer the challenges of the times. In the 2013 curriculum, learning at the primary level must develop 4C in the learning process, which includes: critical thinking, problem solving and collaboration, creative, and communication. The facts about curriculum changes in Indonesia are also based on the low Programme for International Student Assessment (PISA) results achieved by Indonesian students for many years. This indicates that learning has not contributed positively to the development of students' creative thinking skills (CTSs). The process of creative thinking can be developed through problem finding and problem solving, while the thinking strategies pursued by students in the framework of building creative thinking are: defining the problem, providing solutions/suggestions, finding criteria, identifying perspectives, choosing the best solutions, and entering into various different points of view (encountering different angles). In addition, it is also suggested several ways that can be used to develop CTSs for students by using various types of problems and stages of problem solving (Vidgor, 2018).

Facts prove that learning has not been done well, planned, and integrated to empower students' thinking abilities (Leal Filho et al., 2018). The results of science learning in the City of Pangkep Sulawesi Selatan, Indonesia revealed that the teacher still gave a detailed explanation in the learning of science. In other words, teachers tended to teach science through lectures to students, this happens because the efforts and plans of learning activities to develop students' high-level thinking skills have not been clearly described in the learning tools (Ismirawati et al., 2018). It was also found that students' understanding was tried to be explored by the teacher through question and answer and group discussion only. The same

learning conditions were also found in natural science learning in Ambon, Maluku. Science content is part of thematic learning, which refers to a scientific approach. Unfortunately, the learning designed by the teacher has not yet sought students' high-level thinking skills (Leasa & Corebima, 2017). These facts indicate that the design and implementation of learning, which develops students' thinking skills are still weak (Leasa et al., 2019).

Indonesian student learning outcomes, especially aspects of creativity are quite low. This is supported by the results of research (Florida et al., 2011) that Indonesia is still included in the low creativity index (0.037). Its place is in the rank 81 of 82 countries consisting of developed or developing countries. The first rank is occupied by Sweden with a creativity index of 0.923. Its value is quite far from Indonesia. Other studies have shown that of the 11 countries studied, Indonesia ranks 10th and the average ranking difference is 1, which is quite far from 13.3 points. The low creativity of Indonesian students is due to several factors such as curriculum, teacher teaching methods, strategies, models, learning methods used and student characteristics (Al-abdali & Al-Balushi, 2016). A study conducted at school as long as it has not been able to develop students' creative abilities (Khuziakmetov & Gorev, 2017).

Maluku Province is an Islands with thousands of islands, one of which is Aru Islands Regency (AIR), Indonesia. This district is classified as a region with underdeveloped category (3T). The district, which has been expanded since 2005, is Indonesia's outer gate bordering Australia. The Aru Islands bordering neighboring countries such as Papua New Guinea (PNG) and Australia, which are traversed by the Arafura Sea which is the largest producer of marine wealth, will naturally be geopolitical interest as an autonomous force from these countries. Indonesia, which is now learning from the existence of the archipelago as a national integration, needs to consider small islands as the foremost part of national sovereignty (Wellfelt & Djonler, 2019). The Aru Islands are surrounded by the Arafura Sea, which is an illegal fishing paradise with a fleet of ships operating in waters bordering PNG and Australia. Therefore, in the context of strengthening security stability, various security operations in Aru islands is always alerted. The AIR is also one of the areas in Maluku, known as the Disadvantaged, Frontier and Islands regions, in addition to the Southwest Maluku Regency and Western Southeast Maluku Regency (now the Tanimbar Islands Regency) (Kemkes.go.id, 2015).

Some research reports that inform students' creative thinking in learning mathematics include: (Puspitasari et al., 2019; Retnawati et al., 2018), in elementary science learning, among others: (Anazifa & Djukri, 2017; Subali et al., 2018). Currently, there is only a few research reports in Maluku Islands that inform about high-level thinking of elementary students (Schulz & FitzPatrick, 2016). The development of higher order thinking skills is difficult because teachers are still unfamiliar and overwhelmed in developing such learning. Based on the report, it is known that information about science learning that empowers students' high-level thinking skills is still very limited. Therefore, studies are needed that can provide information and data about high-level thinking for elementary students, including CTSs. This study aimed to diagnose students' CTSs for four main components including fluency, flexibility, originality, and elaboration on students in the Islands region.

1. The context of learning science in the Maluku Islands region

Indonesia is an archipelago, which has an impact on the lack of equitable development. The most numerous islands in Indonesia is in the Maluku Province, where the Aru Islands is one of the districts in Maluku which has many islands compared to other districts. Similarly, the equitable development in the Aru Islands is also not comparable with other cities in Indonesia. This was also felt in the education sector, which included 8 national education standards, among others: content standards, process standards, graduation standards, teacher and education staff standards, facilities and infrastructure standards, management standards, and assessment standards. Equitable distribution of the education sector, which is still not optimal, raises various kinds of education problems in the islands. The peak of all is the results of the PISA study that Indonesia's position is still lagging behind other countries in the world, such as in 2015 where Indonesia was ranked 62 out of 72 countries (Faisal & Martin, 2019).

The AIR is one of the areas located on the borders, islands or far from the capital, which is generally still underdeveloped. The backwardness of the islands in the education sector can be seen from various indicators such as teacher quality, availability of books, as well as other minimal facilities and infrastructure (Fenanlampir et al., 2019). The government had instructed that learning in elementary is thematic-integrated based using scientific learning approaches and striving for the development of 21st century life skills of elementary school students. Learning science in elementary schools has several objectives including: 1) enabling students to understand their natural world, 2) contributing to the development of responsible, sensitive and scientifically literate human activities, critically debating scientific issues and participating in ways that informative in democratic decision making processes, 3) it is very important to preserve, manage, develop and utilize natural resources, and 4) ensuring the survival of the local and global environment, and contribute to people who create and shape work opportunities (Rogan & Grayson, 2003).

In fact, the teacher-centered learning approach is still being carried out due to various obstacles and challenges in implementing learning according to curriculum demands. The challenging geographical range of the islands, the quality of teachers, including the incomplete science learning facilities and infrastructure, are still factors that constrain learning in such areas. As a result, learning is still done traditionally (Lemmer et al., 2020), which encourages the formation of misconceptions (Kaltakci-Gurel et al., 2017) and inert knowledge (Trench & Minervino, 2017). In addition, the learning environment has not been neatly organized and is directed as well as possible to encourage elementary students' creative thinking. The learning environment largely determines the development of students' creative thinking (Richardson & Mishra, 2018). The learning environment is very important to support creativity. Fun learning or excitement for students, togetherness and collaboration, learning conditions that value ideas, including mistakes are seen as important parts of the learning process supporting creativity (Chan & Yuen, 2014). Other activities are exploration with new media or technology, fantasy games, outdoor games, modeling, planning and design.

2. Method

The survey research was carried out to measure student performance in the islands bordering Australia. The survey was conducted to find out the extent of students' thinking skills. The survey was given in the form of a diagnostic question in the form of 8 questions that measured four basic components, namely fluency, flexibility, originality, and elaboration. From the answers of students, it could be seen the component parts where students were still experiencing difficulties and needed to improve concepts in good learning later. In addition to the 8 questions given, the next stage is to confirm students' answers in the form of simple interviews related to the questions given. This is done with the aim of reconfirming the results of students' answers that have been filled in the question sheet.

The study was conducted at several elementary schools in AIR. The school locations that were determined were 6 schools. It was assumed that education in district cities was far more advanced than in remote areas, so learning that led to the empowerment of higher order thinking skills was at least done compared to in remote areas. Another assumption was because schools in all regencies had implemented the 2013 curriculum, while in remote areas they had not fully used the curriculum. At each school, 20–25 students were involved so that the sample total was 161 students. The research was conducted in a high class, namely fourth grade elementary students.

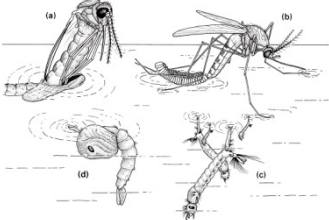
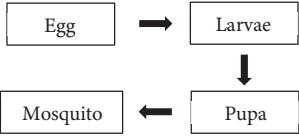

Content material developed in creative thinking instruments had previously been given or taught to students, so students were expected to answer various questions regarding CTSs well. The CTSs test instrument consisted of 2 main materials namely the life cycle material of animals and plant organs. This CTSs instrument contains 8 questions, which were representations of 4 indicators namely fluency, flexibility, originality, and elaboration. This question had been validated by two people who are experts in their fields, namely creative learning experts and experts in the field of biological science content. The two experts came from the Department of Biology from State University of Malang, Indonesia. This problem was developed from indicators of CTSs from Munandar (2002) who is an expert in creative learning psychology from the University of Indonesia, Indonesia. The question orientation consisted of material on animal cycles and plant organs.

Questions given to students in the form of 8 diagnostic questions include fluency, flexibility, originality, and elaboration. Each question provides several types of assessment based on students' answers. If students provided 3 or more alternative correct answers, they would be included in the very creative category. If they provided 2 alternative correct answers, they would be included in the creative category. Then, if they provided 1 alternative correct answers, they would be included into the quite creative category and if they only gave one answer, where there is an element of truth they would be included in the less creative category.

3. Results and discussion

The results of the CTSs analysis from the answers given indicate the diversity of creative thinking levels (see Table 1).

Table 1. Results of conversations with students for creative thinking skills (source: created by authors)

Indicator of creative thinking skills	Questions	Students' answers	Categories
Original	<p>(1) Consider the following mosquito cycle image.</p>  <p>Notes: (a) Adult male mosquito; (b) Adult female mosquito with eggs; (c) Larvae; (d) Pupa (Gullan, Cranston 2004). Rina practices mosquito breeding by observing the life cycle of mosquitoes. Design 4 things that must be done by Rina, in order to get adult mosquitoes in large quantities!</p>	<p>S161</p>  <p>S62 1. Mating; 2. Laying eggs and breeding.</p> <p>S91 1. Giving puddles; 2. Opening the empty barrel.</p> <p>S129 1. Rina must prepare enough water in several ponds or containers; 2. Rina makes the practice location rather dirty and dark; 3. The puddle is rather dirty.</p> <p>S89 1. Mating male and female mosquitoes; 2. Leaving puddle; 3. Open the water reservoirs; 4. Let the bathroom dirty.</p>	<p>False answer</p> <p>Less creative</p> <p>Quite creative</p> <p>Creative</p> <p>Very creative</p>
Fluency	<p>(2) Pay attention to the life cycle picture of the butterfly below.</p>  <p>The life cycle of a butterfly can benefit or disadvantage farmers. Make 3–4 hypotheses or temporary answers related to the development of the butterfly's life cycle to the development of plants or the existence of farmers! (Gullan, Cranston 2004).</p>	<p>S104 Butterflies lay eggs then become larvae, pupae, and mature.</p> <p>S60 Caterpillars (larvae) can harm all farmers.</p> <p>S130 1. Adult butterflies can help the pollination process; 2. When cocoon is very detrimental to farmers' crops.</p> <p>S54 1. Butterflies harm farmers when they are in the form of larvae/ caterpillars; 2. Larva is detrimental to farmers because larvae feed on foliage; 3. Butterflies benefit farmers when they grow up because they help plant openings.</p> <p>S51 1. Butterflies are very beneficial to farmers because butterflies help pollination of flowers; 2. Larva is detrimental to farmers because larvae feed on foliage; 3. The larvae benefits the farmer because it produces silk.</p>	<p>False answer</p> <p>Less creative</p> <p>Quite creative</p> <p>Creative</p> <p>Very creative</p>

Indicator of creative thinking skills	Questions	Students' answers	Categories
Flexibility	(5) Mr. Agus has several numbers of sago trees in his garden. Suddenly Mr. Agus wanted to make new land right on the growth of sago trees, so Mr. Agus had to cut down sago trees. After being cut down, Mr. Agus plans to utilize the sago plant. What do you think are the 3 parts or organs of the sago tree that can be used by Mr. Agus, and explain what they are used for?	S8 Root S32 1. Make a ship; 2. Making house walls and windows. S41 1. Sago leaves can be used to make the roof of a house; 2. We can eat the flesh. S81 1. The leaves are used for the roof of the house; 2. Sago stems can be made into sago flour; 3. Sago can also make papeda food. S139 1. Leaves: making the roof of the house, making sago tumang, crafts; 2. Tree trunks: the inside is taken to be made into sago flour so that it can be eaten; 3. Bark: used as firewood.	False answer Less creative Quite creative Creative Very creative
Elaboration	(8) Sago leaves can be used to make the roof of a house. Sort and write the steps (minimum 3) how to make a roof in detail and accordingly!	S20 1. Carpet, mat and roof. S87 1. Peel the sago leaves; 2. Cutting down bamboo trees; 3. Fold sago leaves. S20 1. Preparing sago leaves; 2. Processing sago leaves; 3. Drying the sago leaves. S57 1. Lifting sago leaves; 2. Sewing one by one sago leaves; 3. Drying sago leaves; 4. Ready to be used as the roof of the house. S131 1. Sago leaves are taken; 2. Preparing a bamboo; 3. Sago leaves are placed on a piece of bamboo, then tied or sewn using a rope.	False answer Less creative Quite creative Creative Very creative

Notes: S161 = The 161st student, S62 = The 62nd student, S92 = The 92nd student.

S129 = The 129th student, S89 = The 89th student, S104 = The 104th student, etc.

Table 2. The mean score of students’ creative thinking skills in each sample schools (source: created by authors)

Sample schools	Number of female	Number of male	Mean score of creative thinking skills	Levels
1	13	11	12.86	Less creative
2	15	10	33.26	Quite creative
3	11	7	45.22	Quite creative
4	16	8	15.49	Less creative
5	31	19	32.25	Quite creative
6	10	10	27.34	Quite creative
Totals	96	65	166.42	
Final average			27.7	Quite creative

Table 2 indicates that elementary students generally have the potential to develop creativity. This can be seen from the data which shows a number of 66.67% of students who reach the level of quite creative, while 33.33% are in the less creative category. The distribution of information about students’ CTs in answering questions based on indicators of students’ CTs is shown in Table 3.

Table 3. Distribution of creative thinking skills levels for elementary students on science concepts (source: created by authors)

Con-cepts	Indicators	Items	Average scores per concept	Average total score	False answer (%)	Less creative (%)	Quite creative (%)	Creative (%)	Very creative (%)
Animal cycle	Originality	1	23.6	29.3	44.7	17.4	19.3	13.7	5
	Fluency	2		16.8	59	18.6	17.4	4.35	0.6
	Fluency	3		31.2	47.2	8.7	18.6	23	2.5
	Flexibility	4		16.9	54.7	25.5	17.4	2.48	0
Plant organs	Flexibility	5	31.8	39.3	34.8	19.3	11.2	23.6	11
	Elaboration	6		31.7	56.5	6.83	6.21	14.3	16
	Originality	7		30.0	38.5	19.9	24.8	15.5	1.2
	Elaboration	8		26.2	53.4	14.9	12.4	11.2	8.1
Final average				27.7	48.6	16.4	15.9	13.5	5.6

Based on Table 3 it is known that the percentage of students who answer incorrectly is still more dominant in each question item. Based on the average total score, it was found that the fluency indicator was higher than the other indicators in the animal cycle concept, whereas in the plant organs concept the flexibility indicator was higher than the other indicators. Very creative achievement levels are found in indicators of originality in the concept of the animal cycle, and elaboration in the concept of plant organs. The weaknesses of students are most apparent when answering questions related to the concept of animal cycles, especially on indicators of fluency and flexibility. Overall, it can be concluded that the higher the level of students’ CTs, the lesser the percentage of students who achieve them.

4. The low creative thinking skills of elementary students in the Maluku Islands region

Information from Tables 1 and 2 show that the majority of students provided answers but not as expected. In general, students who answered incorrectly cannot grasp the intent of the question. Cognitive students tended to be at the level of remembering only, so that when they came into contact with a concept they had learned, students immediately repeated their memories about the concept, without properly understanding the purpose of the question. For example, when they were asked about the question, "Design 4 steps that Rina can take to produce mosquitoes in large quantities?". The concept formed in students' thinking about the life cycle of mosquitoes was the stages of mosquito development that started from eggs, larvae, pupae, and adult mosquitoes. The concept was indeed learned by students in learning science in elementary schools, where students usually memorize the concept. In addition, in the context of the questions given there had been information about the life cycle of mosquitoes through pictures that facilitated students' memories about it. As a result, students immediately wrote down the stages of the mosquito's life cycle without properly interpreting the purpose of the question. Students with limited or weak conceptions and approaches become less able to be creative or display creativity in certain learning domains (Reid & Petocz, 2004).

Before entering the world of education, a child develops each theory about scientific phenomena he encounters in everyday life, or what is known as conception. Science learning aims to form scientific concepts that are internalized in the cognitive structure of students, through the process of assimilation and accommodation of knowledge. It is hoped that both processes will encourage the formation of students' conceptual changes or scientific conceptions, which are different from previous conceptions. If the new knowledge that comes in accordance with the initial knowledge of students, the initial knowledge is developed through assimilation. Through assimilation students use the concepts they already have to deal with new concepts. If the new knowledge that comes in contradicts the initial knowledge, then students change the concept through accommodation. The accommodation process will trigger the formation of conceptual changes (Stasiulis, 2016).

The difficulty of students in answering basic science questions to identify CTSs is that students do not understand the keywords from the context of the problem, students are still difficult to find key information in the problem. This weakness causes students to fail in finding problems that need to be solved with creative solutions. Creative ideas that are expected to appear, apparently not yet visible. Creative thinking starts from the ability of students to find problems, not only focused on the ability to solve problems. If the problem finding process has become part of students' creative thinking, then it will be very easy to do the gathering of facts, sorting the facts, and genius in solving problems (Martz et al., 2017). The process is then matured through the making and structuring of ideas which are the basic conceptual concepts of CTSs. This opinion proves that students must be actively involved in the learning process. The fact that shows the lack of concept understanding, so it fails in analyzing the context of the questions given proves that student participation in learning is still low. Participation is meant, among others, through reading, writing, practicum activities,

discussions with friends and class discussions, as well as summarizing (Adams Ellis, 2016). This negligence triggers more students to make wild predictions or answer carelessly so that answers do not match the purpose of the question (Hadi et al., 2018).

The information also revealed that students failed in answering questions, where it was found that the students' answers column looked blank or did not write any answers at all. One reason that can explain this is that students were less accustomed to reading the contextual problems described in a few sentences, in other words that students are still not trained to read as much and as deeply as possible to find useful and essential information (Ahmad Alhassora et al., 2017). This shows the low skill of reading scientific concepts well.

Students who are less creative are generally only able to give one idea, even though the solution is not very clear. In the first question about the life cycle of mosquitoes, it appears that students have shown an effort in answering. Generally, their answers include mating mosquitoes, opening empty barrels and making the dirty water environment. Students assume that the process of mosquitoes breeding was preceded by marital events, although it was not stated that mating involves male and female individuals. Students also assumed that opening an empty barrel gave an opportunity and space for adult mosquitoes to lay eggs. Mosquito eggs need appropriate temperature and humidity to develop, because they affect the development and hatching of eggs. At temperatures between 23 °C–27 °C, the eggs will hatch for one to two days after contacting with water (Ebrahimi et al., 2014).

Likewise, the question number 2 was related to the development of the life cycle of a butterfly to the existence of farmers and the development of plants. Students with low levels of CTSs had several answers including: butterflies benefit plants, or larvae harm farmers. These answers indicated that students had not been able to provide clear reasons for the proposed hypothesis. Students could only determine the losses or benefits experienced by farmers, but not accompanied by clear reasons. This happens because, students' understanding was still not complete or holistic, where students still store information in pieces. In addition, the learning experience formed has not yet reached the achievement of that information. This condition is known by Brown (2014) as an intuitive fragment view of the elements of knowledge (intuitive fragments of knowledge elements) which perceives the condition of students in the early stages of learning. Where in the system, elements of student knowledge are still small and weakly structured, which arise from observations and experiences in everyday life. Although students knowledge is fragmented, productive resources in the element of students' intuitive knowledge can serve as a conceptual seed to develop the concepts of learning science (Lemmer et al., 2020).

The data on CTSs summarized in Tables 1 and 2 show that students temporarily develop from a less creative level to be quite creative. In other words, students' CTSs are still low. However, students have great potential to develop creative thinking. Students who are quite creative have been able to express one idea correctly and logically, according to the purpose of the question. The rest of the ideas given to the problem given, where the ideas are original, unique, and logical, then students are considered to have CTSs. Despite the importance of creativity in science and science education, science teachers' perceptions of creativity and teaching for creativity are rarely discussed. The teacher is important for shaping student learning experiences, and understanding science from the aspect of conception of creativity,

hence it is an important first step to promote creativity in science classes. This is following the opinion (Batlolona et al., 2019) that teachers play an important role in developing student creativity.

Teachers need to have pedagogical abilities to design learning including tasks that can challenge students to think creatively (Hoth et al., 2016). The learning design is then implemented and needs to be evaluated regularly. The previous research by Diezmann and Watters (2000, 2002) found that math teachers in elementary schools had difficulty in formulating questions related to homework that challenged students to think creatively. Professional services provided by teachers in learning that lead to the development of CTSs are not only related to pedagogical competencies, namely how to develop learning that helps students think creatively, but also professional competence. This competency is related to the content of teaching materials, where teachers need to comprehensively master the teaching material and be able to package it in designing questions that indicate CTSs. Thus, the competence of elementary school teachers should be improved in developing science learning oriented towards empowering 21st century life skills including CTSs. Therefore, efforts to develop students' creative thinking since elementary school are very much determined by the elementary school teachers themselves. Therefore, serious efforts are needed by the government, education authorities, higher education institutions that produce teachers, and related stakeholders to support improving teacher professionalism, especially in pedagogical and professional competencies.

5. Indicator of creative thinking skills levels of students in the Maluku Islands region

Based on the information in Table 3 it is known that the percentage of students who answer incorrectly is still more dominant in each item item. Based on the average total score, it was found that the fluency indicator (No. 3) was higher than the other indicators in the concept of the animal cycle, while in the concept of plant organs the flexibility indicator was higher than other indicators. Very creative achievement levels were found in indicators of originality in the concept of the animal cycle, and elaboration in the concept of plant organs. The weakness of students was most apparent when answering questions related to the concept of animal cycles, especially in indicators of fluency (No. 2) and flexibility (No. 4). Overall, it can be concluded that the higher the level of students' CTSs, the lesser the percentage of students who achieve them.

The research data in Table 3 shows the level of fluency in students is still weak compared to other indicators of CTSs. Fluency is the ability to produce valid ideas. The characteristics of the fluency questions in numbers 2 and 3 were somewhat different, where problem number 2 was only related to the life cycle of a butterfly, while number 3 relates not only to the life cycle of a butterfly but also to food webs involving caterpillars (one of the life cycle phase of a butterfly). Students more easily read diagrams of events in food webs, compared to making hypotheses. The majority of students have difficulty organizing data collected effectively and fail to coordinate hypotheses with evidence (Valanides et al., 2014). The results

of the study Bielik and Yarden (2016) prove that most students tend to act as experimenters in an inquiry. Based on the strategies used in a study or investigation, students are grouped into theorists and experimenters. Theorists prefer to formulate generalizations even though they are not yet accompanied by adequate evidence, while experimenters tend to conduct experiments to prove the hypotheses developed. Thus, if students are less creative in formulating a hypothesis, it can be predicted that they are more theoretic. These characters, might have formed due to the weakness of the investigation activities carried out by students and teachers in learning. In fact, the questions raised in this test are very contextual.

An indicator of strong CTSs is flexibility. Flexibility is the ability to produce various kinds of ideas from different perspectives. Scientific inquiry through imaginative and divergent thinking processes helps in developing students' CTSs in science. The question number 5 character that represents the indicator of flexibility is very contextual in the daily lives of students. Students already have learning experiences inside and outside the classroom related to the concept, because the object used is a sago plant that is found alive and spread in various regions in Maluku. The high achievement of flexibility is due to students using various approaches in developing ideas and complex levels of student knowledge (Santi et al., 2018).

One approach that students use in learning science in elementary schools is contextual. The context that is relevant to learning can be seen from the perspective of the curriculum and the teacher or from the perspective of students, which illustrates how the knowledge is taught or by the way students learn that knowledge. The scientific knowledge taught can be divided into theoretical and experimental components, at a simpler level it can be a logical and practical component. Science learning encourages students to practice directly, thereby helping students build understanding of true science concepts, followed by investigations to prove scientific truth in such learning. In this approach, students are trained to do practical work to help them answer previously uncommon questions and to explain theory by building experiments in order to test hypotheses (Klassen, 2006).

Conclusions

In conclusion, CTSs in science learning for elementary students in the Maluku archipelago are still low or at a quite creative level with an average score of 27.7. This shows that students have the potential to develop CTSs in science learning if they are supported by good teacher teaching quality through increasing teacher pedagogical and professional competence. It was also found that the fluency indicator was higher than other indicators on the concept of the animal cycle, while on the concept of plant organs the flexibility indicator was higher than other indicators. This means that students' mastery of concepts in more depth helps improve their CTSs. Thus, the quality of science teachers in the archipelagic region needs serious attention from the government, including the education office in educational personnel-producing institutions, in addition to the need for provision and improvement of infrastructure that supports the climate of science learning in developing creative thinking of elementary school students.

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