The Learning Toll of Integrated Science Bases Controversy: Students' Views

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Abstract. This study aims to determine respondents' views on controversial-based integrated science learning tools. This research is a survey method involving 28 students. The collected data is processed using descriptive statistics. Conclusion: There are 13 points of respondents' views on controversial-based integrated science learning tools with percentages, namely: (1) unique and creative teaching materials (27 people or 96.4350), (2) the content is easy to understand such as reading short stories (20 people or 71.43%), (3) fun / pleasant to read like short stories (24 people or 85.72%), (4) teaching materials open the mind (20 people or 71.43%), (5) the title of the material makes students curious (19 people or 67.86%), (6) the material in the teaching material seems to be human so that it is interesting to read it (22 people or 78.57%), (7) the teaching material can increase student creativity (20 people or 71.43%), (8) the title of the material attracts the attention of students (25 people or 89.29%), (9) the content of the material is interesting to learn (23 people or 82.14%), (10) can bring up students' creative ideas (24 people or 85.72%), (11) the teaching materials are interesting not boring (26 people or 92.86%), (12) teaching materials can increase students' imagination (22 people or 78.57%), and (13) teaching materials can improve students' thinking skills (25 people or 89.29%).

Keywords: Controversies, Learning Tools, Student Views

1 Introduction

Integrated science learning is the latest science learning icon and recommendation in the national curriculum at all levels of education (Belbase, at.al., 2022; Yu& Jen, 2020 and Tretter, at. Al., 2019). Trianto (2007) said that integrated learning is essentially learning that empowers learners both individually and in groups actively to explore, explore, and discover concepts and principles holistically and authentically. Science as a subject must be taught as a whole or unity, not separately, as Physics, Chemistry, and Biology as they have been so far (Prasanna, 2022; Sulaeman, Putra &; Kumano, 2022 and Kostøl, Boe &; Skår, 2023). Facts in the field show that science learning has so far entered various levels of education generally has not been integrated (Russell &; Martin, 2023; Kalogiannakis, Papadakis &; Zourmpakis, 2021 and Ramadhan, Sukma &; Indriyani, 2019).

The continuous learning process still shows the subjects of Physics, Chemistry, and Biology. This happens for various reasons, including the absence of a representative integrated science learning tool. Learning tools play an important role in integrated

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learning. Learning tools are information, tools and texts needed by teachers to plan and review the implementation of learning (Leal. At.al., 2019). The creation of integrated science learning tools begins with the integration of Core Competencies of several science subjects. Next, a map of related topics is created. As much as possible each topic is studied from the point of view of Physics, Chemistry, and Biology. Thus, the discussion of science topics is truly holistic.

Bailey &; Lee, (2020). said that learning tools are all forms of tools used to assist teachers / instructors in carrying out learning activities. Meanwhile, according to Shahid, at.al. (2019), learning tools are all forms of tools, information, tools and texts used to assist teachers / instructors in carrying out teaching and learning activities. The tool in question can be a written tool or an unwritten tool (Muhaimin, 2008). Sungkono (2009) states that learning devices are Learning Tools or Devices that are arranged completely and systematically, arranged in such a way as to facilitate students to learn. The learning tools are also unique and specific, consisting of knowledge, skills, and attitudes that students must learn in order to achieve the specified Competency Standards. Majid (2009) states that learning tools can help students to learn a competency or basic competency systematically and caustically so that they are able to master all competencies as a whole and integrated. Sholahuddin (2011) stated that learning tools are used to assist teachers / instructors in carrying out teaching and learning activities in the classroom, both in the form of written tools such as hand outs, books, modules, student worksheets, brochures, wallcharts, and unwritten tools such as video / film, VCD, radio, tapes, audio CDs, photos, images, computer-based interactive CDs and the internet.

Learning tools are an important part of providing education. Through learning tools, lecturers will find it easier to carry out learning and students will be more helped and easier to learn. Learning devices can be made in various forms according to the needs and characteristics of the learning devices to be presented. Learning tools are prepared with the hope that they can provide benefits for all parties interested in the development of learning tools, such as principals / rectors, teachers / lecturers, school supervisors / quality assurance and others.

Many benefits can be obtained when a teacher or lecturer develops his own learning tools; first, Tools are obtained according to the learning needs of learners; second, no longer rely on textbooks that are sometimes difficult to obtain; third, learning tools are rich because they are developed using various references; fourth, increase the wealth of knowledge and experience of teachers or lecturers in writing learning tools; Fifth, learning tools will be able to build effective learning communication between teachers / lecturers and students because students will feel more trust in teachers or teacher. With the availability of various learning tools, learners will benefit so that learning activities become more interesting. Students will have more opportunities to learn independently and reduce dependence on the presence of teachers orteaching lecturer. According to Abdul Majid, teaching tools are structured with the objectives: helping students learn something, providing various types of learning tools, making it easier for teachers to carry out learning, and making learning activities interesting.

Of the ten combined learning models (types) Fogarty (1991), there are four types that have the potential to be applied in combining science learning tools or creating

integrated science devices, namely: connected, webbed, integrated, and shared models/types. Connected models/types provide a close-up look at details and interconnections within a single discipline. This model connects one topic, one skill, and one concept with the next; Connect work one day or one idea to the next. The key to this model is to connect ideas within disciplines, rather than assuming that students automatically create those ideas themselves. For example, teachers will link geological units with astronomical units by emphasizing the evolutionary nature of each. Teachers help students make connections by explicitly making connections between subjects. Webbed model, this view covers many different disciplines at once. Webbed curricula usually use a single theme to integrate subject matter. The team of teachers will choose a theme and all subjects should relate to a common theme. For example, if the theme is invention then science can study simple machines, reading and writing can focus on inventors in language arts, designing and making tools in the field of science.

. Integrated Model, presents interdisciplinary topics that rearrange overlapping topics and give rise to patterns and designs. A shared model, this view through binoculars brings together two disciplines into one focused picture. This model uses overlapping concepts. Teachers must plan together in order to teach two disciplines related to each other. For example, a literature teacher and history teacher might choose The American Dream concept as the organizer of a collection of short stories by an American author. Literature teachers and history teachers can work together to show what students have in common.

The integration technique carried out in this study is a technique adopted from the four techniques proposed by Fogarty above. The technique is based on the principle that in discussing a scientific topic, the topic is always studied using the fields of physics, chemistry, and biology. That is, we discuss a scientific topic by always looking at the topic from 3 points of view, namely the point of view of Physics, the point of view of Chemistry, and the point of view of Biology.

The controversy strategy is a strategy that can encourage students to think critically and creatively in science learning. In this strategy, they are involved in exploring scientific controversies such as academic conflicts that arise when their opinions and ideas are not in line with each other (Supriyono Kus, 2003). So that this strategy is increasingly boosted accompanied by controversial tools as well. The controversial science learning tools built on the Tool contain themes or topics that are made as if they contain controversy. Through this controversy-based subject matter comes a higher-order thought process as students analyze their point of view and look for evidence to support their arguments against the topic discussed. Facts and information are analyzed for debate. Higher order thinking (critical and creative thinking) is reflected in a number of ways of resolving controversial issues.

Higher order thinking will be easily realized in a learning environment that directly gives prospective teachers the opportunity to think openly and flexibly without fear, coercion or shame. For example, a defined learning situation should facilitate discussion, encouraging people to come up with original ideas or ideas. To instill the encouragement of higher-order thinking in learning, it is necessary to pay attention to aspects (1) developing high trust and minimizing fear; (2) encourage free communication; (3) imposing individual goals and restrictions on assessment by the

teaching department to Carin & Sund (1995) on participants; and (4) the control is not very strict.

Higher order thinking can happen intentionally and unintentionally (suddenly). Higher order thinking can happen inadvertently despite not using certain strategies, such as opportunities that cause us to think about things from different points of view and then we find a favorable change. Other changes can occur slowly due to the use of intellectual development and mere logical thinking. If you use higher-order thinking inadvertently or the development of logic, it will take a long time to produce progress and improvement. Given the rapid development of world life, it is not very supportive. It's different with deliberate higher-order thinking. Critical thinking can be intentionally developed by using certain strategies to develop new ideas. The strategy leads to the incorporation of ideas to create new ideas and processes. The Learning Strategy controversy is one strategy that can be used insideorder To develop the ability of critical and creative thinking skills can grow rapidly by using controversial learning strategies because such learning strategies are able to facilitate almost all prospective science teachers to learn. Ability, namely the ability to develop existing knowledge, the ability to predict limited information, the ability to formulate problems, the ability to develop hypotheses and test them, and the ability to see information from various points of view.

Johnson (2002), Krulik and Rudnick (1996) state that higher-order thinking is divided into two types, namely critical thinking and creative thinking. Critical thinking is an organized process that involves mental activities such as problem solving, decision making, assumption analysis, and science inquiry. Krulik and Rudnick (1996) argue that critical thinking is the ability to solve problems faced by a person. In order to solve problems well, a person is required to have the ability to analyze, synthesize, evaluate, generalize, compare, conclude, classify information, conclude, and make decisions. Creative thinking is the basic use of the thought process to develop or find original, original, constructive ideas or results related to views, concepts, whose emphasis is on aspects of intuitive and rational thinking especially in the use of information and tools to bring up or explain. with the original perspective of the thinkers. Parkin (1995) suggests creative thinking is the activity of thinking to produce something creative and original. Baer (1993) argues, creative thinking is a synonym of divergent thinking. There are four indicators of divergent thinking, namely fluence, flexibility (the ability to produce varied ideas), originality (the ability to generate new ideas or ideas that have not existed before) and elaboration (the ability to develop or add ideas so as to produce detailed or detailed ideas). Baer further suggests that a person's creativity is shown in many ways, such as thinking habits, attitudes, personality or personality, or problem-solving abilities.

Marzano, et al. (Priyatni, 2021) stated 5 aspects of creative thinking, namely: First, creativity is closely related to desire and effort. To produce something creative requires effort. Second, creativity produces something different from what already exists. Creative students seek to discover something new and provide alternatives to something that does not yet exist. Creative thinkers are never satisfied with what has been or has been invented before. They always want to find something better and more efficient. Third, more creativity requires internal evaluation than external. Creative thinkers must

believe in predetermined standards. Fourth, creativity includes unlimited ideas. Creative thinkers must be able to see a problem from various aspects (points of view) and come up with new and appropriate solutions. Fifth, creativity often appears when doing something, such as Mendeleyev discovering the periodic arrangement of elements at the time of dreaming, and Arcimedes discovering his law while bathing.

According to Rothenberg and Hausmen, some experts have different opinions about creativity, but there are similarities: creativity relates to something new and valuable; creativity covers all aspects of life including mathematics; The ability of creativity is different from the ability of intelligence, meaning that although high intelligence is not necessarily creative and vice versa and everyone has the potential to be creative if they have a spontaneous and open nature. According to Stenberg and Lubart based on the creativity investment theory they developed that there are six attributes of creativity: intelligence, knowledge, motivation, encouraging environment, accuracy of way or style of thinking), and accuracy of people (appropriate personality).

According to Fisher's Sukesi, Emzir, & Akhadiyah (2019), creativity is a person's ability and attitude to create a new product. Meanwhile, according to Evans (2002), creativity is the ability to find new connections, the ability to see things from new angles, and the ability to form combinations of things. Many concepts have in mind. Creativity is not something that does not exist, but creativity is the ability to generate new ideas by combining, making changes, or applying existing ideas in various fields (Harris, 1998). Creativity does not come from its nature but rather from nurture, and the development of talented children creativity should be the goal of nurturing and education (Kim, K2019). Kaufman & Glăveanu (2019), say that:

Creativity is such a broad topic that trying to capture classical, contemporary, and cutting-edge theories in one chapter seems foolish. Like love or happiness, creativity is everywhere and nowhere in academia. There is a reasonable consensus on the definition of creativity, which is that creativity is something new and task-appropriate. There are many possible additional components to this definition, such as high quality, surprise, aesthetics, authenticity, and the creation of a product. In addition, there is the question of what exactly is meant by a theory. Some areas of creativity are filled with effects, studies, and patterns. Sometimes this accumulates into a consistent pattern; Other topics are more prone to debate. The absence of a dominant theory does not mean that a field becomes barren. Similarly, there are many theories that exist as ways to explain how creativity relates to other constructs. This chapter discusses interpretations of how creativity theory answers a variety of core questions, from the underlying structure of creativity, its prerequisites and drivers, to how one creates alone and together, and what makes creative work.

From the above opinion, it can be interpreted that creative is the activity of thinking to bring out creativity in a person, or thinking to produce something new for him. Creative in thinking can be said to be creative thinking (Syahrin &; PRIYATNI, 2019). (Gafour &; Gafour (2021) define specifically, creative thinking is the process that humans use when generating something new, an idea. It is an amalgamation of ideas that have never been combined before. LTSIN (2021) states that creative thinking is a process (not a result) to produce new ideas and these ideas are a combination of ideas that have been put together before. The sensitivity of creative thinking can be measured by

predetermined expert indicators, according to Torrance. According to Torrance's creative thinking, ability is divided into three things, namely: (1) fluency (darkness), which is generating many ideas in various categories, fields, (2) originality, which has new ideas solving problems, and (3). Elaboration, that is, the ability to solve problems in detail. While Guilfordin Satriawan, Liliasari, &; Setiawan (2019) mention five Indicators of creative thinking are: (1). Sensitivity: the ability to detect, recognize, and understand and respond to a statement, situation, or problem; (2). fluency: the ability to generate many ideas; (3). flexibility: the ability to propose various solutions or approaches to problems; (4). originality: the ability to crack jokes in original, non-cliché, and rarely given by most students; and (5). Elaboration: the ability to add a situation or problem so that it becomes complete, and elaborate in detail, in which there are tables, graphs, figures, models and words. Increasing the attractiveness and thinking ability of learners, learning tools are designed in a "controversy" model. The model was developed by Sudarto and Tawil (2019) and the learning tool is called "controversy-based integrated science learning tool". According to Sudarto and Tawil (2019), the characteristics of the learning tools they developed are: learning devices contain controversial titles, learning devices are arranged in a continuous, integrated, together, and learning tools are arranged with a principle that physics, chemistry, and biology materials are always involved in the preparation of these learning materials. This learning tool was developed with the main aim to improve students' critical and creative thinking skills and make students happy and fun in learning science courses.

Before this learning tool is widely used, it would be nice if its application is tested and see the views of respondents on the teaching material. Therefore, this research needs to be done. So, the main proposal of this study is to find out the views of respondents about controversial-based integrated science learning tools in their implementation.

2 Methods

The research method used in this study is the survey method. The survey method is a research method in which the main source of data and information is obtained from respondents as a survey sample using questionnaires or interviews. The data can come from the past or the present (Edy Kelvin, 2022).

The respondents of this study were students of the Fluid program at the Science and Natural Sciences Education Program, Makassar State University in the Odd Semester of the 2016/2017 academic year. The number of respondents was 28 students. The data obtained are processed with descriptive statistics.

3 Results

The results of this study are in the form of information or students' views on questionnaires and interviews about controversial-based integrated science learning tools. They were asked to state as many views as possible of information or answers from questionnaires and interviews which were then synchronized and the results appeared in Table 1 and Figure 1 and Figure 2.

Table 1. Students' Views on Science Learning Tools Based on Controversies and Numbers

No	Display Items	Number of Students	Percent
1	Teaching materials are unique and creatively	27	96.43
2	The content is as easy to understand as reading a short story	20	71.43
3	Fun/pleasant to read like a short story	24	85.72
4	The teaching material opens the mind	20	71.43
5	The title of the material makes students curious	19	67.86
6	It's as if the material in the teaching materials has humans like characters so it's interesting to read it	22	78.57
7	The teaching materials can increase the students' creativity	20	71.43
8	The title of the material grabs the attention of students	25	89.29
9	The content of the material is interesting to learn	23	82.14
10	Can bring up students' creative ideas	24	85.72
11	The teaching materials are not boring	26	92.86
12	The teaching Material can increase students' imagination	22	78.57
13	These teaching materials can improve the students' thinking skills	25	89.29

Figure 1. Graph of Number of Student Views on Integrated Science-Based Learning Tools Controversies

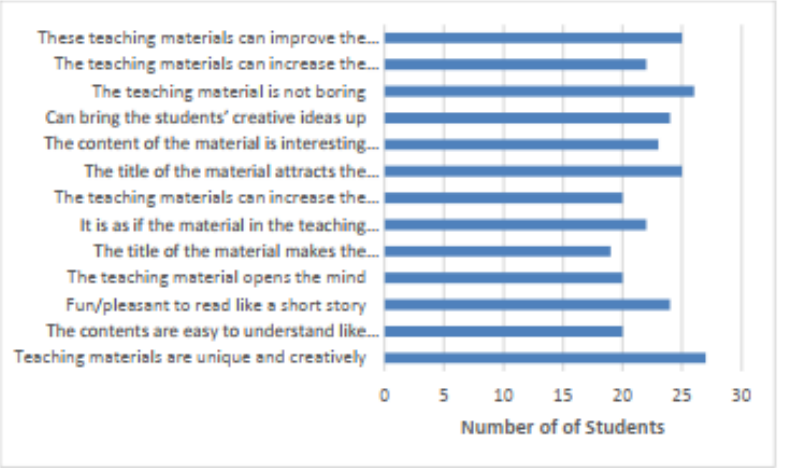
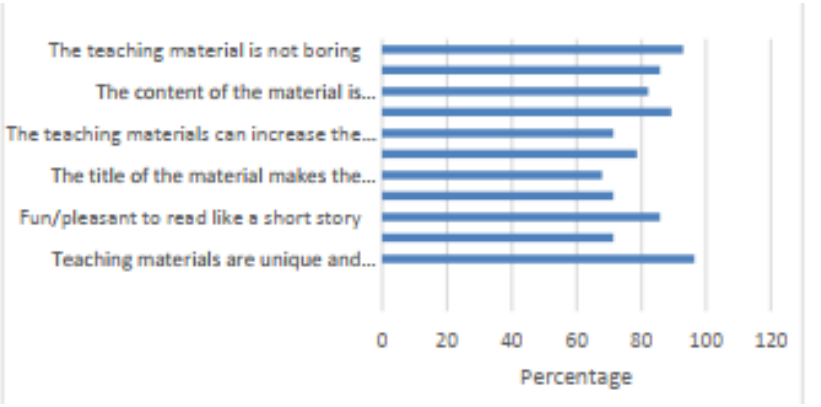


Figure 2. Percentage Graph of Student Views on Integrated Science Base Learning Tools Controversies



Based on Table 1, Figure 1, and Figure 2 above, there are 13 points of respondents' views on the controversy of integrated science-based learning tools. Next, we see that each point was chosen by almost respondents. In detail: (1) unique and creative teaching materials (27 people or 96.4350), (2) the content is easy to understand such as reading short stories (20 people or 71.43%), (3) fun / enjoyable to read like short stories (24 people or 85.72%), (4) teaching materials open the mind (20 people or 71.43%), , (5) the title of the material makes students curious (19 people or 67.86%), (6) as if the material in the teaching materials has a human-like character so that it is interesting to read (22 people or 78.57%), (7) the teaching materials can increase student creativity

(20 people or 71.43%),, (8) the title of the material attracts students' attention (25 people or 89.29%),, (9) the content of the material is interesting to learn (23 people or 82.14%),, (10) can bring up students' creative ideas (24 people or 85.72%),, (11) teaching materials are not boring (26 people or 92.86%),, (12) the teaching materials can increase students' imagination (22 people or 78.57%),, and (13) these teaching materials can improve students' thinking skills (25 people or 89.29%),
From above, we see that all points or all items of positive view of the integrated science base learning tool are controversial because the sum of each point is more than 50%. Therefore, the learning tools mentioned can be tried to be used in other ways to respondents and other topics.

4 Discussion

The results show that respondents' views on integrated science-based learning tools are controversially positive. This can happen because through this controversy, higher-order thought processes emerge as soon as students explore the content of the teaching material being studied (Brophy, 1990). Some research results that support this statement, among others: the results of research by Jungst, at.al (2003) which shows that controversy strategies can make students have a more comprehensive understanding or understanding in solving problems, the results of research by Steiner at.al (2003) which shows that the application of controversy strategies in learning can increase the knowledge of most students taught, the results of research by Moore, in. al (2015) which shows that debate in clinical controversy strategies helps researchers achieve expected results in activities, the results of research by Moore, et al (2015) show that if you want to achieve rapid results in an activity, then apply the controversy strategy, the results of research by Bruen, at. Al (2016) who shows that the controversial approach in learning can develop multi-perspective skills and critical thinking skills. The results also match Tong's (2018) who says that controversy strategies can make humans think high.

5 Conclusion

Based on the results of the study above, we see that there are 13 points of respondents' views on controversial integrated science base learning tools with percentages, namely: (1) unique and creative teaching materials (27 people or 96.4350, (2) the content is easy to understand such as reading short stories (20 people or 71.43%), (3) fun / enjoyable to read like short stories (24 people or 85.72%), (4) teaching materials open minds (20 people or 71.43%), (5) the title of the material makes students curious (19 people or 67.86%), (6) as if the material in the teaching material has a human-like character so that it is interesting to read (22 people or 78.57%), (7) the teaching material can increase student creativity (20 people or 71.43%), (8) the title of the material attracts students' attention (25 people or 89.29%), (9) the content of the material is interesting to learn (23 people or 82.14%),, (10) can bring up students' creative ideas (24 people or 85.72%), (11) teaching materials are not boring (26 people or 92.86%), (12) the

teaching materials can increase students' imagination (22 people or 78.57%), and (13) the teaching materials can improve students' thinking skills (25 people or 89.29%).

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