RESEARCH ARTICLE

Interaction of the reflective ethnobiology (REBI) model and creative thinking argumentation in biodiversity material

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Abstract: The ethnoscience-based reflective learning model has been implemented in the classroom while the learning process has its own strengths and weaknesses. The purpose of this study was to determine the interaction between learning models and arguments for creative thinking. A mixed methods research design was applied to collect both qualitative and quantitative data. Quantitative data were collected using argumentation observations and essay tests which were analyzed with SPSS. Qualitative data sourced from one lecturer and 40 students of National Islamic Institute of Kerinci, Jambi Province were collected using interviews and observations. The results shows that there is an interaction between learning models and arguments for creative thinking. This can be seen from the whole learning process students have achieved indicators of creative thinking involving argumentation skills. We discussed this and formulated recommendations that can be implemented in the future.

Keywords: argumentation; creative thinking; ethnobiology learning; reflective model

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Introduction

Empirical phenomena based on research results show that the creativity and argumentation in the 21st Century is not yet fully understood by students (Alsaleh, 2020; Kim et al., 2019; Opdal, 2022). Argumentation is the ability to prove whether a statement is true or not (Toulmin, 2003). A correct argument should close with a discussion or conclusion that is universal (Carugati & Perret-Clermont, 2015; Hasnunidah et al., 2019; Mercier & Sperber, 2013). Argumentation discourse needs to be adapted by students and taught explicitly through appropriate instructions, task structuring and modeling as a lesson (Landrieu et al., 2023; Manz, 2015). Scientific argumentation involves scientific reasoning in making questions based on facts (Demircioglu et al., 2022; Faize et al., 2018; Gültepe & Kılıç, 2021; Kundariati et al., 2022). There are six important components in an argument, namely claims, reasons, guarantees, qualifications, support and rebuttal (Toulmin, 2003).

Argumentation ability can also be equated with the ability to criticize a topic of discussion so that correct information is obtained (Song et al., 2017). The problem-solving process to find the truth can be found by connecting data and information to produce valid, strong and precise ideas. Argumentation skills are very necessary, especially in evaluating problems that arise logically and justifying decisions in both written and oral formats (Mosley & Baltazar, 2019; Sellars et al., 2018). Good argumentation skills make it possible to make decisions and solve problems, especially complex problems that arise in everyday human life (Purwati et al., 2019). So, the argumentation skills are developed as a decomposition of a hierarchy of claims related to the purpose of the simulation. The purpose of an argument is to support a claim, ultimately followed by evidence if possible, and while still paying attention to the context of the claim (Alden et al., 2015).

A claim in this context is not simply an opinion or contrary idea, it is a conjecture, explanation, or other conclusion that provides an adequate answer to the question (Nappo et al., 2023; Pease et al., 2019; Simion, 2022). The term reason is used to describe the support someone gives to a conclusion. The

term evidence is often used to describe the reasoning used by scientists, especially if its support is based on data gathered through investigation (Brown et al., 1999; Reiss & Sprenger, 2014). However, reasons do not have to be based on measurements or observations to be considered scientific (Saxena & Behari, 2021).

In addition, the ability to think creatively is also very much needed and needs to be developed properly. Creative thinking skills are defined as skills needed in almost all subjects. Meanwhile, according to Munandar (2009) creative thinking is a pattern of thinking that encourages creative products and involves rational and imaginative thinking in solving a problem. The cognitive characteristics of creative thinking are fluency, flexibility, originality, and elaboration (Meiarti et al., 2020). Based on factor analysis, Guilford found five characteristics that characterize the ability to think creatively, namely: fluency, flexibility, originality, decomposition, and reformulation (Nuswowati & Taufiq, 2015). Most of the research shows that there are differences in the results of students' creative abilities based on how to get achievements when the classroom environment is manipulated (Diawati et al., 2017).

The results of the 2015 International Global Creativity Index (GCI) study show that Indonesia's creative index is still very low with a value of 0.202 which ranks 115th out of 139 participating countries (Arina & Rustiadi, 2018; Florida et al., 2015; Sasmita et al., 2021). Torrance (2018) and Almeida et al (2008) identified four components of creative thinking indicators that can be applied, namely: fluency, flexibility, originality, and elaboration. The creative ability test will be built using aspects and sub-aspects of divergent thinking such as fluency, flexibility, originality and elaboration (Megawan & Istiyono, 2019). However, in reality students' creative thinking skills are still low. Many researchers believe that increasing students' creative thinking abilities can be encouraged through collaborative learning with local culture, using reflective learning models, and developing a curriculum that is adaptive to cultural diversity. Thus, science learning can be considered as learning with a multicultural approach. According to many researchers, the increasing debate about multicultural science education is not limited to relatively specific situations, but can be widespread (Baptista & El-Hani, 2009; Zhang, 2019; Zidny et al., 2020).

Reflective learning is a combination of theoretical and practical themes and issues and seeks to integrate them – to open a dialogue between theory and practice. This movement owes much to the work of Dewey who wrote about 'the process of dialectical learning which turns observation and reflection into action (Bubnys & Žydžiūnaitė, 2010; Mermelstein, 2018; Volbers, 2012). Lecturers can also use professional judgment to adjust and modify their skills in response to student needs and curriculum goals (Pang, 2022). Reflective thinking is most often defined as the process and ability to understand and rethink standard and stereotyped experiences, and is considered a prerequisite for the emergence of any innovation (Kazhikenova et al., 2021). The characteristics of reflective teaching include: (1) goals and consequences, reflective teaching (2) cyclical processes, (3) collecting and evaluating evidence, (4) educator attitudes, reflective teaching requires an open attitude, thought, responsibility and sincerity, (5) educator assessment, (6) learning with colleagues, (7) reflective teaching as creative mediation (Muhali et al., 2020).

Genuine scientific knowledge consists of all knowledge relating to the facts of society. The scope of local wisdom includes science, agriculture, ecology, medicine and the benefits of flora and fauna (Rahayu & Sudarmin, 2015). Bahru et al., (2011) states that indigenous peoples are people who adhere to a traditional, non-industrial lifestyle in a particular area where they have lived for generations. This group of people has wider opportunities to interact with their natural environment. As a result, they accumulate considerable local wisdom potential, which is related to the complex rules, beliefs, standards, skills, practices and mental devices possessed by local communities in certain areas. This accumulation of local wisdom is caused by local communities' dependence on natural resources, which helps them adapt and survive in certain areas. For example, pastoralist communities in various regions in Ethiopia know the life history, population dynamics, spatio-temporal distribution of wild plants and animals better than cultivated plants and livestock by using their traditional capabilities.

Basically, local wisdom is cross-disciplinary (Sumartias et al., 2020; Walsh, 2015). One of the cultures in Jambi Province is the Kenduri Sko tradition which is a cultural party/festival. Culture is "a way of thinking and feeling that expresses itself in the whole life of a group of people who make up social, scientific, technical, artistic, religious, philosophical and customs" (Nur, 2017). The research results of Bubnys and Žydžiūnaitė (2010) explain that the problem that must be prioritized is how to focus students on being able to understand real world experiences and relate them to the theoretical knowledge they have acquired in college. To direct students' learning understanding in participating in reflective learning, a discussion process also needs to be carried out. However, feedback and scientific literacy in reflective learning are not implemented optimally and there is no awareness of regional culture as a learning resource (Vieira et al., 2017; Wang et al., 2019; Wolverton et al., 2014).

Based on the description above, researchers will look at the interactions that occur between learning models and argument on creative thinking. Therefore, to find out the interaction in question, we will apply this model to students of IAIN Kerinci, Jambi Province to improve students' creative thinking in biology. The aim of this research was to analyze the interaction between learning models and creative thinking argumentation and analyze how this interaction can occur.

Creative thinking is a series of thought processes that can produce new ideas or thoughts that are useful

in the world of education, especially to meet the demands of learning in the 21st century era. The ability to think creatively can work more synergistically in biology lectures by involving students in gathering information and arguments that can be presented in front of the class. Meanwhile, argumentation is a verbal activity, both social and rational, which aims to convince a reasonable response or suggestion and ask questions about a view that can be accepted by many people. This article discusses the interaction of the Reflective Ethnobiology (REBI) model and argumentation as well as creative thinking skills on biodiversity material for students in higher education. The REBI model has a significant contribution in directing students' argumentation and creative thinking through unique characteristics in each learning syntax. This experimental research aims to determine the direct effect of the REBI model on students' creative thinking. It is hoped that the results of this study can become a theoretical basis for science education researchers and practitioners in implementing and assessing argumentation and creative thinking. This, of course, is in accordance with the objectives in Efforts to support the achievements of the goals set forth in the Sustainable Development Goals (SDGs) through biology education.

Method

This study used a mixed-method with a population of 19-year-old students who were in first semester, Biology Education Study Program at National Islamic Institute of Kerinci (IAIN Kerinci), Jambi Province using two classes. Class selection was selected by random sampling and conducted interviews with lecturers to decide which class to use for research. Each class consisted of 20 students and a total of 40 students in the study.

Treatment given intentionally to individuals or groups of individuals in a learning community. The learning community in this experimental research involved a control group and an experimental group. The experimental group that received treatment in this case used the REBI, while the control group applied the expository model. The modified ethnobiology-based model corresponds to the syntax built. The syntax of the reflective learning model consists of five stages from Bain et al., (2002) i.e. (1) reporting, (2) responding, (3) associating, (4) reasoning and (5) reconstructing. Furthermore, the teacher uses a reflective model based on ethnobiology which is modified into the REBI model which consists of (1) stimulating, (2) reporting, (3) responding, (4) connecting, (5) reasoning (6) reconstructing and (7) concluding. The following are the stages or learning syntax in the REBI model that has been developed (Figure 1).

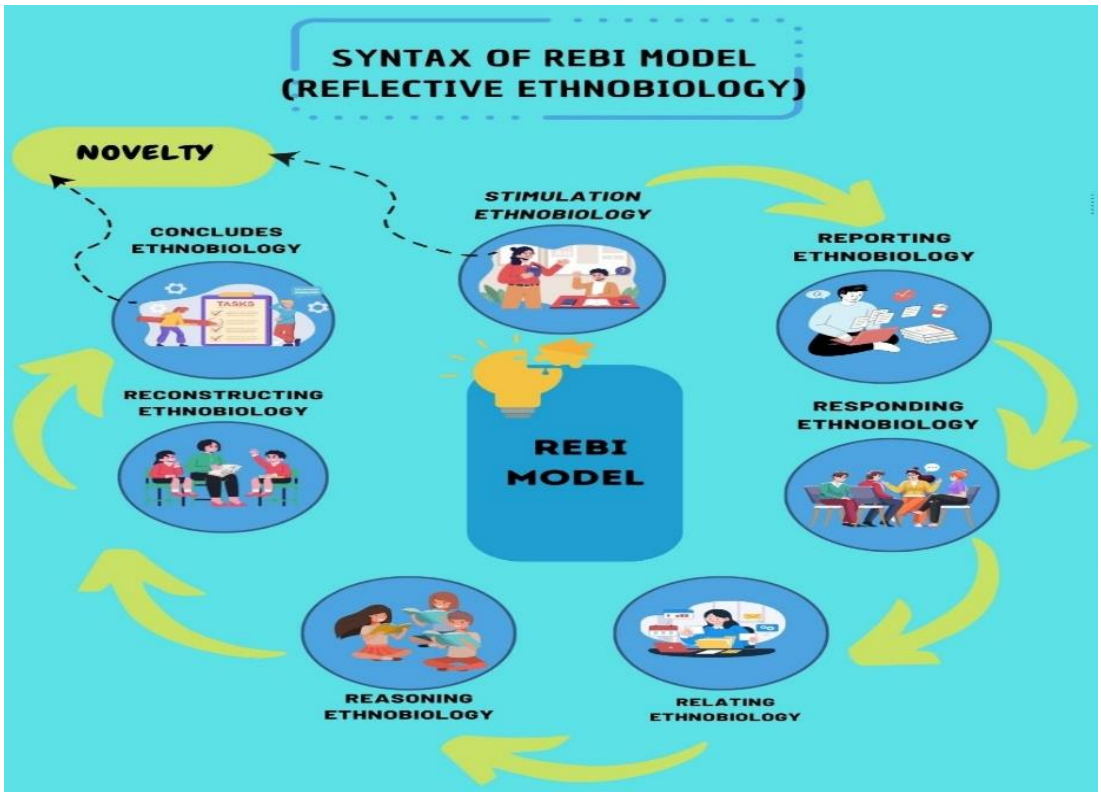

Figure 1. The syntax of the REBI Model

Stimulation of ethnobiology was provides stimulation to students by showing a video about Kerinci ethnobiology. Furthermore, the lecturer will ask several questions and other learning activities to students related to the videos. Students were already in their respective groups which had been randomly appointed by the lecturer to pay attention and observe the activities in the video shown. Students are also directed to identify problems given by lecturers related to Kerinci ethnobiology as the ancestral culture of Kerinci used in learning about biodiversity. This stage also directs students in developing scientific literacy skills, argumentation and also creative thinking in solving problems given by lecturers in identifying problems in the videos displayed which are related to everyday life.

After students understand the problem of the material being observed, the lecturer then directs students and their groups to describe or explain through pictures with clear and detailed words through arguments. This activity is an implementation of the syntax reporting on ethnobiology. In this section, students must read a number of related sources. Moreover, each student discusses with their respective groups to develop new ideas that can solve the problems being discussed related to biodiversity material. Students must also collect various sources, both printed and non-printed (online) references. This stage is responding to ethnobiology, students read and discuss with their groups to develop emotional responses to problems by debating between one group and another to resolve problems from questions asked by other groups regarding the material being discussed. This activity can be repeated alternately between different groups.

The process of responding appropriately to scientific arguments involves the ability to present evidence-based scientific ideas that support claims. Evidence for an idea presented can support or contradict a particular explanation formed through observation, experimentation, and/or investigation. Effective argumentation requires the ability to communicate well and reason to establish and prove why the evidence gathered confirms the claims made. Explicit reasoning in science involves using scientific ideas, theories, or principles to make logical connections to demonstrate evidence that supports a claim. This basic process is used to reveal the truth and resolve the problem being discussed (Grumney, 2022). Linking ethnobiology is carried out by associating creative data processing. Data processing can be done by classifying and sorting it in a more informative form, as well as determining the data source to make it more meaningful. This can be done with arguments based on phenomena with theories underlying the phenomena studied based on Kerinci ethnobiology which are formulated openly and honestly by linking events or problems with the skills possessed by students based on their professional experience. Furthermore, the following syntax is reasoning. At this stage, students are asked to explain the systematic facts of the following concepts by expressing ideas that can produce new findings in learning. Moreover, students can argue between groups based on the discussion of Kerinci ethnobiology in solving problems by expressing sentences in a language that students can easily understand based on the understanding of the flow of literacy in understanding the material being discussed.

The reconstruction of knowledge that has been obtained from the discussion process is carried out with a clear line of argumentation based on the scientific literacy process carried out from various learning sources to add new existing ideas. In the closing stage, the lecturer directs students to review the material that has been discussed in the previous stage and provide conclusions by summarizing the essence of learning.

The type of instrument used in this study used observation sheets, description test and interview sheets. The observation sheet aims to observe the ability of the argument that appear in each syntax of the REBI model in the student worksheets work process, with a rating scale of 1 to 5. Meanwhile, the essay test is to see students' creative thinking skills. and the interview sheet is given to the teacher to find out and identify the use REBI models whose subject matter is related; learning needs, student and environmental analysis, as well as task analysis, learning objectives, learning sequences, learning strategies, message delivery design, developing learning, practical and efficient. Data was analyzed quantitatively and qualitatively. The creative thinking of students in the experimental and control classes were tested using the Two Ways ANOVA test. This test is to determine the interaction of the learning model and argument on student creative thinking in experimental and control classes.

Result and Discussion

The first step is the results of the data obtained by descriptive testing of creative thinking data before and after treatment of experimental and control classes are presented in Table 1 while the results of the two ways ANOVA test and Levene's test are presented in Table 2 and Table 3.

Table 1. Results of argumentative descriptive data on creative thinking

Class Code	Argumentation Code	Mean	Std. Deviation	N
Experiment	Low	58.00	1.732	3
	High	75.88	8.108	17
	Total	73.20	9.929	20
Control	Low	60.00	5.477	7
	High	56.77	7.918	13
	Total	57.90	7.181	20
Total	Low	59.40	4.648	10
	High	67.60	12.450	30
	Total	65.55	11.540	40

Table 2. Two-way ANOVA test results of learning models and arguments for creative thinking

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3203.828a	3	1067.943	19.319	.000	.617
Intercept	102667.771	1	102667.771	1857.239	.000	.981
Model	478.577	1	478.577	8.657	.006	.194
Argumentation	350.802	1	350.802	6.346	.016	.150
Model * Argumentation	728.447	1	728.447	13.177	.001	.268
Error	1990.072	36	55.280			
Total	177066.000	40				
Corrected Total	5193.900	39				

a. R Squared = .617 (Adjusted R Squared = .585)

Table 3. Levene's test result

F	df1	df2	Sig.
2.081	3	36	.120

Based on Table 2 it can be seen that the significance value is 0.001 (sig < 0.05). Thus, it can be concluded that there is a significant interaction between the use of learning models and arguments on students' creative thinking. To find out the form of interaction between the use of models and arguments towards creative thinking, the Figure 2.

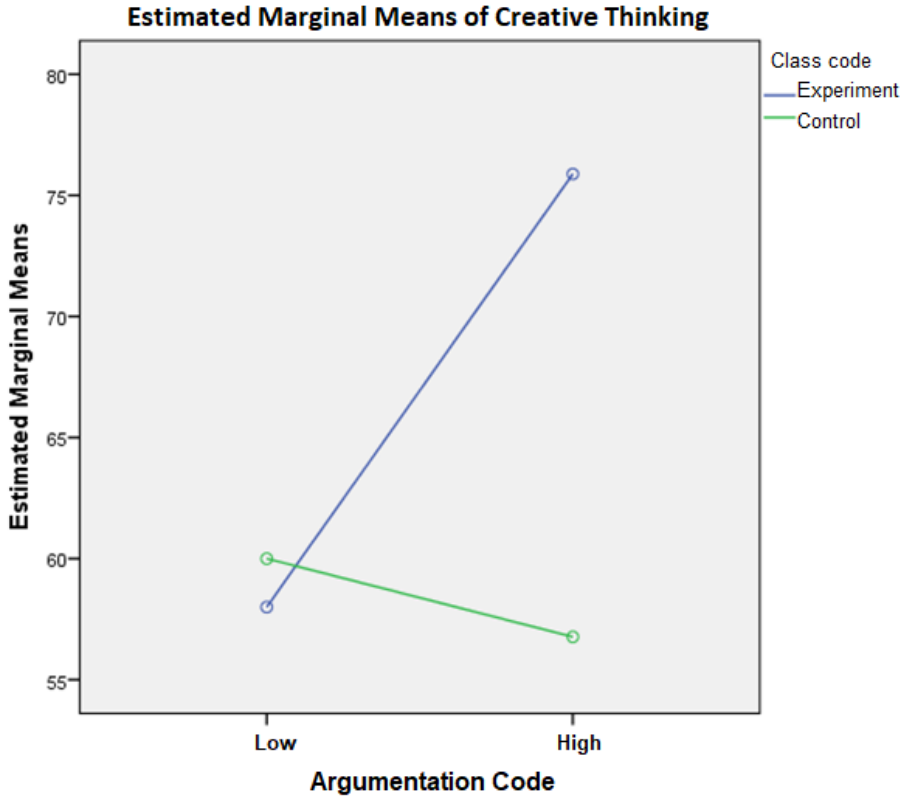

Figure 2. Interaction of learning models and arguments for creative thinking

Figure 2 was described that there is a significant interaction between learning models and arguments on students' creative thinking. However, if seen from the graph, the learning and argumentation models have the potential to interact significantly in the experimental class and the control class. It is because this study only uses a relatively small number of samples.

The fifth problem formulation is whether there is an interaction between the REBI model and creative thinking arguments in the experimental class and control class. Based on the analysis of Table 2, a significance value of 0.001 (sig < 0.005) was obtained. Thus, it can be concluded that there is a significant interaction between the use of learning models and argumentation on students' creative thinking. To find out the form of interaction between the use of models and the ability to argue for creative thinking. Based on Figure 2, it can be interpreted that there is a significant interaction between learning models and argumentation on students' creative thinking.

The argumentation process in biology learning is also based on the claim checking strategy given by students. According to Alden et al., (2015) connections between top-level claims and supporting sub-claims are made through strategy nodes. This strategy should detail the steps that will be taken to certify that the top-level claim is supported. These strategies can in turn lead to the definition of further claims, sub-claims, which are then debated in turn. Examining sub-claims will increase confidence that the parent claim is valid and all sub-claims are considered together when making an overall assessment of whether the top-level claim is satisfied. Some sub-claims can be proven by pointing to evidence such as, statistical results or published research. Scientific argumentation has been used as a valuable approach to measure students' understanding, their conceptual and epistemic ideas about the subjects being discussed. Even scientific argumentation is highly recommended as an understanding of science that will be obtained. Student arguments are also influenced by social factors (Saxena & Behari, 2021). Appropriate argumentation in biology classes can also improve conceptual understanding of complex phenomena, while providing students with the ability to participate in authentic scientific reasoning (Grumney, 2022; Hadzigeorgiou & Schulz, 2019; Hester et al., 2018; Hoskinson et al., 2013). This methodical process often bypassed in biology gives students the opportunity to practice testing claims, refining their positions, and effectively communicating evidence-based ideas to their peers. This method of inquiry teaches scientific reasoning and appropriate communication skills which together will promote higher order thinking in students. Current research shows an increasing need for lecturers to support their students in creating and enriching conceptual schemes through asking questions in the form of appropriate arguments, providing guidance, obtaining prior knowledge, guiding investigations, and encouraging reflective discussions (Grumney, 2022).

The results of this research are in line with Baptista & El-Hani (2009) that ethno and biological approaches can make a significant contribution to the development of a culturally sensitive curriculum. It is based on the belief that the prior knowledge students bring to the classroom is often what matters. The cultural knowledge they gain during their studies, grows under the influence of social media and incorporates previous cultural experiences. Biology students who live in Kerinci have sufficient knowledge about natural resources related to the ethnobiology of the Kerinci area as a source of teaching materials regarding botany, zoology, and ecology, all of these elements are depicted in the *Kenduri Sko* procession on biodiversity material that has been modified according to needs. This fact is supported by the process of curriculum development and biology practice which is carried out first before being applied to students.

Basically, biology is a science that studies living things. Humans, in fulfilling their needs, take and utilize the natural resources around them, including utilizing other living creatures (Fedele et al., 2021; Gómez-Márquez, 2021; Martin et al., 2016). This is related to how the relationship between biological studies is adapted to the culture or traditions that exist in a particular area, which is usually known as ethnobiology. Ethnobiology can be interpreted generally as a scientific evaluation of the population's knowledge about biology, both relating to knowledge of botany, zoology, and ecology (Barrero & Sánchez, 2018; Mourão et al., 2006; Santoro et al., 2018; Wolverton et al., 2014). The indigenous communities are very protective of utilizing and extracting biological natural resources. This is tailored to their needs, not excessive and prioritizes balance and preservation of the environment around them. This is inversely proportional to modern society which has a mind that is always changing and developing, using technology to meet its life needs. Local biological knowledge has been able and successful in protecting potential ecological processes, protecting various species or varieties of plants and animals, along with their ecosystems, for the benefit of their local economy in a sustainable manner (Ganjari, 2020).

One example of a plant that is famous in parts of the world is lilies. Lilies have been known in culture for thousands of years and are cultivated as food, medicinal and ornamental plants. Currently, lilies are generally classified into varieties (hybrids) and species (wild) that grow in the Kerinci area. Lilies have also been used in traditional medicine as medicine. Lilies (*Liliaceae*) have been known in culture for thousands of years and are cultivated as food, medicinal and ornamental plants. In addition, in East Asia, lilies are cultivated as a vegetable for their tubers (Nasimova et al., 2023).

Apart from plants, animals in the Kerinci area, namely monitor lizards (*Varanidae*), are used as medicine

in the form of oil which is used to reduce itching, bloating and other skin ailments. This is the same as research Iyai et al., (2011) who use monitor lizards for non-consumer needs. However, almost all community groups in Papua use their body parts for several important activities on Mansinam Island, Manokwari in the Arfak Tribe in the Warkapi Nature Reserve. Apart from consumption, another fact was also reported that some Biak people do not consume monitor lizard meat because mitosis occurs. Therefore, each tribe in Papua has its own values, perceptions and experiences in utilizing wild animals to fulfill their basic primary and secondary needs, such as magic, traditional rituals, etc. This interrelation between animals and humans is called ethnozoology.

Efforts to build a curriculum that is sensitive to cultural diversity are important and carried out. This is not only in special circumstances, for example with the formation and planning of educational science in indigenous communities. Different societies will understand the natural systems in which they live and be able to adapt to the culture in the environment in which they live (da Silva et al., 2023; Eduardo & Gabriel, 2021; Hayes & Bulat, 2017; Throsby & Petetskaya, 2016).

Based on the results of research conducted, ethnobiology-based reflective learning can improve students' creative thinking abilities. This is in accordance with previous research which explains that reflective abilities are closely related to creativity and are very important in solving real life problems. The innovative reflective dialogue method has great effectiveness and influence on teacher development. Encouraging the development of creativity and critical thinking through the exchange of new creative ideas between students (Kazhikenova et al., 2021).

Other research shows that if ethnoscience-based reflective learning can improve students' creative thinking skills. Reflective ability is very closely related to creativity and is very important in solving real life problems. The innovative reflective dialogue method has great effectiveness and influence on teacher development. It encourages the development of creativity and critical thinking through the exchange of new creative ideas between lecturers. By using this method, each teacher can improve their professional and personal skills, especially communication, creativity, critical thinking, interaction and contact with people (Kazhikenova et al., 2021).

Ethnoscience is essentially an interdisciplinary science based on increased collaboration between the social sciences and the humanities and natural sciences (Orr et al., 2015; Zidny et al., 2021). At the same time, ethnoscience is increasingly trans disciplinary (Pitrou, 2015; Rist & Dahdouh-Guebas, 2006; Savoirs, 2021). Having the ability to participate in conversations about criticism of scientific ideas, discoveries, phenomena, and so on provides an opportunity for students to reflect on their true understanding of new ideas while helping them discover gaps in their own reasoning/arguments. Appropriate communication skills will encourage students' thinking to a high level of creative understanding as a critical mental process that is important for real learning (Grumney, 2022).

Schleigh (2015) provides an overview that for learning to be successful, lecturers need to design learning that provides opportunities for students to learn how to produce explanations from data, identify and assess the relevance of evidence, and articulate and support explanations in an argument. In addition, it is necessary to respond to questions or counter-arguments, and revise claims (arguments) based on the feedback they receive or new evidence. Lecturers also need to find ways to help students learn, adopt, and use the same criteria that biologists use to determine what counts as secure scientific knowledge in the field of biology. Krell et al., (2023) also suggests that in addition to evaluating the structure of arguments are based on interconnected components (i.e., at the micro level), they can also be analyzed by considering the interrelationships of several arguments, focusing on elements such as the reasons for and against an argument.

Research in the field of ethnobiology is very important and can be a milestone in revealing the various potentials of natural resources in more detail, including aspects of zoology, ethnobiology and ecology. This is also related to the relationship between humans and their environment. From time-to-time humans have been very dependent on the nature they live in, both as a place to live, forage for food and other activities. With an understanding of how to conserve nature, the wisdom of local communities is able to maintain nature with firmly held traditions. One of them is the aspect of traditional knowledge about botany, known as ethnobotany, namely how local people use plant species both as food and traditional medicine (Traditional botanical knowledge) (Nahdi, 2018). However, during the learning process, there will definitely be students who find it difficult to solve problems by providing arguments. Many studies reveal that students' difficulties in formulating arguments are caused by a lack of participation in scientific discussions and limited lecturers pedagogical competence to support argumentative activities, such as the teacher's lack of ability to initiate and manage discussions (Putri & Rusdiana, 2017) .

Lecturers can provide assistance in the form of scaffolding to students when learning argumentation skills by explicitly teaching them how to justify claims based on evidence. Possible strategies for explicitly teaching students argumentation skills in the classroom. Students will be involved in the process of tabulating and analyzing data systematically so that they are able to produce evidence that can defend claims made in relation to data obtained from practical work activities in lectures (Ping et al., 2020). The epistemic and conceptual goals of learning are achieved to build students' arguments. The aim of education is not only to direct students to master scientific concepts but also to involve them in scientific

discussions. The inclusion of argumentation as a scientific practice can be found in the definition of argumentation, namely, the process of coordinating theory with evidence to justify a conclusion, while argumentation can be considered as its product. Arguments in this sense are similar to scientific explanations, because both make use of scientific evidence and principles. However, the distinguishing feature of an argument is that it has an uncertain conclusion, which must be justified through persuasion, whereas an explanation seeks to build understanding of a definite claim. These two practices complement each other, as arguments can be created to compare opposing explanations (Schen, 2013). As is known, argumentation as a scientific ability is recognized as the main goal in building communication skills and understanding knowledge in students' reasoning (Probosari et al., 2022). Argumentation skills have been emphasized in national science standards and curricula throughout the world in practice that is important for scientific literacy. These practices include using evidence to justify conclusions, make decisions, and evaluate scientific knowledge claims. These practices also need to be included in university science curricula as they are much more important for students pursuing science careers. However, not much is known about the argumentation abilities of students majoring in science as the curriculum develops (Schen, 2013). Argumentation is generally a public process that requires the articulation of ideas, discussion, and complex thinking. Students who engage in Argumentation are publicly accountable for their thought processes. Therefore, the argument can be considered consistent with the current constructivist view that learning is not simply a process that occurs in the mind of the individual learner. On the other hand, learning is a process that requires interaction with the learning community; learning requires explanation and sharing of ideas; this requires discussion, public scrutiny, justification, and criticism of the concepts studied (Dawson & Venville, 2013).

Conclusion

This research shows there is an interaction between the learning model and argumentation in creative thinking with a significance value of 0.001 (sig < 0.05). This can be seen from the whole learning process students have achieved indicators of creative thinking involving argumentation skills. The interaction that occurs between the REBI model and argumentation against SPS is due to the application of the REBI model applied to worksheets to train argumentation skills and creative thinking in each REBI model syntax. Improving quality learning in higher education, especially in biology education study programs, is recommended using the REBI (Reflective Ethnobiology) learning model. And for future researchers it is recommended to use the REBI model at different school levels as well as in other study programs and materials other than the biology education study program.

Author Contributions

E. Jon: writing original draft preparation, methodology, review, and editing. **A. Asrial:** question validation, review, and editing. **M. H. E. Hasibuan:** writing original draft preparation. **B. Hariyadi:** data analysis.

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