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VALIDITY OF SOCIO-SCIENTIFIC ISSUES (SSI) BASED STUDENT WORKSHEETS ON ENVIRONMENTAL CHANGE MATERIAL TO TRAIN REFLECTIVE JUDGMENT ABILITY

Validitas LKPD Berbasis Socio-Scientific Issues (SSI) Materi Perubahan Lingkungan Untuk Melatihkan Kemampuan Keputusan Reflektif Siswa

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Abstract

Reflective judgement is the ability to evaluate and process information to reach conclusions based on the data collected. Students who have good reflective judgment ability are more capable in solving complex problems. Students can explore various solutions, consider the consequences of each solution, and make better decisions based on critical and systematic analysis. An approach that can be applied in learning to train reflective judgment skills is the SSI approach. Learning using the Socio-Scientific Issues (SSI) approach seeks to engage students in decision-making about current social issues that have a moral impact in a scientific context. The purpose of the research is to produce Student Worksheet based on SSI in environmental change material to train reflective judgment that are valid. This research is a development research consisting of analysis, design, development and evaluation stages. This research produced Student Worksheet contains two learning activities and features that are in accordance with SSI aspects. The Bio-News feature contains articles about the Earthquake on Bawean Island and the Operation of the Cement Factory which students will then explore with the Bio-Explore, Bio-Disscus features, and in the Bio-Evaluate feature students make problem solving decisions on the articles presented. Aspect of validity include content, presentation, language, and worksheets characteristics to train reflective judgment ability. The result showed that student worksheet based on SSI in this study obtained a validity score of 3.89, with a very valid. Based on the results of the validity, it can be concluded that the the developed student worksheets has a practical category and is suitable for use.
Keywords: Validation, eksploration, analysis

Abstrak

Kemampuan keputusan reflektif merupakan kemampuan mengevaluasi dan memproses informasi untuk menarik kesimpulan sesuai bukti-bukti yang dikumpulkan. Siswa yang memiliki kemampuan keputusan reflektif yang baik cenderung lebih mampu dalam memecahkan masalah yang kompleks. Siswa dapat mengeksplorasi berbagai solusi, mempertimbangkan konsekuensi dari setiap solusi, dan membuat keputusan yang lebih baik berdasarkan analisis kritis dan sistematis. Salah satu pendekatan yang dapat diterapkan dalam pembelajaran untuk melatih kemampuan keputusan reflektif adalah pendekatan SSI. Pembelajaran menggunakan pendekatan Socio-Scientific Issues (SSI) berusaha untuk melibatkan siswa dalam pengambilan keputusan mengenai isu-isu sosial terkini yang memiliki dampak moral dalam konteks ilmiah. Tujuan penelitian adalah mendeskripsikan validitas LKPD berbasis SSI materi perubahan lingkungan untuk melatihkan keputusan reflektif. Penelitian ini merupakan penelitian pengembangan yang terdiri atas tahapan analysis, design, development, dan evaluation. LKPD yang dikembangkan berisi dua kegiatan pembelajaran dan fitur-fitur yang sesuai dengan aspek SSI. Fitur Bio-News memuat artikel tentang Gempa Bumi di Pulau Bawean dan Pengoperasian Pabrik Semen yang kemudian akan dieksplorasi siswa dengan fitur Bio-Explore, Bio-Disscus, dan pada fitur Bio-Evaluate siswa membuat keputusan pemecahan masalah terhadap artikel yang disajikan. Aspek validitas yang dinilai meliputi isi, penyajian, bahasa, dan karakteristik LKPD untuk melatih kemampuan keputusan reflektif. Hasil penelitian menunjukkan bahwa lembar kerja siswa berbasis SSI pada penelitian ini memperoleh nilai validitas sebesar 3.89 dengan kategori sangat valid. Berdasarkan hasil validitas tersebut, dapat disimpulkan bahwa LKPD berbasis SSI yang dikembangkan dalam penelitian ini dapat digunakan dalam proses belajar mengajar untuk melatihkan kemampuan reflective judgment siswa.
Kata kunci: *Validitas, eksplorasi, analisis.*

INTRODUCTION

Education in the globalization era has faced the requirement of the development knowledge and technology to build a society that has 21st-century skills. One way to improve the quality of education is to update the curriculum continuously (Fadiah & Ambarwati, 2024). The Merdeka curriculum is a new program from the Ministry of Education and Culture of the Republic of Indonesia (Kemendikbud RI). The Merdeka Curriculum is more flexible and focuses on material oriented to the daily life, character development, and students competence (Kemendikbud, 2022).

Learning through the Merdeka Curriculum is supposed to provide relevant and contextual learning experiences for students (Kemendikbud, 2022). Environmental change is one of the biology materials in the E phase of the Merdeka Curriculum in class X which links learning materials with contextual issues that occur in daily life. The learning outcome (CP) of environmental change material is that at the end of phase E, students can create solutions to problems based on local, national, or global issues related to understanding the diversity of living things and their roles, viruses, and their roles, biological technology innovation, ecosystem components and interactions between components and environmental changes (Kemendikbud, 2022).

The problems or phenomena of environmental change can help student to use their knowledge to make the right decisions (Aisya, et al., 2016). In biology learning, contextuality is very important because it is related to daily life and involves not only knowledge but also the ability to address and solve problems. Therefore, an appropriate learning approach that focuses on aspects of contextuality that should help students acquire knowledge, values, attitudes, and skills to make decisions about problems is Socio-scientific Issues (SSI) (Aisya, et al., 2016).

Socio Scientific Issues (SSI) are phenomena related to social problems that occur in society, which include concepts and technology and their relationship with science (Sadler, 2004). SSI is also a combination of social issues involving moral and ethical elements and their relevance to science (Callahan, 2009). Therefore, it can be concluded that SSI is a problem that deals with social issues related to science such as genetic engineering, global climate change, alternative energy, stem cell research, and other issues that require public attention in addition to specific scientists (Zeidler & Sadler, 2009).

SSI-based learning has a similar learning approach to problem-based learning as both frame science content in a story (Siska, et. al., 2020). In problem-based learning, students are given a problem and asked to find an answer or solve a problem. The SSI approach is different as students are challenged to explore the controversy surrounding a science-informed issue, integrate social aspects (moral, ethical, economic, etc.) and perspectives of other individuals or groups, and develop a position based on their investigation. For example, students will not be able to solve the global warming issue, but they will be able to create solutions based on the research they find as they explore the issue and learn the science content (Klosterman & Sadler, 2010).

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Problems in SSI content are usually controversial but have the added element of requiring moral reasoning or evaluation of issues and ethics in the process of arriving at decisions about possible solutions (Zeidler & Nicols, 2009). The aim is for the problems to be personable and interesting to students, require the use of evidence-based reasoning, and provide a context for understanding scientific information (Zeidler & Nicols, 2009).

Based on the explanation above, SSI-contextualized learning can be done in four stages, namely: (1) scientific background; (2) evaluation of information; (3) local, national, and global dimensions; and (4) making decision making (Rahayu et. al., 2016). The SSI approach creates contextual learning situations to develop argumentative scientific skills, exploration of moral issues, development of moral reasoning, and reflective judgment ability (Zeidler, 2009).

John Dewey (1938) observed that reflective thinking is needed when one realizes that some problems cannot be solved with certainty. Based on this observation, King and Kitchener chose the term "reflective judgment" to describe a type of epistemic cognition that includes the recognition that uncertainty is real about some issues. Reflective judgment describes the development of

reasoning about such issues in late adolescence through adulthood (Zeidler et. al., 2009).

The simplest description of reflective judgment is taking a step back, which is the ability to evaluate and process information to conclude according to the evidence collected (Dwyer, 2017). Reflective judgment have seven levels that are grouped into three categories, namely pre-reflective, quasi-reflective, and reflective.

Based on previous research, shows that the context of SSI on global warming material can improve students' reflective judgments ability and concept understanding (Alvita, 2017). Subiantoro and Ariyanti (2013) stated that learning on SSI-based ecosystem material in the context of the eruption of Mount Merapi had a better effect on improving reflective decision skills than traditional learning applied by teachers.

Subiantoro and Ariyanti (2013) explained that the profile of reflective judgment ability of biology learning of grade X students at Madrasah Mu'allimin Muhammadiyah Yogyakarta, each control and treatment group is 30.65 and 33.63 classified as low.

The reflective judgment ability of high school students is still relatively low, this is based on the results of surveys and interviews with Biology subject teachers who stated that when facing complex problems, students tend to follow the opinions of other students without conducting their critical evaluation or reflecting on the values and beliefs that underlie their opinions. This results in students' reflective judgment skills not being developed, moreover, students tend to see the problem only from one point of view so it is necessary to apply SSI-based learning.

To implement SSI-based learning that can train reflective judgment skills, the existence of media or tools so that learning can go according to plan and students are not passive when learning (Adini Et al., 2022). Teaching aids that can be developed in this study are Student Worksheet. Student Worksheet are learning materials in the form of sheets that contain theory, summaries, and directions that students need to complete (Syafitri, 2020). Kurniawati et al., (2021) stated that the preparation of Student Worksheet should be based on the needs and conditions of students who are expected to stimulate the thoughts, feelings, attention, and abilities of students so that they can encourage the learning process.

Based on the background, a Student Worksheet Based on SSI was developed to train reflective decision-making skills containing four features which are Bio-News, Bio-Explore, Bio-Discussion, and Bio-Evaluate. Bio-News is a feature that can encourage students to identify social science issues presented in the article; Bio-Explore is a feature that can train students to explore problem-solving in articles from various sources; Bio-Discussion to conduct collaborative discussions with other groups to conduct a systematic analysis of the exploration results; and Bio-Evaluate facilitates students to be able to practice reflective judgment skills, namely concluding problem-solving. The features are also tailored to the needs of the environmental change material being taught.

Student Worksheet are used to make it easier for students to learn independently, so that students are active during learning and can solve problems related to everyday life (Astuti et al., 2018). In teaching and learning activities students will be more active when the teacher provides SSI-based teaching materials (Kartika et al., 2019). The purpose of this research is to describe the validity of SSI-based Student Worksheet on environmental change material that is valid for practicing reflective judgment skills of class X high school students.

METHOD

The research is development research to produce SSI based student worksheet to train reflective judgment ability on environmental change material for class X in senior high school uses several stages, namely analysis, design, development, and evaluation.

The research was designed and conducted at the Biology Education Program, Faculty of Mathematics and Natural Sciences, State University of Surabaya, The preliminary phase, which included the planning, development of instructional materials, creation of assessment instruments, and design of learning units, was conducted from January to February 2024. The validation phase was conducted in May 2024.

Research design

The analysis stage contains curriculum analysis activities. The worksheet material refers to the Phase E Merdeka Curriculum with learning outcomes (CP). At the end of phase E, students can create solutions to problems based on local, national, or global issues related to understanding the diversity of living things and their roles, viruses and their roles, biological technology innovation, ecosystem components, and interactions between components and environmental change (Kemendikbud, 2022). The analysis was conducted on grade X students with an age range of 15-16 years. Based on Piaget's learning theory the stage of an adolescent can already think logically, formal theoretical thinking, able to conclude and begin to understand how to think

abstractly. Third, concept analysis includes factors that cause environmental changes and efforts to overcome environmental changes. Fourth, task analysis includes identifying issues, formulating problems, conducting literature studies, discussing, and making problem-solving decisions.

The design stage consists of searching for Worksheet and material content based on literature review, analyzing tasks and determining additional information related to the material, determining the features that will be included in the worksheet, designing designs with the selection of material content and aligning presentation on Worksheet, and printing the results of Worksheet into sheets.

The development stage of development is carried out to produce SSI-based Worksheet on environmental change material based on the results of the design or design stage. The development of student Worksheet based on SSI on environmental change materials includes writing drafts, revision, and validation, then producing Worksheet that are ready for use.

The evaluation stage is carried out by looking at the input suggestions from the expert lecturer validation analysis to train the reflective judgment skills of students.

Data analysis technique

Data analysis techniques In this work, descriptive statistical analysis was used to analyze the data.

The validity of the student worksheet based on SSI on environmental change material includes content feasibility, language feasibility, presentation, and components that train reflective decision skills. Validation was carried out by material experts, and media experts from expert lecturers from the Biology Department, FMIPA, Surabaya State University. SSI based student worksheet on enviromental change material is declared feasible if it reaches a score $\geq$ 2.6. The validation stage is to validate the student worksheets based on SSI to train reflective judgment using a Likert scale as follows:

Table 1. Validation result analysis

Value	Scale
Not good	1
Less good	2
Good	3
Very good	4

The score obtained is then calculated on average and calculated using the following formula:

$$Validity = \frac{\Sigma\ score}{\Sigma\ maximum\ score} \ldots\ldots (1)$$

In order to examine the validity of the student Worksheet, the validation findings from experts were utilized in conjunction with Riduwan's (2013) assessment criteria for score interpretation:

Table 2. Score intrepretation criteria

Nilai	Category
$1.0 \leq P \leq 1.5$	Invalid
$1.6 \leq P \leq 2.5$	Quite valid
$2.6 \leq P \leq 3.5$	Valid
$3.6 \leq P \leq 4.0$	Very valid

RESULT AND DISCUSSION

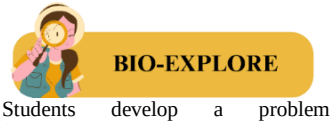
The results of this development research are Students' Worksheet (LKPD) based on Socio Scientific Issues (SSI) to train reflective judgment skills on environmental change material. This worksheet contains readings related to social science issues, and problem-solving steps by the characteristics of the SSI approach used to train students' reflective judgment ability. The reflective judgment ability that is trained in this worksheet is pre-reflective, quasi-reflective, and reflective categories.

Student Worksheet based on SSI are designed using Canva and Microsoft Office Word 2019 written in Times New Roman 12pt font. The presentation of the content of the SSI-based worksheet is divided into two issues, namely the issue of Earthquakes and the issue of cement factories. SSI-based student worksheet contains constituent components consisting of introduction, content, and closing. In line with the opinion of Prastowo (2015), states that a good one must be by the structure of a systematic worksheet consisting of introduction, content, and closing. In the introduction section, there is a cover, foreword, table of contents, worksheet usage guide, features guide, learning outcomes, learning objectives, and concept map. The existence of this introduction component makes it easier for learners to use the worksheet both to understand the content and how to use the features. Learning outcomes and learning objectives are also included in the worksheet so that it is expected to be a learning media that is by the independent curriculum and learning outcomes will be relevant to learning objectives (Jannah and Raharjo, 2019). In the content section, there is material including articles on social science issues and problem-solving stages. In the closing section, there is a summary and a bibliography. Student worksheets equipped with a summary will make it easier for students to understand terms (Rahma et. al., 2022).

The characteristics of this student worksheet based on SSI are in the form of a book equipped with issue articles, questions, and QR codes to watch videos. These elements make the worksheet more interesting and are expected to help train students' reflective decision-making skills. This is in line with the Ministry of National Education which states that one of the requirements for a worksheet to be said to be good is an attractive appearance in terms of writing, tasks, and assessment. In addition, the characteristics of the worksheet also contain various supporting features that are structured activities to train learners' reflective judgments skills and by SSI-based learning which are implemented into Bio-News, Bio-Explore, Bio-Discussion, and Bio-Evaluate features in the student worksheet.

Bio-News contains activities to read articles that can train reflective judgment skills, which are identifying issues. Bio-Explore contains activities to formulate problems and exploration activities regarding the impact and causes of problems in the article. According to Itaunada & Rachmadiarti (2023), teachers must provide analytical tasks to train students' reasoning skills. Bio-Discuss contains student activities that involve the use of scientific topics for discussion, and the problem requires moral reasoning or evaluation that trains reflective judgment ability (Zeidler & Nicols, 2009). The Bio-Evaluate feature can train reflective judgment, which is making problem/solution decisions based on evidence, critical analysis, and synthesis of information (Zeidler et al., 2009).

Table 3. Linkage of Student Worksheet Based on SSI Features with Reflective Judgment Categories

Features	Reflective Judgment Categories
Bio-News  Learning begins with the presentation of articles related to social science issues. Learners identify the factors that cause environmental changes in the article presented so that learners can understand the problems that occur independently.	Pre-Reflective: Students identify the issues presented and view environmental issues as something that must happen because of learners' knowledge based on experience, observation, evaluation, or derived from news sources.
Bio-Explore  Students develop a problem formulation collaboratively and explore the literature study with the help of the keywords that have been presented.	Quasy-Reflective: Students analyze the data found on the issue presented, including an understanding of the root causes of the problem and its impact on local, national, and global communities.
Bio-Disscus  Students collaboratively discuss with other groups with consideration of the chosen role to exchange opinions and thoughts, and to create problem-solving ideas. Students can accept that others have different ideas for solving problems.	Reflective: Students are skilled at constructing knowledge independently and critically evaluating sources and evidence by considering the context in which ideas are constructed. Students can accept that others have different ideas.
Bio-Evaluate  Students create written ideas on innovative solutions that can be applied to address social science issues on environmental change.	Reflective: Students develop objective solutions based on weighing evidence and critically analyzing and synthesizing information about the role of science in solving social and environmental problems that occur.

Worksheet are developed with color, font, layout, text, images, and illustrations as well as the overall appearance of the worksheet. The worksheet color is dominantly white with a combination of yellow, black, and gray. Damayanti and Ratnasari (2021) stated that an attractive appearance can foster students' interest in learning when using it. The font uses Times New Roman font with varying sizes but is still clearly legible. The layout of text, images, and illustrations is also considered so that the composition is clear, easy, and interesting to read. The following is the appearance of the SSI-based worksheet to train students' reflective judgment skills on environmental change material consisting of introduction, content, and closing. The following is a view of the worksheet.

Worksheet validation is categorized into four aspects including content feasibility, presentation feasibility, language feasibility, and aspects that train reflective decision skills. Validation by two expert lecturers from Surabaya State University.

Presentation Feasibility Aspect

Table 4. Validation Result of Presentation Feasibility Aspect

No.	Presentation Feasibility Aspect	Averange score
1.	Display	3
2.	Design	4
3.	Layout Title	3.5
4.	Time Allocation	3
5.	Learning Objective	4
6.	Instructions for using worksheet	3.5
7.	Presentation Systematics	4
Averange of Presentation Feasibility Aspect		3,57
Category		Very valid

The feasibility aspect of presenting Worksheet with an average of 3.6 categories is very valid. The criteria assessed in the presentation aspect are the appearance of the worksheet, cover design, time allocation, learning objectives, instructions for use, and systematic presentation of the worksheet obtained a percentage of validity respectively 3; 4; 3.5; 3; 4; 3.5; 4 with very valid criteria (Riduwan & Sunarto, 2013).

The appearance of the worksheet is in conformity with the subject matter. The presentation of the worksheet has been by the topic with the form of the title studied, namely environmental changes, in the Worksheet listed topics with clear language and sentences, pictures, and readings by the subject matter, namely the phenomenon of environmental change. The cover design of the worksheet is attractive with images that are relevant to the material. This is to the statement of Rosa & Susantini (2020) that the presentation of good Worksheet containing pictures written and attractive designs can foster student learning motivation. The learning objectives achieved by the topic/subject matter are environmental changes which refer to the learning outcomes of phase E of the Merdeka Curriculum.

The validator suggested improvements to the placement of the title, time allocation, and instructions for using the worksheet. This Worksheet was revised by the validator's recommendations by changing sentences that were difficult to understand into sentences that were easily understood by students. This is because the use of language in Worksheet must be appropriate for the maturity level of students and use a clear sentence structure (Salirawati, 2011).

The activities in the worksheet are arranged coherently (identifying social science issue articles, formulating problems, conducting explorations, group discussions, problem-solving, and summarizing), and each component is related to the other. Widajanti (2008) explains that Worksheet must be arranged coherently and regularly so that they are easily understood by students.

Content Appropriateness Aspects

Table 5. Validation Result of Content Appropriateness Aspects

No.	Content Appropriateness Aspects	Averange score
1.	Relevance to everyday life related to Science	4
2.	Compatibility with Socio-Scientific Issues (SSI)	4
Averange score of Content Appropriateness Aspects		4
Category		Very valid

Based on the validation results in the presentation of Table 3, it shows that the content feasibility aspect of the Learner Worksheet is proven to be very valid with an average of 4. The validity criteria for the content feasibility aspect of the Student Worksheet include the relevance of the content of the Student Worksheet to daily life related to science and compatibility with socio scientific issues (SSI). One example that this worksheet is said to be valid in the aspect of feasibility is the distribution of phase E learning outcomes, where students have the ability to create solutions to problems based on local, national or global issues related to understanding the diversity of living things and their roles, viruses and their roles, biological technology innovation, ecosystem components and interactions between components and environmental change (Kemendikbud, 2022). These learning outcomes are operationalized in life and implemented into learning objectives, namely concluding factors that cause environmental changes and the impacts caused through observing the phenomena presented. The indicator is used to identify issues and there are other indicators that can lead to problem-solving activities.

The validation results in the presentation of Table 5, show that the content feasibility aspect of the Learner Worksheet is proven to be very valid with an average of 4. The validity criteria for the content feasibility aspect of the Student Worksheet include the relevance of the content of the Student Worksheet to daily life related to science and compatibility with socio-scientific issues (SSI). One example that this worksheet is said to be valid in the aspect of feasibility is the distribution of phase-E learning outcomes, where students can create solutions to problems based on local, national, or global issues related to understanding the diversity of living things and their roles, viruses and their roles, biological technology innovation, ecosystem components and interactions between components and environmental change (Kemendikbud, 2022). These learning outcomes are operationalized in life and implemented into learning objectives, namely concluded factors that cause environmental changes and the impacts caused through observing the phenomena presented. The indicator is used to identify issues, and other indicators can lead to problem-solving activities.

In the first stage, the SSI approach presents issues from a scientific background summarized in the Bio-News feature. The article on factors causing environmental change is divided into two learning activities. Learning activity one presents an article on the Bawean earthquake as one of the natural factors causing

environmental change. Meanwhile, learning activity two presents an article about the operation of a cement factory as one of the human factors causing environmental change. Then given questions related to the article. The reading activity is one of the activities that can train students' reflective judgment skills, namely identifying scientific phenomena (Callahan, 2009). The Bio-News feature contains learner-stimulation activities with video displays. Students learn to analyze video science social issues related to environmental change material, then answer the questions provided and are expected to provide answers and responses to training reflective judgment in the pre-reflective category of identifying issues and analyzing issues from one point of view, namely trusted sources (news) (Siska, et al., 2019).

The second stage, evaluation of information on the worksheet is implemented in the Bio-Explore feature, which presents a question that students are asked to explore and study literature to answer the question. The Bio-Explore feature contains activities that require students to formulate problems by existing keywords, then explore the phenomena presented and problem-solving steps that have been taken to evaluate the impact that will be caused if applied. This feature can train reflective judgment in the quasi-reflective category, namely analyzing data from literature studies and evaluating information from data from literature studies (Siska, et al., 2019).

The third stage of the learning process involves examining the impact of social science issues locally, nationally, and globally. Students have the opportunity to exchange views and further explore the impact of these issues through the Bio-Discuss feature. Through collaborative discussions with other groups, learners can exchange opinions and thoughts, generating problem-solving ideas based on their chosen roles. This stage helps develop reflective judgments skills by engaging in activities that require the use of scientific topics and moral reasoning. By considering data from various perspectives, learners can analyze the impact caused by social science issues and develop a reflective understanding of the subject matter.

In the fourth stage of learning, called decision-making, learners engage in problem-solving based on the data they have gathered through exploration and discussion. This stage aims to develop reflective judgment skills by using the Bio-Evaluate feature, which presents problem-solving steps or solutions that learners can offer to the government or society to address issues. The Bio-Evaluate feature helps learners make decisions by analyzing evidence, critically evaluating information, and synthesizing knowledge. The learning activities in the students worksheets (teaching and learning aids) have been adapted to align with the requirements of the Merdeka Curriculum, allowing students to have more flexibility in choosing learning resources and developing their understanding of the material. These activities also help students in finding concepts, constructing knowledge, analyzing problems, and making problem-solving decisions.

Language Feasibility Aspect

Table 6. Validation of Languange Feasibility Aspects

No.	Languange Feasibility Aspect	Averange score
1.	Legibility	4
2.	Language Use	4
Averange of Languange Feasibility Aspect		4
Category		Very valid

The language feasibility aspect of the worksheet received an average score of 4 with a very valid category. Language feasibility criteria including readability and language used. The criteria for language readability and language use include the accuracy of grammar, spelling, sentence structure, and the standardization of terms that have been able to meet the rules of Indonesian and PUEBI. The language used is also communicative so that it is easy for students to understand and does not cause multiple interpretations. The use of language in Worksheet should match the maturity level of the students and have a clear sentence structure (Khikmah & Susantini, 2019).

Reflective Judgment Skills Aspects

Tabel 7. Validation Results of Reflective Judgment Skills Aspects

No.	Content Appropriateness Aspect	Score
1.	Suitability of LKPD to train Reflective Decision Skills Pre-Reflective a. The Worksheet contains articles on current social science issues in daily life to be identified in the Bio-News feature. b. The Worksheet guides learners to analyze factors that cause environmental changes. Quasi-Reflective a. The Worksheet guides students to formulate problems in the Bio-Explore feature. b. The Worksheet guides students to conduct exploration on the Bio-Explore feature. c. The Worksheet guides learners to analyze the data from the exploration results by considering the impact of problems locally, globally, and nationally. Reflective a. The Worksheet guides learners to conduct	4

No.	Content Appropriateness Aspect	Score
	discussions with other groups to consider problem-solving from other perspectives in the Bio-Discuss feature. b. The Worksheet guides students to analyze data from exploration results and discussions with other groups. c. The Worksheet guides students to make problem-solving decisions related to the social science issues presented.	
Averange of Reflective Judgment Skills Aspects		4
Category	Very valid	

The study evaluated the aspect of practicing reflective judgment skills and found that it was rated highly. The promotion of reflective judgment was measured through the use of student Worksheet and the socio-scientific issues (SSI) approach. SSI learning involves presenting social issues that are connected to scientific concepts in order to enhance students' reflective decision-making skills. The student worksheet had several features for practicing reflective decision-making skills, including Bio-News, Bio-Explore, Bio-Discuss, and Bio-Evaluate. Bio-News focused on reading articles to identify issues, while Bio-Explore involved formulating problems and conducting exploration activities. Bio-Discuss incorporated scientific topics for discussion and moral reasoning, and Bio-Evaluate focused on making problem/solution decisions based on evidence and critical analysis. The study emphasized the importance of analytical tasks in training students in reasoning and critical thinking. Overall, the findings indicated that the use of these features in the SSI approach can effectively improve students' reflective judgment skills. The development of SSI-based learner Worksheet aims to train pre-reflective, quasi-reflective, and reflective decision abilities so that the preparation is based on the steps of the SSI approach and the category of reflective decisions (Alvita et al., 2017). In addition, according to Zeidler et al. (2009), SSI provides a contextualized learning environment that enables the development of argumentative scientific skills, exploration of moral issues, development of moral reasoning, and changes in students' concept understanding and reflective judgment abilities.

CLOSURE

Conclusion

Based on the result, it has been determined that the SSI based students worksheet on environmental change material to train the reflective judgment ability is valid based on content, presentation, language, and features of the student worksheet to train reflective judgment ability is 3.89 categorized as very valid the developed in this study can be used in the teaching and learning process to train students' reflective judgment skills.

Suggestion

The development of an students worksheet to train reflective judgment ability can be implemented in other biological topics in order to effectively train students' reflective judgment according to the researchers' recommendations based on the analysis of the data and conclusions.

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