



NEEDS ANALYSIS SURVEY FOR THE DEVELOPMENT OF SOCIO-SCIENTIFIC ISSUES-BASED STUDENT WORKSHEETS ON ACID-BASE TOPIC

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DOI: 10.20414/spin.v6i1.8765

History Article

Accepted:

Nov 29, 2023

reviewed:

Mar 29, 2024

Published:

July 13, 2024

Kata Kunci:

Asam Basa,
Berpikir Kritis,
Lembar Kerja
Peserta Didik,
Socio Scientific
Issues (SSI)

Keywords:

*Acid-Base, Critical
Thinking, Socio
Scientific Issues
(SSI), Student'
Worksheet.*

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ABSTRAK

Socio Scientific Issues (SSI) merupakan pendekatan yang dapat digunakan untuk menstimulus cara berpikir kritis siswa pada pembelajaran sains, terutama pembelajaran kimia. Pendekatan ini dapat diintegrasikan dalam Lembar Kerja Peserta Didik (LKPD) untuk melatih siswa berfikir kritis dan mencapai tujuan pembelajaran. Tujuan dari penelitian ini adalah untuk mengetahui tanggapan guru kimia dan siswa kelas XII Sekolah Menengah Atas (SMA) terhadap analisis kebutuhan pengembangan LKPD Berbasis Socio Scientific Issues pada materi Asam Basa. Metode penelitian yang digunakan berupa metode survei dengan menggunakan instrumen penelitian angket atau kuisioner. Instrumen penelitian ini diisi melalui google form yang terdiri dari beberapa pertanyaan atau pernyataan tertulis yang harus dijawab oleh responden. Subjek penelitian yang digunakan adalah guru kimia dan siswa kelas XII SMA. Hasil penelitian menunjukkan bahwa sebagian besar guru dan siswa belum mengenal mengenai pendekatan socio-scientific issue dalam pembelajaran kimia. Namun sebagian besar guru dan siswa setuju terhadap dikembangkannya LKPD pada materi Asam Basa yang mendukung untuk menstimulus keterampilan berpikir kritis dan pembelajaran kimia yang bermakna.

ABSTRACT

Socio Scientific Issues (SSI) is an approach that can stimulate students' critical thinking in science learning, especially chemistry learning. This approach can be integrated into the students' worksheets to help students to think critically and achieve learning objectives. This study aimed to determine the responses of chemistry teachers and students of twelve-grade secondary school based on the needs analysis of the development of Socio Scientific Issues on Acid-Base topics. The research method used was a survey method using a questionnaire research instrument. This research instrument is filled in through a Google form containing several questions or written statements the respondent must answer. The subject of the research was chemistry teachers and XII-grade high school students. The results showed that most teachers and students were unfamiliar with the socio-scientific issue approach in chemistry learning. However, most teachers and students agree to the development of students' worksheets on the Acid-Base topic that supports stimulating critical thinking skills and meaningful chemistry learning.

How to Cite

Aini, D. A., Solekha, N. A., Juvitasari, S., Nisfah, U. A., Tia, R., Aisyah, R. S. S., Irhamni., & Zidny, R., (2024) Needs Analysis Survey for The Development of Socio Scientific Issues-Based Student' Worksheets on Acid-Base Topic. *SPIN-Jurnal Kimia & Pendidikan Kimia*. 6(1). 19-26.

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INTRODUCTION

The rapid development of information technology and education in the 21st century has brought about major changes in various aspects/fields, including in the world of education. Therefore, education in schools must be designed and able to face changes in the 21st century. There are seven skills that students in the 21st century must have, including 1) critical thinking and problem-solving skills, 2) collaboration and leadership, 3) agility and adaptability, 4) initiative and entrepreneurial spirit, 5) ability to communicate effectively orally and written, 6) the ability to access and analyze information, and 7) curiosity and imagination (Wagner, 2010).

In 2022, the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) launched an independent curriculum as a relevant approach to improving students' skills in the 21st century. The aim of the independent curriculum is to provide teachers or educators with the flexibility to create quality learning (focusing on essential material) according to student's needs and to focus on strengthening character (Kemendikbudristek, 2022). In addition, the independent curriculum provides a collaborative learning experience where students are active in making decisions related to learning materials, teaching methods, and assessments. Of course, it will develop critical thinking skills, creativity, initiative, respect for diversity, and teamwork in students (Lubis, M. U el at, 2023).

Critical thinking skills (Critical Thinking) are one of the skills that students in the 21st century must have. According to Fithriyah (2016), critical thinking is the skill of analyzing and evaluating information to obtain valid conclusions. Based on the 2018 PISA results in Sa'adah et al (2020) show that in the Science category, Indonesian students are ranked 71st out of 79 countries with an average score of 396, which is still category below the international average of 500 (Organization for

Economic Co-operation and Development, 2019). This can happen because there is still a lack of problem-solving abilities or critical thinking skills at a high level (Kertayasa, 2012). Thus, it should be a concern for the government and teachers to foster students' critical thinking skills in the classroom learning process.

These 21st-century skills must be applied in every subject, including chemistry subjects. High school chemistry learning aims to apply scientific concepts to solve problems in everyday life. In this way, chemistry learning will be more meaningful for students, and the success of this learning will be more pronounced (Sirmayeni, 2023). The characteristics of chemistry learning are that there are many abstract concepts because they involve chemical reactions and many chemical calculations. So, it is difficult for students to understand chemical concepts, and students often memorize material or concepts and formulas even though they do not understand them. This can be seen in chemistry learning at school, where teachers only focus on teaching and completing curriculum targets by conveying chemical knowledge to students and asking students to memorize this knowledge (Rustaman, 2008). Therefore, chemistry learning must be connected to problems in everyday life so that students' critical thinking skills can be trained.

To stimulate students' critical thinking skills, the learning process in the classroom can be implemented with Socio Scientific Issues (SSI) based learning and linking it to sustainability issues (Zidny & Eilks, 2020). Socio Scientific Issues (SSI) based learning is a learning process that connects chemical material with open-ended scientific issues, whether conceptual or procedural. It can also encourage students to solve problems rationally, which can be influenced by social aspects such as cultural identity, politics, economics, and ethics (Setiani, 2016). Of course, the application of the SSI context in the learning process must be adapted to the

learning model. One of the recommended learning models that can improve students' critical thinking abilities is Problem-Based Learning (PBL). Masrinah et al (2019) support this belief that critical thinking skills can be improved through PBL. Because the learning model approach is centered on authentic problems, students must be able to work together to solve these problems. So it can stimulate students' critical thinking abilities and skills. The chemical material used is acid-base material taught in class: beverage products, industrial, cleaning products, waste (Cahyarini et al., 2016), pesticides (Zidny & Eilks, 2022), and so on.

Teaching materials during the learning process are also very necessary for teachers and students. Teaching materials are a collection of learning materials that are arranged systematically according to the curriculum and student needs (Department of National Education, 2006). One is the need for quality Student Worksheets (LKPD) teaching materials that include several aspects, namely improving skills in the learning process. So, LKPD must integrate Socio Scientific Issues (SSI) into chemistry learning, especially in acid-base material. The aim is to meet students' needs in the orientation of 21st-century needs, namely critical thinking skills. This aligns with research by Sirmayeni (2023), showing that implementing the chemistry learning process using the SSI approach can improve students' critical thinking abilities. Apart from that, the innovative use of LKPD aims to attract students' learning motivation in order to improve students' critical thinking skills. Based on this, the researcher has a problem formulation, namely, how chemistry teachers and class XII high school students respond to the development of student worksheets based on socio-scientific issues on acid and base material.

METHODS

This research is quantitative descriptive research with a quantitative approach using survey methods. This research was carried out in one of the schools in Serang district, Banten. The subjects of this research were 67 students of class XII MIPA and two chemistry teachers. The data collection method is non-test, and the instrument is a questionnaire. Data was collected by distributing questionnaires to chemistry students and teachers via Google Forms. The instrument used in this research is a questionnaire on the availability and use of chemistry learning resources for teachers and students to find out the problems teachers and students face regarding the teaching materials used for Acids and Bases material. The data analysis technique used is the quantitative descriptive statistical data analysis technique. The data obtained was analyzed to determine the need for developing LKPD based on Socio Scientific Issues on Acid and Base material in Serang Regency, Banten school. The results of this research are used to develop learning resources in the form of LKPD in subsequent research.

RESULT AND DISCUSSION

The research data was collected through a questionnaire with two targets: students and chemistry subject teachers. The questionnaire has four components, including classroom teaching methods, students' understanding and difficulties in acid-base material, teaching materials, and research on teaching materials using a socioscientific issues approach.

In this research, the respondents were 67 students from class XII MIPA and 2 chemistry subject teachers at a school in Serang district, Banten. The results obtained from this research are data on the needs of students and teachers regarding the use of socioscientific issues-based LKPD on acid-base material. Data were obtained based on the results of the student and teacher needs analysis questionnaire, which can be seen in Table 1 and Table 2.

Table 1. Analysis of student needs

Questions	Answer choices	%
1. What curriculum is used at your school?	Merdeka	0
	K13	0
	K13 Revisi	92,5
2. Is learning chemistry at your school fun?	Yes	61,2
	No	38,8
3. Is the chemistry learning method at your school still focused on the teacher?	Yes	38,8
	No	61,2
4. Are the methods used by teachers in teaching chemistry boring?	Yes	53,7
	No	46,3
5. Do you already know about acids and bases?	Yes	91
	No	9
6. Do you think that acid-base material is a chemistry lesson that is difficult to understand?	Yes	49,3
	No	50,7
7. Are you enthusiastic about participating in chemistry lessons on acids and bases?	Yes	64,2
	No	35,8
8. Do you have difficulty understanding the material through the teaching materials and methods applied by the teacher?	Yes	82,1
	No	17,9
9. Do you use teaching materials like student worksheets in chemistry learning activities?	Yes	97
	No	3
10. Does using student worksheets in learning make it easier to understand chemistry material?	Yes	83,6
	No	16,4
11. Do you often study social issues in chemistry learning activities at school?	Yes	82,1
	No	17,9
12. Do you like learning chemistry related to social issues in everyday life?	Yes	95,5
	No	4,5
13. Are you asked to study issues and summarize the results in learning activities with student worksheets?	Yes	7,5
	No	92,5
14. Are you interested in using student worksheets that present Social Issues in studying acid-base chemistry?	Yes	79,1
	No	20,9

Table 2. Analysis of teacher needs

Questions	Answer Choices	%
1. Has the school where you teach implemented the independent curriculum?	Yes	100
	No	0
<i>Reason/Remarks: Only applied in grade X</i>		
2. Do you use teaching materials or learning media in your chemistry learning activities?	Yes	100
	No	0
<i>Reason/Remarks: To make learning more focused</i>		
3. Do you know about teaching materials in the form of Student Worksheets?	Yes	100
	No	0

Questions	Answer Choices	%
<i>Reason/Explanation: Student Worksheets are used by students to help students understand the material and help students discover concepts</i>		
4. Do you use Student Worksheets in implementing learning?	Yes	100
	No	0
<i>Reason/Explanation: Facilitates the learning process and makes it easier for students to discover concepts</i>		
5. Do you experience difficulties in compiling student worksheets?	Yes	50
	No	50
<i>Reason/Explanation: Sometimes, because it needs to be adapted to the learning model and characteristics of the material, many references can be found</i>		
6. Is the availability of teaching materials in schools sufficient to support the effectiveness of chemistry learning?	Yes	50
	No	50
<i>Reason/Remarks: There are still many shortcomings that need to be improved, but there are still many print and digital references that can be accessed</i>		
7. Can the teaching materials used in learning at school make it easier for teachers in learning activities?	Yes	100
	No	0
<i>Reason/Remarks: Teaching materials can make it easier for teachers in the learning and teaching process and are arranged according to the characteristics of the material and students</i>		
8. Is chemistry learning on acid-base material easy to teach to students?	Yes	100
	No	0
<i>Reason/Explanation: Because acids and bases are contextual</i>		
9. Are you aware of socio-Scientific Issues-based learning?	Yes	0
	No	100
<i>Reason/Remarks: Don't know the details yet</i>		
10. Have you ever taught using Socio-Scientific Issues-based teaching materials on acid-base material?	Yes	0
	No	100
<i>Reason/Remarks: Not yet because I have not studied the teaching materials in depth, and there are not many references</i>		
11. Do you often include activities that stimulate critical thinking skills in the chemistry learning process?	Yes	100
	No	0
<i>Reason/Explanation: At the beginning of learning and on LKPD and to develop students' thinking abilities</i>		
12. Do you need the development of student worksheets that can stimulate students' critical thinking skills?	Yes	100
	No	0
<i>Reason/Remarks: So that children get used to thinking critically with a variety of supporting student worksheets</i>		
13. Do you agree that the development of Student Worksheets based on Socio Scientific Issues is carried out?	Yes	100
	No	0
<i>Reason/Explanation: So that learning is more meaningful if it is stimulated by supporting student worksheets and relevant variations</i>		

Based on the results obtained from the needs analysis questionnaire, information was obtained that class XII MIPA students in one of the schools in Serang district, Banten, were still

implementing the revised 2013 curriculum. Implementing the curriculum Merdeka at the school in the 2023/2024 academic year will only be implemented in class X.

Chemistry subjects at school are often said to be one of the less enjoyable subjects. Most respondents stated that learning chemistry at school was fun. However, as many as 38.8% of respondents still stated that learning chemistry at school was not fun. Students' views on chemistry lessons that are considered less enjoyable are in line with the opinion of Chang (2005), who says that the reason chemistry is considered difficult and less enjoyable is that some concepts in chemistry are abstract so that students also view chemistry only as formulas and facts which makes learning activities tend to carry out by memorizing activities which over time will be forgotten (Fibonacci et al., 2016).

Students' lack of enthusiasm for learning chemistry at school is influenced by several factors, including the model and how teachers teach chemistry material. Based on the questionnaire results, 61.2% of respondents stated that learning did not focus on teachers, but 38.8% still stated that chemistry learning at school still focused on teachers. As many as 53.7% of respondents stated that the learning methods were boring. This can also be influenced by the learning model, which is still teacher-centered, causing students to feel bored because of the monotonous student activities, namely just listening and taking notes, which affects students' chemistry learning motivation (Lestari & Irawati, 2020).

Apart from the learning model, teachers' learning media in chemistry learning also influences students' motivation and understanding of the learning material. Based on the needs analysis questionnaire results, 82.1% of respondents had difficulty understanding the material through the teaching materials and methods applied by the teacher.

Based on the results of the analysis questionnaire, 97% stated that chemistry learning activities at school used learning media in the form of LKPD. Quoted from Andi (2011:204), LKPD is a teaching material used in learning whose contents are sheets of paper containing materials, summaries, and directions for processing assignments that must be carried out by students. The intended assignments can be assignments related to various basic student

skills or concept discoveries that are used as parameters that must be achieved.

The use of LKPD in learning can make it easier for students to discover concepts and understand learning material (Farizka et al., 2021). This is in line with the results of the questionnaire, which stated that 83.6% of students felt that using LKPD in chemistry learning made it easier for them to understand chemistry material. However, teacher respondents sometimes experience difficulties in preparing LKPD because adjustments are needed to the learning model used and the characteristics of the material. Apart from that, the availability of teaching materials in schools is also felt insufficient to support the effectiveness of chemistry learning activities. There are still many deficiencies that need improvement. So, as a solution, teachers look for various online digital references.

Acid-base material is one of the chemistry learning materials found in classes XI MIPA and XII MIPA. The acid-base concept has a high level of conceptual difficulty because understanding it requires connecting it with other concepts (Sheppard, 2006). The results of the analysis questionnaire showed that 49.3% of student respondents stated that acid-base material was one of the most difficult chemical materials to understand. However, even though they found it difficult to understand, students experienced high enthusiasm for the acid-base material, where 64.2% of respondents expressed enthusiasm when studying it. This happens because when discussing acids and bases, simple, practical activities usually make students enthusiastic. Apart from that, teacher respondents also stated that several concepts of contextual acid-base material were easy to teach to students.

Apart from learning models and media, one important thing that needs to be considered is the approach used in learning. Based on a needs analysis questionnaire, 82.1% of students stated that when learning chemistry, they often linked it to social issues that occurred in society. In addition, 95.5% of students also stated that they liked learning chemistry that was related to social issues in life.

Learning that presents social issues is called socioscientific issues (SSI)- based learning. SSI-based learning is categorized as new and not yet widely known. Teacher respondents stated that they did not understand SSI-based learning in detail and that there were not many references available on the Internet. Therefore, teachers have not implemented SSI-based learning, especially on acid-base material.

Socio-scientific issues (SSI) represent social issues related to science. SSI gives students a role in solving social issues by thinking like scientists (Nazilah et al., 2018). This SSI approach stimulates students' critical thinking skills at school because SSI-based learning is integrated with scientific concepts that impact society's social life (Widia et al., 2018). According to teacher respondents, critical thinking skills must be stimulated to get used to thinking critically.

However, in the implementation of chemistry learning at school, 92.5% of student respondents stated that in learning activities, they had not used learning media in the form of SSI-based LKPD, which directs students to study social issues, find solutions to problems, and summarize the results.

Based on the needs analysis results carried out through questionnaires for students and teachers, one solution that can be used to overcome existing problems and needs is to develop teaching materials in the form of Socio Scientific Issues (SSI) based LKPD on the acid-base concept material. The results of the questionnaire showed that 79.1% of student and teacher respondents agreed to the development of SSI-based LKPD on acid-base material because LKPD supports stimulating critical thinking skills and will be able to make learning more meaningful.

CONCLUSION

Based on the results of a needs analysis conducted through a questionnaire on students and teachers, it can be concluded that most teachers and students are not familiar with the socio-scientific issue approach in learning chemistry. However, most teachers and students agree with the development of LKPD on acid

and base material, which supports the stimulation of critical thinking skills. Developing LKPD based on Socio Scientific Issues can be an alternative solution that can be used to overcome the problems and needs faced by teachers and students, especially in Acid-Base material. The LKPD, based on Socio Scientific Issues, supports the stimulus process for students' critical thinking skills so that learning activities will become more meaningful.

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