Learning Environmental Change Based on Social Issues Using Google Site to Improve Scientific Literacy and Learning Independence in High School Students

Trianti Widiastutik, Sigit Saptono[1✉]

[1]Biology Department, FMIPA, Universitas Negeri Semarang, Indonesia

Article Info	Abstract
	Indonesia's scientific literacy is ranked in the bottom 10 based on PISA results from 2000-2022. Efforts continue to be made to increase students' scientific literacy, one of which is through the Learning Management System using Google Site. The aim of this research is to analyze the validity, scientific literacy, and learning independence of high school students on environmental change material based on social issues using Google Site. This research method uses Quasi Experimental Design with Nonequivalent Control Group Design. The subjects of this research were class X at SMAN 1 Jakenan, Pati, Central Java with two control and experimental classes. Data analysis uses media and material validity, N-gain, students' classical completeness, and learning independence. The media and material validity scores are 89% and 93% with the same criteria, namely very valid. The total N-gain score is 0.71 with high criteria, the scientific literacy score for context, knowledge and competency aspects respectively is 0.73; 0.68, and 0.67 with high, medium, and moderate criteria. The student learning independence score is 77.32% with strong criteria. This research can be an alternative learning to increase students' scientific literacy and learning independence and is still open to material with practical activities in it.

✉Correspondence Address:
 D6 Building 1st Floor Jl Raya Sekaran Gunungpati Semarang
 E-mail: sigit_biounnes@mail.unnes.ac.id

INTRODUCTION

Technological advances have a big impact on all aspects of human life, one of which is in the field of education. Schools and universities are required to introduce education models that can overcome dynamic global challenges due to technological advances. Regarding this fact, changes need to be made in the education system to achieve effectiveness and success in the learning process. To achieve this, it involves various elements such as educators, students, policy makers, and the curriculum which must be integrated into a system known as educational technology (Nurdyansyah, 2017; Azizah, 2021).

Educational technology really helps overcome problems at all levels of education (Jamun, 2018). The presence of new innovations in the world of education with a touch of technology makes the learning process more enjoyable, for example internet-integrated learning media (Megahantara, 2017) and the ease of accessing additional learning resources (Matitsa, et. al., 2021). The effectiveness and efficiency of learning media is very important to determine its impact on student learning outcomes. Using appropriate learning media can motivate students to learn independently and achieve student centered learning activities. However, there are still many learning media that are not effective enough in improving student learning outcomes (Pujiastutik, 2019; Affandi, et.al., 2020). This can influence students' digital literacy and scientific literacy skills in the era of globalization to answer the challenges of the 21st century.

Online learning during the Covid-19 pandemic resulted in the number of digital users increasing, both internationally and nationally. 2020 digital data shows that Indonesia ranks 4th in the country with the highest population in the world, 64% of the population uses the internet from the total population in Indonesia in 2020. Data from the 2018 Global Web Index written by (Dinnur & Gumelar, 2020) wrote that 86% of internet users in Indonesia use the internet to shop online. This data shows that internet use for education is still very low. Therefore, to optimize the potential of internet technology in the education sector, it is necessary to innovate a learning media that has internet access, so that school age internet users can use their cellphones more for studying than shopping online.

The high percentage of internet use for things other than educational needs results in the low literacy level of Indonesian students, especially the aspect of scientific literacy. Data on Indonesia's scientific literacy level shows low results, based on the results of the Program for International Student Assessment (PISA) conducted by The Organization for Economic Co-operation and Development (OECD) in 2000, 2003, 2006, 2009, 2012, 2015, 2018, and most recently 2022 shows that Indonesia often occupies the last top 10. Indonesia's scientific literacy ranking based on PISA results in 2000, 2003, 2006, 2009, 2012, 2015, 2018 and 2022 respectively, namely 38 out of 41, 38 out of 40, 50 out of 57, 60 out of 65, 64 out of 65, 62 out of 70, 71 of 79, and 63 of 81.

The low literacy rate among Indonesian students has given rise to the National Literacy Movement (GLN) policy which is implemented at all levels of education from elementary school, middle school to high school by the Ministry of Education and Culture. The launch of GLN without innovation and elements of creativity in making learning media used in the learning process does not show optimal results. The learning media used must be innovative and able to attract students' literacy interest. The urgency of using technology in developing learning media is very necessary. The continued use of slides without any interactive elements makes students bored and less motivated in the learning process. The motivation aspect is important in supporting the continuity of the learning process which will later have an impact on student learning achievement (Afandi, 2015).

Student learning achievements are not only concluded from their cognitive results, but also from their ability to solve problems in everyday life. The Problem Based Learning (PBL) learning model stimulates students to have a better understanding of problems, organize and solve problems based on initial planning, and analyze the solutions that have been provided (Simatupang, 2020). One of the Biology class X materials that stimulates this ability is Environmental Change. This topic is not only often discussed in school but also

in everyday life, this is because our lives cannot be separated from the problem of environmental change (Simatupang, 2020; Syahputra & Ariani, 2021). In this material, students will learn about causes, consequences, and efforts to overcome them (Simatupang, 2020).

The learning media that can overcome this problem is Google Site. Google Site is a Google product that allows teachers to create a Learning Management System (LMS) in the form of a learning website easily and cheaply. On the Google Site teachers can link learning materials in various forms in the form of text, videos, images, PPT, charts, and so on (Mukti, et.al, 2020; Adzkiya & Suryaman, 2021; Salsabila & Aslam, 2022; & Latifah & Rukmana, 2022). Apart from that, teachers can use their creativity in creating a Google Site to support the learning process such as creating discussion, evaluation, and exercise.

Students' learning independence plays a very important role in improving their learning outcomes. The existence of learning independence in students will motivate them to study the material, whether they will, during or have already been studied. Learning independence is a condition where students learn based on their wishes and there is no element of coercion (Bungsu, et. al., 2019). Al Aslamiyah, et. al. (2019) stated that independent learning is a student's skill to achieve their learning targets. One way to facilitate student learning independence is to use Google Site. Students can access it anytime and anywhere if they have a cellphone and internet access.

Educational technology really helps overcome problems at all levels of education (Jamun, 2018). The presence of new innovations in the world of education with a touch of technology makes the learning process more enjoyable, for example internet-integrated learning media (Megahantara, 2017) and the ease of accessing additional learning resources (Matitsa, et. al., 2021). The effectiveness and efficiency of learning media is very important to determine its impact on student learning outcomes. Using appropriate learning media can motivate students to learn independently and achieve student centered learning activities. However, there are still many learning media that are not effective enough in improving student learning outcomes (Pujiastutik, 2019; Affandi, et.al., 2020). This can influence students' digital literacy and scientific literacy skills in the era of globalization to answer the challenges of the 21st century.

RESEARCH METHOD

This research was conducted at SMAN 1 Jakenan, Pati, Central Java in the even semester of the 2023/2024 academic year. The population of this study was all class X of SMAN 1 Jakenan with 12 classes. The research design used was Quasi Experimental Design with Nonequivalent Control Group Design using two experimental and control classes. The research samples were X-4 and X-5 with 66 students as the experimental class, while classes X-1 and X-2 with 56 students were the control class. The data analysis used is descriptive quantitative for the Google Site validity questionnaire and student learning independence. Quantitative for increasing scientific literacy using N-gain and descriptive percentages for student and teacher response questionnaires.

RESULTS AND DISCUSSION

The purpose of the study is to analyze the validity of the Google Site, increase scientific literacy, and the learning independence of high school students on social issue-based Environmental Change material using the Google Site. Google Site validity is achieved if the score from media and material experts gets a score in the range of 60-100 with valid to very valid criteria. The N-gain value of students' scientific literacy is in the range $0.3 \leq \langle g \rangle \leq 0.7$ with medium to high criteria and the percentage of student learning independence is in the range $50 \leq s \leq 100$ with strong to very strong criteria.

Validity of Google Site Materials on Environmental Changes

Google Site validity data is obtained from the results of validation analysis by media experts and material experts. The validity of the Google Site media material on Environmental Change is based on the validation results of media expert lecturers. Media can be understood in the form of tools to help information givers to information recipients (Hasan, et all., 2021). In this context, the provider of information is the teacher, and the recipient of information is the student, so that the learning process is maximized because there is stimulus from the media. Data from the assessment results by the validator are presented in Table 4.1.

Table 4.1 Google Site Validity

No.	Assessment Aspect	Percentage (%)	Criteria
1.	Graphics	88	Very Valid
2.	Language	92	Very Valid
	Total	89	Very Valid

Google Site can stimulate students to form independent learning. Furthermore, based on the results of research conducted by Devi, Sjaifuddin, & Nestiadi (2023) in class IX SMP, the Google Site web-based e-book is very valid for overcoming learning loss in students, this is because the features in it can be linked to many things, Apart from that, the pictures in it are colored, whereas sometimes in textbooks they are black and white. Another advantage of the Google Site is that it is flexible and portable and can be studied anywhere and anytime if there is a cellphone and internet connection without the need to carry printed textbooks.

The results of the Google Site media validity assessment obtained a final score percentage from media expert lecturers of 90% with very valid criteria. Based on the results of the explanation above, it can be concluded that Google Site is declared suitable for use in the Environmental Change learning process for class X SMA.

The validity of the Google Site material developed is assessed by competent and relevant material experts in their field. The aspect of assessing material validity consists of 3 aspects, namely content, language, and presentation. Data from the assessment results by the validator are presented in table 4.2.

Table 4.2 Validity of Google Site Material

No.	Assessment Aspect	Percentage (%)	Criteria
1.	Content	95	Very valid
2.	Language	85	Very valid
3.	Presentation	100	Very valid
	Total	93	Very valid

The concepts contained in Environmental Change material require students to read more before concluding a concept of the material. Students can do this by analyzing Environmental Change issues from various sources (Pratiwi, 2022). A variety of reading sources for Environmental Change Material can be obtained from the Google Site because there are many links in it ranging from articles, videos, images, to social media. Apart from that, Google Site can facilitate various student learning styles ranging from audio, visual, to kinesthetic. This is supported by the validation results of material expert lecturers of 93%, which means it is in the very valid category and suitable for use in Environmental Change material for class X SMA.

Student Literacy in Environmental Change Materials

Scientific literacy includes an understanding of the nature of science as well as inquiry skills such as

designing experiments, collecting, and analyzing data, and drawing valid conclusions from existing evidence (Ogunkola, 2013). The results of scientific literacy in this study were measured by pre-test and post-test questions in the form of 25 multiple choice questions. The pre-test and post-test for the experimental class and control class are presented in Table 4.3.

Table 4.3 Pre-test and Post-test Data for Experimental Class and Control Class

No.		Eksperiment Class with Problem Based Learning (PBL) model		Control Class with Conventional learning	
		Pre-Test	Post-Test	Pre-Test	Post-Test
1.	The number of students	66	66	56	56
2.	Rate-rate	63	89	70	83
3.	Highest score	92	100	100	100
4.	Lowest score	32	52	36	52
5.	Complete number of students	23	58	26	42
6.	The number of students is incomplete	43	8	30	14
7.	Classical completion (%)	35	87	46	75
8.	KKM	70	70	70	70

Based on Table 4.3, it is known that the experimental class experienced a higher average increase than the control class. The average increase in the experimental class was 26, while the control class only experienced an increase of 13. Apart from that, the highest score in the experimental class also increased to a maximum value of 100. Student learning outcomes are influenced by two factors, namely internal factors, and external factors. Based on the results of Angraini's research, 2016, the internal factors that influence learning outcomes are interest, motivation, attention to learning and students' learning readiness, while the external factors are the teacher's teaching methods, class facilities and circle of friends.

Other things that influence student learning outcomes that cannot be controlled are students' interests, talents, health, psychology, learning styles, learning independence and intellectual intelligence (Nabillah & Abadi, 2019). Meanwhile, external factors that influence student learning outcomes are environmental factors starting from the family, community, and circle of friends.

Based on the percentage of classical learning completeness, a class can be said to have completed learning if there are 85% of students in the class who have reached the KKM (Widarta, 2020). In the experimental class there was a percentage of 87% of students who passed the KKM with 58 students passing the post-test with the Biology KKM 70 which is valid at SMA N 1 Jakenan.

The post-test results for the control class were only 42 students who passed and 24 students who did not pass the post-test, so they had a classical completeness percentage of 75%, meaning that the control class had not yet reached 85% classical completeness. In the control class, they only apply conventional learning using the lecture method, resulting in Teacher Centered Learning and less Meaningful Learning. The advantage of meaningful learning is that it actively involves students during the learning process. Students who are active in the learning process will have an influence on improving their learning outcomes (Setyowati & Mawardi, 2018).

The increase in learning outcomes for experimental class and control class students experienced a significant increase after the t-test was carried out. Based on the results of the t-test carried out between the experimental class and the control class, the Sig (2-tailed) values were 0.011 and 0.013 which were smaller than the 0.05 significance level, meaning that the experimental class and the control class had significant differences in their pre-test results.

The t-test results of the post-test scores for the experimental class and the control class have the same Sig (2-tailed) value, namely 0.11, which is smaller than the significance level of 0.05, meaning that the post-test results for the experimental class and the control class have a significant difference. This significant

difference shows the effectiveness of learning Environmental Change material using social issue-based Google Sites to increase students' scientific literacy.

The significant differences in the t-test in the pre-test and post-test scores for the experimental class and the control class are basically different. The average pre-test score for the control class was higher than the experimental class. But the average post-test score for the experimental class was ultimately higher than the control class. This is because the post-test score for control class X-1, which is relatively high, is weighed down by the post-test score for class Meanwhile, the experimental class in classes X-4 and X-5 had a fairly balanced post-test average score so that after recapitulation the final score did not decrease. This resulted in the experimental class t-test having quite significant differences and the results were inversely proportional to the t-test results even though the results both showed quite significant differences. Students' scientific literacy in the material on Environmental Change in the experimental class and control class is presented in Table 4.4.

Table 4.4 N-Gain of Science Literacy for Experiment Class and Control Class

Class	⟨g⟩	
	Pre-Test	Post-Test
Eksperiment with Problem Based Learning (PBL) model	0,71	High
Control with conventional learning	0,37	Medium

Table 4.4 results of N-gain scientific literacy show an increase in learning outcomes in the experimental class through post-test scores. The N-gain value for the experimental class is 0.71 which is in the high category while the control class has an N-gain score of 0.37 which is in the medium category. Thus, learning about environmental change based on social issues using Google Site can increase the scientific literacy of X high school students.

The urgency of scientific literacy is very high in the world of education, this is because students cannot be separated from social issues in everyday life. Students' scientific literacy skills are very important to be able to make wise decisions based on facts in the field (Kelp, et. al., 2023). Stadlander, (2023) states that to improve students' scientific literacy skills they can use selected popular literature such as articles because it has many advantages such as language that is easy to understand and simple so that it can be interesting and give a positive impression to students. This is what makes researchers link several articles on the Google Site to provide new color in the learning process, while the learning process usually uses textbooks, either LKS or textbooks. The results of scientific literacy per aspect of scientific literacy in the experimental class and control class are presented in Table 4.5.

Table 4.5 N-gain Perspective of Scientific Literacy

Aspects of Science Literacy	Question Number	$\overline{X}$ Eksperiment Class with Problem Based Learning (PBL) model		$\overline{X}$ Control Class with Conventional learning		Experimental Class N-gain	Control Class N-gain
		Pre Test	Post Tes	Pre Test	Post Test		
Context	1,2,3,4,9,11,12,13,14	24,72	32,97	26,75	31,14	0,73	0,47
Knowledge	5,6,8,15,16,17,21,23	20,85	28,48	22,86	26,28	0,68	0,37
Skills	7,10,18,19,20,22,	19,57	28	22,57	25,28	0,67	0,28

Aspects of Science Literacy	Question Number	Eksperiment Class with Problem Based Learning (PBL) model $\overline{X}$		Control Class with Conventional learning $\overline{X}$		Experimental Class N-gain	Control Class N-gain
		Pre Test	Post Tes	Pre Test	Post Test		
Total	24,25 25	65,14	89,45	72,18	82,7	0,69	0,37

Based on Table 4.5, we can see that from the 3 aspects of scientific literacy, both the control class and the experimental class, the N-gain value is from small to large, namely the skills, knowledge, and context aspects. The experimental class's n-gain in the context aspect is in the high criteria, while the knowledge and context aspects are in the medium criteria. The N-gain value of the control class for the 3 aspects falls into the medium criteria. Even though the N-gain aspects of knowledge and skills have the same criteria between the experimental class and the control class, they have quite significant differences.

The differences in students' scientific literacy abilities between the experimental class and the control class are caused by academic development, previous science learning, and the composition of students in each class (Gormally, et. al., 2012). Furthermore, the achievement of post-test scientific literacy scores that did not meet expectations indicates that developing students' scientific literacy skills requires a different time, not just three weeks like the research period, so it needs to be honed continuously. Apart from that, the questions given to students have a high level of critical thinking and scientific reading skills for some students, making it a challenge.

Student Learning Independence

The learning independence of experimental class students can be seen in Table 4.6.

Table 4.6 Experimental Class Students' Learning Independence

No.	Assessment Indicators	$\overline{x}$ Percentage (%)	Criteria
1.	Independent	68,75	Strong
2.	Believe in yourself	75,60	Very Strong
3.	Discipline	82, 80	Very Strong
4.	Responsibility	78,07	Very Strong
5.	Initiative	78,60	Very Strong
6.	Self-control	80,67	Very Strong
	Final Percentage (%)	77,91	Very Strong

Based on the results of the student learning independence questionnaire, it shows a score of 77.91% which is very strong criteria. The independent aspect of student learning is stimulated using the Google Site because each subchapter is given a discussion-inducing topic and there is a link to the social issue article Environmental Change. Through the linked articles, students become aware of various environmental change issues around them that are not yet known, so that during discussion sessions they are active and try to find other sources via Google.

This is also supported by research conducted in the Netherlands by Meyer, et.al. (2008) that students who study in an independent learning environment will be more motivated to learn, enjoy the material more, and be more actively involved in their learning than students who study in a more restrictive environment. The same research results were also obtained by Wiriani, (2021) that learning independence had a significant effect on student learning outcomes. The post-test results of the researcher's experimental class also increased

which was the result of student learning independence. Student learning independence is a learning activity with personal will without any element of coercion from other people. In this way, it is hoped that students' academic abilities will increase during the learning process. The data on student learning independence is relevant to the results of processing the student response questionnaire data that has been obtained, which can be seen in Table 4.7 below.

Table 4.7 Percentage of Student Responses

Response Criteria	Number of Responses	Percentage (%)
Strongly agree (4)	142	14,3
Agree (3)	686	69,3
Don't agree (2)	155	15,7
Strongly Disagree (1)	7	0,7
Total	990	100

From these data it was found that the percentage of students who responded strongly agreed was 14.3%; agree by 69.3%; disagree by 15.7%; and strongly disagree by 0.7%. If recapitulated, the percentage of students who responded positively to learning about Environmental Change using Google Site was 83.6%, which was obtained from the percentage of students who strongly agreed and agreed. Based on qualifying data, the percentage of 83.6% falls within the 81-100% interval with very good criteria. This was said to be successful for class X students in the Environmental Change material using Google Site to increase students' scientific literacy and learning independence. The same results were also obtained by Giawa, et.al. (2022) that learning using learning modules is effective in improving learning outcomes and student achievement compared to using textbooks containing material and a collection of questions. This is because students become motivated to be active in learning activities in line with the objectives of using the Google Site implemented by researchers.

The teacher's response to social issue-based environmental change learning using Google sites is very suitable for use. The results of high student independence are supported by the teacher's response that the Google Site LMS is good, starting from the depth of the material, appearance and language used. Biology teachers' assessments of the Google Site are presented in Table 4.8.

Table 4.8 Teacher Response Questionnaire Results

Aspek	ΣX	ΣX Maks	Skor (%)	Criteria
Content	38	40	95	Very Worth It
Languange	18	20	90	Very Worth It
Presentation	15	15	100	Very Worth It
Graphics	49	50	98	Very Worth It
Total		95,75%		Very Worth It

The results of the teacher's responses with a total score of 95.75% fall within the criteria of being very suitable for use. This supports the results that the experimental class has a higher increase in post-test results compared to the control class so that the experimental class's N-gain shows high criteria while the control class's N-gain shows medium criteria. Students' independent learning using the Google Site is well stimulated because the language used is easy for students to understand, besides that the interactive appearance of the Google Site makes students have the initiative to learn independently. Apart from that, trusted and relevant source links with easy access make students enjoy the learning process more so that student learning activities become more effective (Maskar, et. al., 2021).

CONCLUSION

Based on the results of the analysis and discussion, the Google Site Environmental Change material developed is very valid based on assessments from media experts and material experts. The results of the validity assessment by media experts were 89% and material experts were 93%. The scientific literacy of class Students' learning independence experienced an increase in social issue-based Environmental Change material using Google Site resulting in strong criteria with a final percentage of 77.32%.

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