



Development of Student Worksheets Based on Contextual Teaching and Learning in Ecosystem Learning Materials

Annisa Ayu, * Nirwana Anas

Department of Biology Education, Faculty of Tarbiyah and Teacher Training, State Islamic University of North Sumatra, Jl. William Iskandar Ps. V, North Sumatra 20371, Indonesia

*Corresponding Author e-mail: annisaayu@uinsu.ac.id

Received: May 2023; Revised: June 2023; Published: July 2023

Abstract

This study aims to develop teaching materials in the form of Student Worksheets based on Contextual Teaching and Learning in Biology learning that are valid, practical, and effective in Ecosystem material. This type of research is research and development using the 4D model, namely, Define, Design, Develop, Disseminate. This research was conducted at SMA Muhammadiyah 09 Kualuh Hulu for the 2022/2023 academic year. The data were collected by using validation sheet, students response, and test instruments. Furthermore, data analyzed descriptively by using percentage and n-gain formula. The product stated valid by media (86%) and material (89%) validators. The practicality analysis result shows that the product developed very practical to use for facilitating students learning outcomes. The N-Gain results in this study obtained a value of 0.84 in the High category. Based on the current study finding, it can be concluded that the student worksheets based on contextual teaching and learning developed were valid, practical, and effective to facilitate students' learning outcomes in ecosystem learning material.

Keywords: Student worksheet, Contextual Teaching and Learning, learning outcomes, Ecosystem

How to Cite: Ayu, A., & Anas, N. (2023). Development of Student Worksheets Based on Contextual Teaching and Learning in Ecosystem Learning Materials. *Prisma Sains : Jurnal Pengkajian Ilmu dan Pembelajaran Matematika dan IPA IKIP Mataram*, 11(3), 828-835. doi:<https://doi.org/10.33394/j-ps.v11i3.8538>



<https://doi.org/10.33394/j-ps.v11i3.8538>

Copyright© 2023, Ayu & Anas

This is an open-access article under the [CC-BY](https://creativecommons.org/licenses/by/4.0/) License.



INTRODUCTION

Globalization should be followed by professional and high-quality educational work. Educational institutions are the single most important thing that can be done to prevent a decline in education standards in Indonesia in all fields of study and teaching so that students can compete successfully on the global stage, high educational standards are very important (Rahayuningsih, 2013). According to the Minister of Education and Culture No. 21 of 2016, one of the important qualifications for teaching is that students must be able to present evidence of their mastery in a concrete context related to the results of the material they learn at school.

A learning approach that emphasizes that students must be taught to be able to collaborate with others, subject matter needs to be related to everyday life and at school can facilitate students to be involved in a social environment (Syahputra, 2018). The only teaching and learning model that can be used in learning is Contextual Teaching and Learning. One of the key characteristics of contextualization is the expectation that students will relate their personal knowledge to their everyday lives. In addition, the knowledge they acquire goes beyond just understanding the concept that also includes their own independent learning outcomes, enabling the continuation of teaching to be efficient and effective to increase student interest and motivation (Fanani, 2018).

Contextual Learning, which is usually called Contextual Teaching and Learning, is not a new approach in education. The foundation for contextual learning had been laid by John

Dewey in 1916, and the Washington State Conference on contextual teaching and learning continues to build on this foundation. Contextual Teaching and Learning is a teaching theory that helps teachers relate their lessons to real-world situations and motivates students by creating connections between their knowledge and its application in everyday life as members of society, citizens, and workers while improving learning outcomes (Kunandar, 2007). Contextual learning-based education delivered in the form of Student Worksheets (SW), which is the only form of educational teaching that is most common and the only means that can increase student motivation during the learning process, facilitate research projects, and support participant exploration educate. SW is a teacher-student collaboration method that is used to develop all learning standards in the form of experimental work or demonstrations (Trianto, 2010).

In an education the development of SW is needed to facilitate the achievement of teachers in achieving the goals that have been set so that they can inspire and motivate students, presented in a clear and useful way so that students can use them. For this reason, good design for SW is needed to complement the educational process which makes students more active in learning (Barasa, 2021). SW developed using the Contextual Teaching and Learning model will link various teaching materials with everyday life so that students will more easily understand and more easily find various solutions to problems or phenomena presented in the SW. Several studies that have been carried out previously stated that the level of validation of student worksheets based on Contextual Teaching Learning to build students' critical thinking skills on the theme of global warming seen as a whole is included in a very valid category so it is very feasible to develop (Romlah, 2021). Other research also states that SW based on Contextual Teaching and Learning can be used to train students' critical thinking skills, so as to improve student learning outcomes (Ningrum, 2020). Much research has been done on the development of Contextual Teaching and Learning-based SW. According to the results of the research that was tested by (Rahman, 2020) conducted the same research showed that the development of contextual learning-based worksheets could improve students' learning outcomes. However, the SW developed in the previous study is specifically for elementary level students. The current study focused on the development of contextual learning-based SW that could improve students' learning outcomes in ecosystem learning material that not covered yet in the previous studies.

Based on the results of observations that have been made, information is obtained that in the learning process, SW are used which only contain questions that students will work on at home and students rarely do group learning in finding material that connects with everyday life. The activity that is often done by students is to rewrite material written by the teacher on the blackboard when explaining which makes learning monotonous. So that it is necessary to develop a SW based on contextual teaching and learning which attracts students to learn and encourages students to be active in the learning process and emphasizes students' full thinking activities both physically and mentally. Therefore the purpose of this research is to develop a valid, practical and effective SW based on contextual teaching and learning to improve students' learning outcomes in the ecosystem learning material. The SW developed is expected to be an interesting medium, and could motivate students to be more enthusiastic in learning biology.

METHOD

The research and development (R&D) model is used to develop a product by validating products that will be used in an educational environment that will later be studied (Sugiono, 2013). The research and development model that the researchers used for this study was using the 4D design by (Thiagarajan et al., 1974), namely Define, Design, Develop, and Disseminate. Define stage: this stage results from the observation process that has been carried out on the learning process at school. Design Stage: the purpose of this stage is to make SW, which consists of 3 stages namely, compiling tests, choosing media, preparing learning objectives,

and drafting SW. The design of SW was carried out based on the learning process based on Contextual Teaching and Learning. The material used is Ecosystem. Develop stage: the purpose of this stage is to develop SW with valid, practical, effective criteria that have been previously revised by media experts, materials, teacher and student responses. The current study involved one media expert, one material expert, and one teacher to validate the product developed. Moreover, 37 students participate in the study to assess the product practicality and effectiveness. The SW revision process consists of two stages, namely the SW revised by the supervisor and the assessment of media and material experts and field practitioners. Dissemination Stage: the purpose of this stage is to disseminate the designed SW. The dissemination of this SW was carried out by class X SMA Private Muhammadiyah 09 Kualuh Hulu. Furthermore, large-scale dissemination is the publication of this scientific article.

The research instrument used is the material expert and media expert validation sheet by providing an assessment of the product to be developed to determine the level of validity. Questionnaire, intended to determine the level of practicality of learning media from its users (teachers and students). Tests (Pretest and Posttest) to determine the level of effectiveness of whether the developed SW is effective in improving students' learning outcomes. Data from the results of the validity assessed by the material expert and media expert validators are in the form of a percentage score, while the product practicality assessed by biology teacher that involved in the current study. The data obtained further proceed using the Equation 1, while the effectiveness viewed from student learning outcomes analyzed using n-gain equation (Hake, 1999) (Equation 2) and further categorized using the criteria provided in Table 1.

$$\text{Presentage (\%)} = \frac{\text{score obtained}}{\text{maximum score}} \times 100 \% \dots\dots\dots (1)$$

$$N - \text{Gain} = \frac{\text{Score}_{\text{posttest}} - \text{Score}_{\text{pretest}}}{\text{Score}_{\text{maksimal}} - \text{Score}_{\text{pretest}}} \dots\dots\dots (2)$$

Table 1. Results criteria

Validity and Practicality		Effectiveness (n-gain)	
Percentage (%)	Criteria	Score	Criteria
80-100	Very Valid/Practical	> 0.70	High
60-79	Valid/Practical	0.30 – 0.70	Moderate
40-59	Valid/Practical Enough	< 0.30	Low
20-39	Not Valid/Practical		
19-0	Very not Valid/Practical		

RESULTS AND DISCUSSIONS

The Define stage is carried out by interviewing teachers and students who are at SMA Private Muhammadiyah 09 Kualuh Hulu with the aim of knowing the problems that exist in schools and knowing what media the teacher uses in conveying learning and students' understanding in learning through media taught by Teacher. Design stage, namely planning the media to be used, such as planning the development of SW, preparing general learning objectives, namely achieving KI and KD as well as specific goals, namely increasing learning outcomes, choosing the SW format by reviewing existing SW, choosing Contextual-based Ecosystem material Teaching and Learning which will be compiled in SW, compiles the design of CTL-based SW as teaching materials. The Develop stage is the development of the SW used in research as teaching materials by validating the SW that has been made to find out whether the media that the researcher has made is appropriate or not. The validation test was carried out to find out whether the media that the researcher worked on was worth or not. The validation test was carried out by 4 validators including media validators, material validators, question instrument validators and questionnaire instruments.

Based on the results obtained in media validation, it shows the "Very Valid" category with a percentage of 86%. The following Table 2 shows the results of validation by the media validator.

Table 2. validation results by the media validator

Aspect	Score obtained	Maximum Score	Percentage	Category
LKPD cover size	7	8	95%	Very Valid
LKPD cover design	23	32	80%	Very Valid
LKPD content design	56	68	80%	Very Valid
Score obtained			86	
Maximum Score			100	
Percentage			86%	
Category				Very Valid

Based on the results obtained in material validation, it shows the "Very Valid" category with a percentage of 89%. Following are the results of validation by the material validator (Table 3).

Table 3. Validation results by the material validator

Aspect	Score obtained	Maximum Score	Percentage	Category
Suitability of material with KI and KD	16	16	100%	Very Valid
Material accuracy	20	24	95%	Very Valid
Material update	4	4	100%	Very Valid
Encourage curiosity	7	8	95%	Very Valid
Serving technique	4	4	100%	Very Valid
Presentation support	10	12	95%	Very Valid
Student engagement	8	8	100%	Very Valid
Coherence and coherence flow of thought	7	8	95%	Very Valid
Contextual essence	13	16	95%	Very Valid
Score obtained			89	
Maximum Score			100	
Percentage			89%	
Category				Very Valid

The results obtained in instruments validation showed the "Very Valid" category with a percentage of 90%. The following is Table 4 of validation results by the question instrument validator.

Table 4. Validation of instrument

Aspect	Score obtained	Maximum Score	Percentage	Category
Clarity	8	8	100%	Very Valid
Core precision	3	4	95%	Very Valid
Relevant	3	4	95%	Very Valid
Content validity	3	4	95%	Very Valid
No biases	8	8	100%	Very Valid
Language accuracy	12	12	100%	Very Valid
Score obtained			37	
Maximum Score			40	
Percentage			90%	
Category				Very Valid

Based on the results obtained in questionnaire validation, it shows the 95% category. The following Table 5 validates the results by the questionnaire validator.

Table 5. validation results by the questionnaire validator

Aspect	Score obtained	Maximum Score	Percentage	Category
Clarity	13	15	95%	Very Valid
Content accuracy	4	5	95%	Very Valid
Relevance	9	10	95%	Very Valid
Content validity	5	5	100%	Very Valid
No biases	20	20	100%	Very Valid
Score obtained			51	
Maximum Score			55	
Percentage			95%	
Category				Very Valid

After validating the SW that will be used, then conducting a practicality test on the SW by giving response questionnaires to teachers and students regarding the use of SW as media or teaching materials. Teacher response results showed that the SW gets a maximum score of 85 with a percentage of 100% so that the SW can be declared Very Practical as showed in Table 6.

Table 6. The results of biology teachers

Aspect	Score obtained	Maximum Score	Percentage	Category
Material	20	20	100%	Very Practical
Language	15	15	100%	Very Practical
Presentation	50	50	100%	Very Practical
Score obtained			85	
Maximum Score			85	
Percentage			100%	
Category				Very Practical

The student response questionnaire was filled out by 37 students for practical tests of SW which used for research conducted. The results of the responses from 37 participants presented in Table 7.

Table 7. Response results from 37 students

N	Total score	Average	Percentage (%)	Category
37	432	11.67	90	Very Practical

From the student response showed in Table 7, it can be seen that the results of student responses to Contextual Teaching and Learning-based SW used from 37 students got a total score of 432 out of a maximum score of 444 with a percentage result of 90% in the very practical category. Thus it was concluded that the SW based on Contextual Teaching and Learning was categorized as Very Practical to be used in learning activities.

The Disseminate stage is carried out by distributing or giving SW to participants and seeing the results of the effectiveness of SW. Next, test of the effectiveness of Contextual Teaching and Learning-based SW by conducting direct trials on students who are at Private High School Muhammadiyah 09 Kualuh Hulu. The effectiveness results are as in the following Table 8.

Table 8. Results of the effectiveness of student learning outcomes

N	Pretest	Posttest	n-gain	Category
37	50.54	91.89	0.84	High

Based on the Table 8 of N-Gain test results, it can be seen that the N-Gain Score is 0.84 with the high category. The results of the Pretest and Posttest values that have been carried out in this study obtained an average Pretest score of 50.5 and a Posttest average score of 91.9 which indicates that the value increased by 49.4 from the Pretest value to the Posttest value.

Based on the results of the analysis, it can be seen that the SW is declared Very Valid from Media Experts by 86%, then from Material Experts it is stated as Very Valid with a Percentage of 89% and Very Valid from Question Instrument Experts with a percentage of 90% and very valid from Questionnaire Experts with a percentage of 95%. SW are also Practical in accordance with the Practicality Test Results conducted by teachers and students with respective scores of 100% and 95% in the Very Practical category. SW are also effective with an N-Gain value of 0.84 in the High category. This shows that learning outcomes in the cognitive domain increase after the use of Contextual Teaching and Learning-based worksheets in learning. SW are a tool for teaching materials that teachers can use to increase student involvement or student activity in the learning process (Isrok'atun, 2018). Contextual Teaching and Learning (CTL) is a learning concept in which the teacher presents real-world situations into the classroom and encourages students to make connections between their knowledge and apply it in everyday life (Shoimin, 2014).

SW developed on the basis of Contextual Teaching and Learning have 7 indicators (Constructivism, Questions, Inquiry, Learning Community, Modeling, Reflection, Authentic Assessment). In the 7 indicators of Contextual Teaching and Learning students seem interested in learning, this supports an increase in learning outcomes that have been packaged in SW based on Contextual Teaching and Learning, so that they can be used as references for teaching materials by teachers to improve learning outcomes students and motivate students in learning. Research on the Development of SW based on Contextual Teaching and Learning has been carried out a lot with positive results that are well received by students and are popular when learning takes place.

CONCLUSION

Based on the results of the analysis that has been done, it can be concluded that the Student Worksheet based on Contextual Teaching and Learning is Very Valid with a percentage value of 86% from Media Experts, 89% from Material Experts in the Very Valid category and 90% from Instrument Experts in the Question category Very Valid and 95% with

the Very Valid category from Questionnaire Experts. Student Worksheets Based on Contextual Teaching and Learning are also Practical in accordance with the Practicality Test with a percentage value of 100% from school biology teachers in the Very Practical category and 95% of student responses in the Very Practical category. Then the Contextual Teaching and Learning-based SW used were included as Effective with an average score of 0.84 in the High category and experienced an increase from the Pretest score to the Posttest score of 49.4%.

RECOMMENDATION

In the research conducted in the development of Contextual Teaching and Learning-based Student Worksheets for Ecosystem material designed for class X SMA/MA, there are several recommendations that the authors provide in order to improve Student Worksheets, namely the material curriculum is developed further in accordance with technological advances so that the learning process is not hampered. Then Student Worksheets based on Contextual Teaching and Learning must be developed so that students are able to learn by relating it to everyday life and also to increase motivation and insight to improve student learning outcomes.

ACKNOWLEDGMENT

The author would like to thank all those who participated in this research, the teachers of SMA PRIVATE MUHAMMADIYAH 09 kualuh hulu, who always give time and enthusiasm and then provide suggestions for improvement in learning, as well as friends from the State Islamic University of North Sumatra who have participated in the research. this research. I would like to express my utmost gratitude to my parents, Mr. Armansyah Pohan and Mrs. Prihatin who have helped pray for me, who have physically and mentally provided encouragement and also strong support in all processes during the process of making this journal, thanks to Miefta Sutrisna who have given me motivation and support so that I can finish my journal article and I thank my supervisor Dr. Nirwana Anas, M.Pd who has provided input and direction and encouragement for the preparation of my article.

REFERENCES

- Aqib, Z. (2013). *Model-model, Media dan Strategi Pembelajaran Kontekstual*. Bandung: Yrama Widya.
- Barasa, M. (2021). *Desain dan uji coba lembar kerja peserta didik (LKPD) berbasis kontekstual pada materi larutan elektrolit dan non elektrolit sebagai sumber belajar peserta didik* (Doctoral dissertation, Universitas Islam Negeri Sultan Syarif Kasim Riau).
- Elhefni. (2011). *Strategi Belajar: Revansi CTL dan KTSP*. Palembang: Grafika Telindo Press.
- Fanani, D. (2018). Keefektifan LKS Berbasis Contextual Teaching and Learning (CTL) Untuk Meningkatkan Keterampilan Proses Sains Siswa Pada Materi Pesawat Sederhana. *PENSA E-JURNAL: PENDIDIKAN SAINS* 6(02). <https://ejournal.unesa.ac.id/index.php/bioedu/article/view/36767>
- Irnaningtiyas. (2013). *Biologi Untuk SMA/MA kelas X*. Jakarta: Erlangga.
- Isrok'atun., Hanifah, N., & Sujana, A. (2018). *Melatih Kemampuan Problem Posing Melalui Situation-Based Learning Bagi Anak Sekolah Dasar*. Sumedang: Upi Sumedang Press.
- Jayusman, I., & Shavab, O. A. K. (2020). Studi Deskriptif Kuantitatif Tentang Aktivitas Belajar Mahasiswa Dengan Menggunakan Media Pembelajaran Edmodo Dalam Pembelajaran Sejarah. *Jurnal Artefak*, 7(1), 13–20. <https://jurnal.unigal.ac.id/artefak/article/view/3180>
- Kosasih, E. (2021). *Pengembangan Bahan Ajar*. Jakarta: PT. Bumi Aksara
- Kunandar. (2007). *Guru Profesional*. Jakarta: PT Raja Grafindo Persada
- Lase, n.k & Z, nurlina.,(2022). pengembangan LKPD berbasis contextual teaching and learning pada materi sistem eksresi manusia dikelas VIII SMP negeri 3 idanogawo.*jurnal pendidikan minda*,3 (2).

- <https://ejournal.universitaskarimun.ac.id/index.php/mindafkip/article/view/462/412>
Lestari, Y., D. (2017). Pengembangan lembar kerja siswa (LKS) berbasis Contextual Teaching and Learning pada materi perubahan lingkungan. *Jurnal bioedu*, 6 (3).
<https://ejournal.unesa.ac.id/index.php/bioedu/20878/19151>
- Muslich, M. (2011). *KTSP pembelajaran berbasis kompetensi dan kontekstual*. Jakarta: Bumi Aksara.
- Ningrum, S. N. K., & Winarsih. (2020). Pengembangan Lembar Kegiatan Peserta Didik Berbasis Contextual Teaching And Learning Pada Sub-Materi Interaksi Antar Komponen Ekosistem. *Jurnal Berkala Ilmiah Pendidikan Biologi*,9(3), 406–413.
<https://ejournal.unesa.ac.id/index.php/bioedu/article/view/36767>
- Rahman, I. N., (2020). Pengembangan LKPD berbasis Kontekstual untuk meningkatkan hasil belajar. *Jurnal teknologi pendidikan dan pembelajaran*. Vol. 7 no 1.
<https://jurnal.untirta.ac.id/index.php/JTPPM/article/view/10678>
- Rahmawati, A., &Yonata, B. (2019). pengembangan LKPD berbasis Contextual Teaching and Learning (CTL) untuk melatih keterampilan proses sains pada materi keseimbangan kimia. *Unesa Journal of Chemical Education*, 8 (2).
<https://ejournal.unesa.ac.id/index.php/journal-of-chemical-education/article/view/28442>
- Romlah, S., Hodijah, N., & Taufik, A. N. (2021). Pengembangan LKPD Berbasis Pendekatan Contextual Teaching Learning untuk Membangun Kemampuan Berpikir Kritis Peserta Didik pada Tema Global Warming. *Journal of Science Education*, 6(1), 278–284.
<https://www.researchgate.net/publication/356867169>
- Riduwan.(2010). *skala pengukuran variabel-variabel penelitian*, Bandung: Alfabeta.
- Retnawati, H.(2016). *Analisis Kuantitatif Instrumen Penelitian*. Yogyakarta: Parama Publishing.
- Sugiyono. (2013). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta
- Sugiyanto, Y. Hasibuan MHE,& Anggereni E. (2018). Pengembangan Lembar Kerja Peserta Didik (LKPD) berbasis Kontekstual pada materi Ekosistem kelas VII SMPN Tanjung Jabung Timur
- Shoimin, A. (2014). *68 Model Pembelajaran Inovatif dalam kurikulum 2013*. Yogyakarta: Ar-ruzz media.
- Syahputra, E. (2018). Pembelajaran Abad 21 dan penerapannya di indonesia. Prosiding seminar nasional SINESTEKMAPAN. *Universitas Quality* 1 (1),1276-1283.
<https://www.researchgate.net/publication/331638425>
- Trianto.(2010). model pembelajaran terpadu. jakarta : Bumi aksara. Hal.111.
- Prastowo, adi. 2021. Panduan kreatif membuat bahan ajar inovatif yogyakarta : Diva Press.
- Yunipiyanto M R. (2010). Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Masalah Untuk Meningkatkan Kemampuan Berpikir Kritis Dalam Proses Pembelajaran Ekonomi. *Jurnal Studi Sosial*. 8 (1). 1-15.
<http://repository.lppm.unila.ac.id/27022/1/21018-49184-1-PB.pdf>
- Widayati, S. (2009). *Biologi SMA/MA Kelas X*. Jakarta: Pusat Perbukuan Departemen Pendidikan Nasional.