

Contextual Teaching and Learning-based E-Worksheet on Science Subjects for Fourth Grade Elementary Schools

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ARTICLE INFO

Article history:

Received October 14, 2023

Accepted March 30, 2024

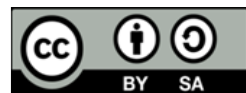
Available online April 25, 2024

Kata Kunci:

Pembelajaran Kontekstual, E-LKPD, IPAS

Keywords:

Contextual Teaching and Learning, E-Worksheet, Science



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ABSTRAK

Kurangnya motivasi belajar dalam diri siswa mengakibatkan mereka menjadi kurang fokus dalam belajar dan kurang aktif pada saat proses pembelajaran berlangsung, sehingga berdampak pada rendahnya hasil belajar siswa, khususnya pada proses pembelajaran IPAS. Hal tersebut kebanyakan disebabkan oleh kurangnya bahan ajar yang inovatif atau cenderung monoton. Oleh karena itu, diperlukan bahan ajar yang mendukung, bentuk menarik, serta berdasar pada model pembelajaran yang sesuai agar siswa menjadi semangat belajar dan mempunyai kemampuan berikir kritis. Salah satu media yang menjadi solusi adalah dengan menggunakan E-LKPD berbasis CTL. Tujuan penelitian ini adalah untuk mengembangkan E-LKPD berbasis CTL pada muatan IPAS kelas 4 Sekolah Dasar. Penelitian ini berjenis penelitian pengembangan dengan model ADDIE. Subjek penelitian adalah media E-LKPD berbasis CTL pada muatan IPAS kelas 4. Pengumpulan data menggunakan instrumen uji ahli dan uji coba. Teknik analisis data dengan cara menghitung skor persentase penilaian validasi dan respon pengguna. Hasil penelitian menunjukkan bahwa pengembangan E-LKPD berbasis CTL pada muatan IPAS kelas 4 memenuhi kriteria sangat valid dari aspek kualitas dengan rincian skor 93,775% dari ahli media, 95% dari ahli desain pembelajaran, dan 94,6% dari ahli isi pembelajaran. Hasil uji respon siswa menunjukkan bahwa terjadi peningkatan dari hasil pretest dengan nilai rata-rata 34,8%, menjadi nilai rata-rata 84,8 pada hasil post test siswa. Berdasarkan hasil tersebut, maka dapat disimpulkan bahwa bahan ajar E-LKPD berbasis CTL yang telah dikembangkan layak diterapkan dalam pembelajaran. Implikasi dari penelitian ini adalah secara teoritis dan praktis menyajikan media pembelajaran E-LKPD berbasis CTL muatan IPAS kelas 4 sebagai solusi permasalahan proses pembelajaran siswa.

ABSTRACT

Lack of motivation to learn students results in them being less focused on learning and less active during the learning process, which impacts low student learning outcomes, especially in the science and science learning process. A lack of innovative teaching materials mostly causes this or tends to be monotonous. Therefore, supportive teaching materials that are attractive in form and based on appropriate learning models are needed so that students are enthusiastic about learning and can think critically. One medium that is a solution is to use CTL-based E-Worksheet. This research aims to develop a CTL-based E-Worksheet for grade 4 elementary school science content. This research is a development research type with the ADDIE model. The research subject is CTL-based E-Worksheet media on class 4 science content. Data collection uses expert test instruments and trials. The data analysis technique calculates the percentage score for validation assessments and user responses. The research results show that the development of a CTL-based E-Worksheet for grade 4 science content meets very valid criteria from the quality aspect, with a detailed score of 93.775% from media experts, 95% from learning design experts, and 94.6% from learning content experts. The results of the student response test showed an increase from the pretest results, with an average score of 34.8%, to an average score of 84.8 on the students' post-test results. Based on these results, the CTL-based E-Worksheet teaching materials that have been developed are suitable for application in learning. This research implies that it presents CTL-based E-Worksheet learning media with grade 4 science content as a solution to problems in the student learning process.

1. INTRODUCTION

Educational progress is one of the keys to a nation's progress. Therefore, innovation in education and policy changes made by the Government are very important in improving the quality of education in Indonesia (A. Hardianti & Suharti, 2022; Pandipa, 2020). The Indonesian Government has made various efforts to improve the quality of education, including developing new, creative ideas in learning activities. The Government's current efforts to improve the quality of education are by implementing an independent curriculum, which can influence the way teachers and all elements involved in education work, including learning administration, teaching methods, and even the way teachers assess students (M. M. Jannah & Rasyid, 2023; Ledia et al., 2024). With that, it is hoped that the quality of education in Indonesia will be better because this independent curriculum does not only focus on one student competency but focuses on all student competencies in each phase so that students can learn the material more deeply and meaningfully, and enjoyably (Rahmadayanti & Hartoyo, 2022). Dynamic education demands a learning process based on the demands of the times (Asrowi et al., 2019; Devi Erlistiana et al., 2022). The development of the era has entered the digitalization era of the Industrial Revolution 4.0, followed by the era of Society 5.0, marked by society starting to implement technological advances that emerged in the Industrial Revolution 4.0 in solving various problems that occur in the social sphere (Ismail & Nugroho, 2022; Sugiono, 2020). The advancement of digital technology has provided many benefits for anyone in accessing various information without any limitations of space and time (Farida et al., 2019). This change directly impacts the education sector, leading to the evolution of integrating information and communication technology in learning (Moreno-Guerrero et al., 2021). Thus, the world of education is currently experiencing an increase in the use of technology-based learning systems (Huriyah et al., 2022).

Advances in science and technology mean that students are now expected to be able to adapt to the use of digital technology (Ambarwati et al., 2021; E. N. Sari & Listiadi, 2023). Moreover, the implementation of learning in the current independent curriculum is centered on children (student-centered learning), a learning process based on problem-solving, real-life project-based learning, and a collaborative learning process. This can provide space for the growth of student skills, such as a culture of critical thinking, communication and collaboration skills, and becoming creative students. So that students can fulfill the four main competencies commonly called 4C, namely critical thinking, communication, collaboration, and creativity (Saputra et al., 2019). Therefore, one of the preparations that educational institutions can make in the learning process in the digital era in the independent curriculum is to provide learning tools, including teaching materials and other learning aids (Sofia & Basri, 2023; Ummah et al., 2022). There are several differences in the learning materials in the independent curriculum with the previous curriculum, one of which is different and new in the independent curriculum is the presence of science content at the elementary school level. This science content is a combination of natural sciences and social sciences. The hope of combining these materials is that it can trigger students to manage the surrounding natural environment and the social environment in an integrated manner (S. Dewi et al., 2022; M. M. Jannah & Rasyid, 2023). This is because the thinking ability of elementary school students is at a holistic, whole, and concrete stage (Marwa et al., 2023). So, the science learning process in the classroom is considered necessary and, of course, must be supported by various media, teaching materials, and learning methods that can make it easier for students to understand the material. Teaching materials are one of the means to support the smooth learning process. In addition, when teaching materials are used correctly according to the needs of teachers and students, this can be an important factor that can improve the quality of learning (Maghfiroh, 2022; Sarni et al., 2021). Teaching materials have many benefits in learning activities, namely making learning more interesting, making it easier for students to learn the competencies they need to master, and providing opportunities for students to learn independently so that they can reduce dependence on the presence of teachers (Suryani et al., 2020). Teaching materials often used in the world of education, such as printed teaching materials, teaching materials in audio form, teaching materials in audiovisual form, and interactive multimedia teaching materials. However, most teachers use printed teaching materials such as modules, books, and Student Worksheets (Indariani et al., 2019; Sarni et al., 2021). Student Worksheets are one of the teaching materials that teachers can use to support the communication process between teachers and students, so this teaching material is considered to be able to increase student involvement or activity in the learning process (Chodijah et al., 2012; T. Hardianti et al., 2021).

Student Worksheets are sheets containing student assignments, usually in the form of instructions or steps for completing assignments. Assignments on the Student Worksheet can also contain problems or descriptions that trigger students to build their knowledge through group activities (Fariroh & Anggraito, 2015; Sarni et al., 2021). In addition, the Student Worksheet also presents a series of main discussion topics equipped with study instructions and practical exercises packaged in the form of sheets (Saruati & Susilowibowo, 2020). Applying the Student Worksheet for learning will create a more systematic and

effective teaching and learning process in understanding a concept that aims to solve problems (Alfiana & Dewi, 2019; P. S. Dewi, 2016). Thus, the Student Worksheet is an important component that can support the achievement of learning objectives. However, many teachers still need to use worksheets that fit the needs of their students.

Given the important role of Student Worksheets, developing more innovative Student Worksheets is necessary. Innovation in developing Student Worksheets based on solving contextual problems supported by image displays and providing Student Worksheet questions suitable for learning, especially in Elementary Schools (Ma'arif et al., 2022; Septonanto et al., 2024). In connection with the digitalization era, which also impacts the learning process, teachers can utilize digital-based teaching materials as media that can attract students' attention (Ummah et al., 2022). Teachers can innovate digital-based learning, such as digital Student Worksheets or E-Student Worksheets (Lavtania et al., 2021). E-student worksheets can be accessed via electronic devices containing instructions, materials, and questions from learning objectives (Safitri, 2022). Student E-Worksheets are interactive teaching materials packaged using multimedia or electronic-based learning media with certain characteristics to support the process of achieving student competencies that can be accessed online (Damayanti & Suniasih, 2022; E. N. Sari & Listiadi, 2023). However, based on observations made by researchers at SD Negeri 4 Panji, many problems remain in the learning process, such as fourth-grade students still needing help understanding Natural and Social Sciences material, which impacts low student learning outcomes.

The results of interviews with teachers in charge of Natural and Social Sciences subjects revealed that there still needs to be more innovative learning media in the Natural and Social Sciences content. Many teachers at the school still need to start using media in the learning process. This makes students less motivated to learn, which results in them needing to be more focused on learning and more active during the learning process. Teachers have created Student Worksheet teaching materials as collections of materials and questions that are no different from the books used by students. The Student Worksheet also has no learning model used in the classroom. This makes students' analytical skills less effective because students need help to grasp the material the teacher gives optimally. Student Worksheets at the school are still in paper form and not digital-based. This is because the school still needs digital learning media to support the learning process at school. Students need supporting teaching materials, attractive forms, and media that directly contain appropriate learning models so the teacher can easily understand the material and questions. In this case, Student Worksheets are needed that are highly attractive and support students in constructing the knowledge they have gained (Lestari & Muchlis, 2021). This aims to enable students to implement knowledge and skills daily. Teachers can develop Student Worksheets that aim to provide practice in critical thinking skills, requiring a fixed method, namely Student Worksheets based on Contextual Teaching and Learning (CTL) in the science content to encourage students to be more active both physically and mentally. The CTL approach can improve students' critical thinking skills and motivation in learning. Students' critical thinking skills can be trained through teaching materials, including the Student Worksheet (Novitasari & Puspitawati, 2022; Shanti et al., 2018).

Developing teaching materials in E-Student Worksheets based on CTL is more interactive and interesting for students. It is by Natural and Social Sciences learning in Elementary Schools (Amalia & Rasiman, 2019). This is because the CTL approach emphasizes student-centeredness. Students will be trained independently to solve problems in class and their surroundings (Hasudungan, 2022). E-student worksheet teaching materials based on CTL in Natural and Social Sciences learning are appropriate because the science content encourages teachers and students to think creatively. In addition to the integrative approach, teachers must be creative in developing teaching materials because this greatly affects student learning outcomes. In science learning, teachers guide students to actively seek understanding related to learning materials and problem-solving activities and develop creative thinking skills (M. M. Jannah & Rasyid, 2023; Kusumawati et al., 2022). The findings of previous studies on Student Worksheets explain that using Student Worksheets impacts cognitive learning outcomes of products and processes in students (Ilmy et al., 2022; Mardhati et al., 2022). This CTL-based Student Worksheet is very practical for learning (Anggraini et al., 2022; Firdausi & Suchayo, 2021). The developed Student Worksheets received positive student responses and obtained very high validity (Aprilda & Kusmana, 2021; Herianto & Indana, 2020). The novelty of this study is combining the concept of E-Student Worksheets with CTL for Natural and Social Sciences subjects based on problems in the field. Based on the explanation of the facts above, it is necessary to develop CTL-based E-Student Worksheet teaching materials on the Science content to support the learning process for grade 4, especially at SD Negeri 4 Panji. So, this study aims to analyze the effectiveness of developing CTL-based Student E-Worksheets at SD Negeri 4 Panji, especially for the Natural and Social Sciences content of grade 4. In addition, this study is also expected to motivate teachers to create innovative, effective, and efficient teaching materials in the teaching and learning process so that they can obtain

maximum results in learning at school. This study can also contribute to helping teachers overcome various learning problems, especially in the independent curriculum's Natural and Social Sciences content.

2. METHOD

This research is a type of development research. The development model used in this study is ADDIE (Analysis, Design, Development, Implementation, Evaluation) (B. K. Sari, 2017). The ADDIE learning model is based on an effective and efficient system approach and through an interactive process between students, teachers, and the environment (Hidayat & Muhamad, 2021). The ADDIE model in this study will use five stages of development: Analysis, Design, Development, Implementation, and Evaluation. The analysis stage includes competency analysis, material analysis, student characteristic analysis, and instructional analysis. The results of the analysis stage are then used as study material (teaching materials), followed up at the design stage. The planning stage (design) includes the preparation of a structural framework (outline), determination of systematics, and designing evaluation tools. The development stage (development) includes pre-writing, drafting, editing, and revision, as well as limited trials to obtain input from interested parties such as media and material experts, peer reviewers, teachers, and students. The implementation stage is carried out with extensive/empirical trials, and the teaching material products are used by teachers and students in the learning process. The evaluation stage includes the results of the previous stage. Then, an evaluation is carried out to see whether the product developed is successful and by initial expectations. The instrument used is a learning outcome test consisting of a pretest and a post-test. The subjects in this study were CTL-based Student E-Worksheet media on Natural and Social Sciences content for grade 4 of elementary school. Data were collected using expert test instruments and media trial instruments. The instrument grid is presented in Table 1. Furthermore, the data collected from the instrument results, the percentage score of the validation assessment, and user response were calculated.

Table 1. Research Instrument Grid

No.	Expert	Criteria
1.	Learning Media Expert Test	The accuracy of background selection with the material The accuracy of layout proportions The use of fonts and font sizes on the cover Color combinations The attractiveness of the cover design The clarity of the writing The suitability of images and layouts The combination of interesting writing, images, videos Audio clarity Interactive presentation
2.	Learning Design Expert Test	Clarity of learning objectives Clarity of instructions for Student E-Worksheets The sequence of presentation of the material is clear Providing examples in presenting material Interesting material delivery Learning activities motivate students The interactivity of interesting media Completeness of structure for Student E-Worksheets Instructions for completing assignments are clear Suitability of evaluation to student characteristics
3.	Learning Content Expert Test	Suitability of material with basic competencies Suitability of material with competency achievement indicators Suitability of material with learning objectives Correctness of material Coverage of material Interestingness of material Importance of material Material is easy to understand Suitability of evaluation with material Suitability of evaluation with student characteristics Readability Effective and efficient use of language

No.	Expert	Criteria
4.	Individual Trial	The attractiveness of the appearance of the Student E-Worksheet Readability of writing Image clarity Color suitability Accuracy of video use Material is easy to understand Clarity of material description Suitability of evaluation with material Student E-Worksheet motivates learning Ease of use
5.	Small Group Trial	The attractiveness of the appearance of the Student E-Worksheet Readability of writing Image clarity Color suitability Accuracy of video use Material is easy to understand Clarity of material description Suitability of evaluation with material Student E-Worksheet motivates learning Ease of use

Table 1 shows the instrument grid, which includes the media expert test instrument, design, content, and the individual and small group trial instrument grid.

3. RESULT AND DISCUSSION

Result

The first stage is the analysis stage. The results of the analysis stage are in the form of a description of students, the tasks they will learn, and the learning objectives (Angko, 2017). With this, the analysis stage in this study consists of student character analysis, material and curriculum analysis, and analysis of learning materials and learning activities so that the need to develop innovative teaching materials in learning and analyze the feasibility and requirements for its development can be known. This analysis is a material that can be used as a reference in developing learning products in the form of CTL-based Student Worksheets in 4th-grade IPS lessons. In analyzing student characteristics, there are several things that teachers need to pay attention to, namely: 1) Overall student characteristics such as age, gender, family background; 2) Specific basic competencies possessed by students that can describe the types of abilities, skills or competencies that students must have before learning; 3) Learning styles possessed by students such as tendencies or hobbies, preferences or how students' learning habits are (Khoiriyah et al., 2022; Niswatin et al., 2022).

The results of the analysis stage are that 4th-grade elementary school students are, on average, 9-10 years old. According to Piaget, children have reached the concrete operational thinking stage, a stage of cognitive development where children tend to think logically but can only apply logic to physical objects and begin to show conservation abilities. However, even though they can solve problems logically, they cannot think abstractly about solving them (Desmita, 2015; Juwantara, 2019). Therefore, teaching materials must contain materials that can improve students' critical thinking skills. Based on the pre-cycle test on the material on the role of Islamic scholars in spreading Islamic teachings in Indonesia, the results obtained by students still need to be higher because the teaching materials need to be more interesting, so students are less enthusiastic about learning.

There are 13 male and 17 female students in one class, and the learning styles of students in the class tend to be audiovisual and kinesthetic. So that teaching materials can be adjusted to these learning styles. Furthermore, curriculum and material analysis and development of teaching materials must respond to competency standards and basic competencies, which are the ultimate curriculum education goals (Cahyadi, 2019). The guidelines in this study are the independent curriculum and the achievement of 4th-grade elementary school science learning. Then, learning activity analysis is carried out while developing teaching materials; needs analysis is a very important part and step (Aifulloh & Cahyanto, 2021). In this study, the need to develop teaching materials is the implementation of an independent curriculum in which students are expected to play an active role in the learning process. The independent curriculum learning process refers to the profile of Pancasila students, which aims to produce competent graduates and uphold

character values. Therefore, the teaching materials that will be made must be adjusted to learning activities that will form the profile of Pancasila students. These Natural and Social Sciences learning activities must contain the values of faith, devotion to God Almighty, noble morals, global diversity, cooperation, independence, critical thinking, and creativity.

The second stage is the design stage. The design stage includes planning for the development of teaching materials, including 1) Preparation of teaching materials in contextual learning by reviewing initial competencies, learning outcomes (CP), learning objectives (TP), and student targets based on the independent curriculum structure to determine learning materials based on facts, principles, concepts, and procedures, allocation of learning time, indicators and student assessment instruments, 2) Designing learning scenarios with a learning approach, 3) Selection of teaching material competencies, 4) Initial planning of learning devices based on subject competencies, 5) Designing learning materials and learning evaluation tools with a learning approach (Cahyadi, 2019). The researcher's design stage consists of designing the CTL Student E-Worksheet media by selecting materials. Researchers tend to choose materials that can utilize natural resources for the benefit of the local community. Researchers use the Google website, namely live worksheets, to develop the Student E-Worksheet. Researchers then choose fonts, elements, colors, and others to make the Student Worksheet a digital display that attracts students' interest in learning. The third stage is the development stage.

At this stage, media experts, learning design experts, and learning content experts assessed the results of the feasibility test of the E-Student Worksheet product. From the feasibility test results, a score from the learning media expert of 93.75% means that this teaching material is in the very good category, and a score from the learning design expert of 95% is in the very good category. A score from the learning content expert of 94.6% is in the very good category. Based on this, it can be concluded that the E-Student Worksheet teaching material product based on CTL on the Natural and Social Sciences content of grade 4 of SD Negeri 4 Panji can be said to be very good and very feasible so that it has met the criteria as a good and ideal teaching material so that this teaching material can be applied to learning activities in the classroom. The fourth stage is the implementation stage. The CTL-based E-Student Worksheet, which has been declared valid and meets the criteria as a good and ideal teaching material, began to be implemented in learning. Then, a limited trial was conducted by asking for individual and small-group student responses. From the individual trial results, a score of 96.6% was obtained, entering the very good category. The results of the small group trial obtained a score of 95%, which was categorized as very good. The field test results obtained a score of 93%, categorized as very good. Based on this, it is concluded that the CTL-based Student E-Worksheet teaching material is suitable for use in the learning process.

There are seven learning steps in the CTL-based E-Student Worksheet learning media system for Natural and Social Sciences content, namely: the first teacher starts the lesson with a greeting and asks students to pray together, checks student attendance, pays attention to student readiness, pays attention to neatness, and student seating positions, the teacher provides motivation and conveys the scope of the material, learning objectives, and activities to be carried out, as well as the scope and assessment techniques, the teacher will ask questions related to the subject matter to be studied; the second step, the teacher explains the teaching materials in the form of CTL-based E-Student Worksheets used in learning and how to use them; the third step, the teacher and each student access the CTL-based E-Student Worksheets for Natural and Social Sciences content; the fourth step, the teacher gives students the opportunity to read and explore knowledge related to the material to be studied that day on the E-Student Worksheet; the fifth step, in a certain section, a video will appear, then students are asked to watch the video and note down what they have learned from the video; the sixth step students carry out everything in the Student E-Worksheet, such as doing group assignments, guessing pictures, doing quizzes, and doing individual assignments; and the last step on the individual assignment page, the teacher applies the independent learning policy to students to do the assignments in their own way. Students can search for materials from the internet, books, magazines, encyclopedias, newspapers, and others. Then, students are free to think and reason about the findings. The fifth stage is the evaluation stage. Based on the pretest results, it can be seen that students get an average score of 34.8%, which means that the student's score is in the low category. Then, there was an increase in student scores on the post-test, with an average score of 84.8, which means it is in the high category. Based on the t-test results, the t-count value was 38.079, while the t-table value was 2.086, with a significance level of 5%. This means that $t_{count} > t_{table} > 1$ so that H_0 is rejected and H_1 is accepted. Based on this, the CTL-based Student E-Worksheet product can effectively be applied to the science content of grade 4 students of SD Negeri 4 Panji. In addition, this CTL-based Student E-Worksheet can help students be active and motivated to learn because the learning presented is more interesting, fun, and not boring, and allows students to explore their abilities. This CTL-based Student E-Worksheet can help teachers control activities, give badges to the best students, and evaluate student understanding. With teaching materials like this, students will become more independent in learning.

Discussion

Based on the results of data analysis, the CTL-based Student Worksheet E-learning material for the Natural and Social Sciences content of grade four elementary schools is very feasible to develop and apply in the learning process. Combining several supporting media components, such as videos and images, can attract students' interest in learning and add new learning experiences for students so that they feel more meaningful. Students seem enthusiastic about utilizing the Liveworksheet-based Student Worksheet in learning activities (Dwiyanti et al., 2023; Rachmadyanti et al., 2023). In addition to influencing students, teachers can be more creative and innovative when developing teaching materials. In this case, teachers are required to follow all developments that occur in students and be active and creative in finding out what can be utilized in learning activities so that students become more motivated in learning (Magdalena et al., 2020; Nurfadhillah et al., 2021). Learning using the CTL learning method is necessary to emphasize theoretical concepts to students that link what students are learning with students' daily conditions (Catur & Angggriyani, 2020; Widiyati, 2022). Using the CTL learning model, learning carried out by students becomes more dynamic and innovative to increase student learning activities (Fatimah et al., 2023; Manap, 2023). Student Worksheets (LKPD) are student guides used to develop cognitive aspects and all aspects of learning in the form of guides for investigation activities or problem-solving according to the indicators of learning outcome achievement that must be achieved by a task about the Basic Competencies (KD) to be achieved by them (Dachi & Perdana, 2021; Pulungan et al., 2020). In compiling Student Worksheets, there are three requirements: First, Didactic requirements, namely students must be active during the learning process which emphasizes the process of discovering concepts, the presence of varying stimuli in themselves and can develop students' attitude skills; Second, Construction requirements, namely the use of language, vocabulary, sentences, cognitive levels, and clarity that make it easier for students to understand the subject matter; Third, Technical requirements, namely examining the form of writing, appearance, and images on the Student Worksheet (Kinanti & Subagio, 2020; A. Sari & Revita, 2022). The steps for compiling the Student Worksheet are as follows, namely, analyzing the independent curriculum to determine the material that requires Student Worksheet teaching materials (I. K. Jannah & Suciptaningsih, 2023; Tamalene et al., 2023). The analysis includes the main material, the material to be taught, learning experiences, and students' competencies. Continued by compiling a Student Worksheet needs a map that is by the independent curriculum, the competencies that students must have, and determining the title of the Student Worksheet based on Learning Achievements (CP), main material, or learning experiences contained in the independent curriculum, writing Student Worksheets, which include: formulating Learning Objectives (TP) and Learning Objective Flow (ATP) as part of Learning Outcomes (CP). Then continued by determining the assessment tool according to student needs. The test tool used contains the material being taught.

Furthermore, student worksheet material can be compiled as supporting information, such as a general description or scope of the substance to be studied. Material sources can be taken from books, the internet, magazines, research journals, and others. In compiling Student Worksheets, it is necessary to pay attention to the structure of the Student Worksheet, which consists of the title, learning instructions, competencies to be achieved by students, supporting information, student assignments, and work steps, and assessments to measure student success after going through the learning process.

The Contextual Teaching and Learning (CTL) approach aims to help students understand the meaning of the material taught by the teacher, and they can relate the material to the context of students' daily lives, such as personal, cultural, and social contexts so that students can gain dynamic and flexible knowledge and skills. That way, they can actively build their understanding of how to deal with one problem to another. Learning with the CTL model has several characteristics including (I. K. Jannah & Suciptaningsih, 2023), learning with an authentic context, namely learning to achieve student skills in the context of real life or learning in a natural environment, learning that provides opportunities for students to do meaningful tasks, learning to provide meaningful experiences for students, learning through discussions between friends, group work, and providing suggestions or criticism between friends, learning that provides opportunities for students to create a sense of togetherness, and understand each other deeply, active, creative, and productive learning and learning by creating a pleasant atmosphere. The CTL approach focuses on teachers who deal more with strategy than providing information. The teacher's task in this approach is to manage the class as a team that works together to discover something new for students. The development of CTL-based Student E-Worksheets in Natural and Social Sciences content is useful for providing students with learning experiences to develop their critical thinking ability. This CTL-based Student E-Worksheet was created using the Google website, namely live worksheets. This application allows students to access their Student Worksheets anywhere and anytime. This Student E-Worksheet also includes an explanation of the material in audiovisual form. The findings of previous studies on Student Worksheets explain that using Student Worksheets influences the cognitive learning outcomes of products and processes in students (Ilmy et al., 2022; Mardhati et al., 2022). This CTL-based Student Worksheet is

very practical for learning (Anggraini et al., 2022; Firdausi & Suchayo, 2021). The Student Worksheets received positive student responses and were highly valid (Aprilda & Kusmana, 2021; Herianto & Indana, 2020). The novelty of this study is combining the concept of E-Student Worksheets with CTL for Natural and Social Sciences subjects based on problems in the field. The Student Worksheet teaching material based on CTL is feasible to develop and apply in learning activities to increase learning motivation and improve learning outcomes. This teaching material interests students, especially fourth-grade elementary school students. This is because the student worksheets developed have a very attractive design that uses a variety of colors and a font that is not rigid. In addition, this Student Worksheet presents pictures and videos that can support student learning activities. This Student Worksheet also presents learning activities through very interesting experiments. The limitation of this study is that the Student Worksheet teaching material is only limited to the content of Natural and Social Sciences for grade four and can only be accessed using electronic devices such as mobile phones and laptops. In addition, using this Student Worksheet teaching material also requires a stable internet connection. So, recommendations for further research can develop the Student Worksheet teaching material in other subjects, not only at one grade level. This is because the existence of this Student Worksheet teaching material can facilitate student learning activities. This study provides theoretical and practical implications for presenting E-Student Worksheet learning media based on CTL for Natural and Social Sciences for fourth grade as a solution to the problems of the student learning process.

4. CONCLUSION

Student E-Worksheets based on Contextual Teaching and Learning (CTL) on the Natural and Social Sciences content for grade four have been declared valid and meet the criteria as good and ideal teaching materials in terms of media, design, and learning content on Student E-Worksheets, and are suitable for use in the learning process. Student E-Worksheets based on CTL on the Natural and Social Sciences content should be implemented in grade four of SD Negeri 4 Panji to support the independent curriculum. Student E-Worksheets based on CTL are considered effective for the independent curriculum because these teaching materials can help teachers control student activities, give badges to the best students, and evaluate student understanding. As for students, with these teaching materials, students become more independent and more active in the learning process. In addition, Student E-Worksheets based on CTL are also considered to be able to improve student learning outcomes because the learning process uses interesting, fun, and not boring teaching materials and helps students be more independent because they are given the freedom to think and reason about the findings of what they have learned.

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