E-Worksheet for Students Using Liveworksheet for Digestive System Material

Syahria Fardinelly[1]*, Adeng Slamet [2], Rahmi Susanti [3], Makmum Raharjo[4] (iD)

[1,2,3] Teknologi Pendidikan, Fakultas Keguruan Ilmu Pendidikan, Universitas Sriwijaya, Palembang, Indonesia
[2,3] Keguruan Ilmu Pendidikan, Universitas Sriwijaya, Palembang, Indonesia

A B S T R A K

Permasalahan yang terjadi saat ini yaitu masih banyak kegiatan pembelajaran yang kurang memanfaatkan media sebagai alat pendukung pembelajaran. Penelitian ini bertujuan untuk mengembangkan Lembar Kerja Siswa Elektronik (E-LKPD) dalam pembelajaran IPA Sekolah Menengah Pertama (SMP). Jenis penelitian ini yaitu penelitian pengembangan dengan menggunakan model pengembangan Hannafin dan Peck yang terdiri dari tahap analisis kebutuhan, pengembangan, desain dan implementasi, disertai evaluasi Tessmer. Populasi dalam penelitian ini adalah seluruh siswa Kelas VIII yang berjumlah 30 orang. Subjek penelitian adalah para ahli yang meliputi ahli materi pembelajaran, ahli bahasa, dan ahli pemdia pembelajaran. Metode yang digunakan dalam pengumpulan data dalam penelitian ini melalui observasi, wawancara, angket, dan tes. Instrumen pengumpulan data berupa kuesioner dan soal tes. Teknik yang digunakan untuk menganalisis data yaitu analisis deskriptif kualitatif dan kuantitatif, serta N-gain. Hasil penelitian yaitu penilaian yang diberikan oleh ahli materi yaitu 86,67 (sangat valid), ahli bahasa 88,89 (sangat valid), dan ahli media 98,46% (sangat valid). Hasil uji kepraktisan menunjukan bahwa Lembar Kerja Siswa Elektronik (E-LKPD) dalam pembelajaran IPA mendapatkan kualifikasi sangat praktis. Hasil uji N-gain menunjukan terjadinya peningkatan nilai hasil belajar dan diperoleh kategori sedang sehingga efektif. Disimpulkan bahwa E-LKPD menggunakan liveworksheet sebagai bahan ajar dapat meningkatkan nilai hasil belajar peserta didik. Implikasi penelitian ini yaitu E-LKPD menggunakan liveworksheet yang dikembangkan dapat digunakan dalam pembelajaran.

A B S T R A K

The current problem is that many learning activities still need to utilize media as a learning support tool. This research aims to develop Electronic Student Worksheets (E-LKPD) in junior high school (SMP) science learning in science learning. This type of development research uses the Hannafin and Peck development model, which consists of needs analysis, development, design, implementation stages, and Tessmer evaluation. The population in this study was all Class VIII students, totalling 30 people. The research subjects were experts, including learning material experts, language experts, and learning media experts. The methods used in collecting data in this research were observation, interviews, questionnaires and tests. Data collection instruments include questionnaires and test questions. The techniques used to analyze the data are qualitative and quantitative descriptive analysis and N-gain. The results of the research were that the assessment given by material experts was 86.67 (very valid), linguist experts 88.89 (very valid), and media experts 98.46% (very valid). The results of the practicality test show that the Electronic Student Worksheet (E-LKPD) in science learning is highly qualified. The results of the N-gain test show an increase in learning outcomes, and the medium category is obtained, so it is effective. It was concluded that E-LKPD using live worksheets as teaching materials can increase the value of students' learning outcomes. The implication of this research is that E-LKPD uses the live worksheet that was developed and can be used in learning.

*Corresponding author.
E-mail addresses: fiasyafar81@gmail.com (Syahria Fardinelly)

1. INTRODUCTION

In learning the teacher plays the role of a facilitator who facilitates students in learning.In order for all the demands of the 21st century to be achieved, learning must be implemented through innovative approaches, strategies, models and teaching materials, especially in science learning (Makhrus et al., 2018; Pertiwi et al., 2018). Science learning in the 2013 curriculum does not just introduce concepts to students but also improves skills in the learning process so that it can increase students' sense of understanding and competence (Makhrus et al., 2018; Wina et al., 2017; Winangun, 2020). Apart from that, learning is also required to be able to provide direct experience so that students can more easily understand the learning material and make learning more meaningful (Adnyani et al., 2020; Dwiqi et al., 2020; Rositayani & Surya Abadi, 2019; Wahyuni et al., 2017). In science learning you can use severalalternative innovative learning models that can improve students' knowledge and skills. Learning requires an interactive process between students and educators or learning resources in schools or other environments in the learning environment (Azizi & Prasetyo, 2018; Novita Sari, 2018; Witari et al., 2018). The fundamental factor for optimal learning is the desire to learn. Wanting to learn means that students have the desire or motivation within themselves to acquire knowledge. Being able to learn means students can be involved effectively in the learning process. The success of learning really depends on the quality of interaction between students and educators or learning resources. This is what causes learning activities to require a medium that can support the achievement of maximum learning objectives (Ariyani & Ganing, 2021; Virgiana & Wasitohadi, 2016).

However, the current problem is that there are still many learning activities that do not utilize media as a learning support tool. Previous research findings also revealed that there are still many teachers in science learning who do not use innovative learning media (Muslina et al., 2018; Oktafiani et al., 2020; Saripudin et al., 2018). Previous research also revealed that the lack of learning media had an impact on learning outcomes that were less than optimal (Kurniawan et al., 2018; Maulidah & Aslam, 2021; Putri et al., 2021). This problem is also found in junior high schools. Based on information and observation results, it was found that science teachers experienced difficulties in developing learning steps, it was difficult to organize students in the learning process. Teachers' instructions tend not to be understood by students, seen from students' confusion regarding the tasks that students have to do in the material. Apart from that, another problem is that the teaching materials are not yet varied, so the impact is that they are less motivated and tend not to be enthusiastic about learning. Teachers only use textbook teaching materials. The teaching materials used by teachers in the form of printed teaching materials, namely charts or pictures, have an impact on students' learning outcomes.

Based on these problems, one solution offered is to use teaching materials or learning media that can facilitate science learning for students.One form of teaching technology that can actively encourage and build students' conceptual understanding during the learning process is Student Worksheets (LKPD) (Haifaturrahmah et al., 2020; Halija et al., 2021; Hekmah et al., 2019).One of the learning materials that students can use is the Electronic Student Worksheet (E-LKPD) using Liveworksheet.E-LKPD is an application in the form of student worksheets that can be accessed via laptop, cellphone and computer, which can be accessed anytime and anywhere (Pribadi et al., 2021; Puspita & Dewi, 2021a).Use of E-LKPDmore practical because it can be used anywhere (Augustha et al., 2021; Pribadi et al., 2021; Puspita & Dewi, 2021a).LKPD or printed teaching materials consisting of sheets of paper containing material, summaries and instructions for learning tasks. With advances in technology, LKPD is now transitioning to a digital format that can be accessed via computer, cell phone or smartphone (Vadilla, 2022; Wahyuni, Candiasa, & Wibawa, 2021a).The increasing number of students who have mobile devices opens up opportunities for alternative media that can improve mastery of lesson material. Integrating multimedia features into LKPD can increase grades and stimulate students' interest in learning. E-LKPD is interactive, we can also insert images, audio and video according to the desired design (Augustha et al., 2021; Putra & Agustiana, 2021).

The novelty of this research highlights innovation in the development of technology-based teaching materials that are relevant to the learning needs of the 21st century. The main focus of this research is on the development of Electronic Student Worksheets (E-LKPD) using the Liveworksheet platform, which is specifically designed for digestive system material in science learning in junior high schools. This is a new step that has not been widely explored in the context of science learning. E-LKPD with Liveworksheet offers the advantage of flexible accessibility via digital devices such as laptops, smartphones and computers, allowing students to study anytime and anywhere. In addition, this research emphasizes the use of interactive multimedia in E-LKPD, such as images, audio and video, which can increase students' conceptual understanding and learning motivation. It is hoped that the existence of E-LKPD can overcome the problem of the lack of innovative learning media in schools and improve student learning outcomes. Thus, this research makes an important contribution in developing more effective and efficient learning methods in the digital era, especially in science learning at junior high school level.

Previous research findings state thatE-LKPD can be used in learning activities because it is effective and practical (Apriyanto et al., 2019; KSP Wahyuni et al., 2021; Wahyuni et al., 2021). Other findings also state that E-LKPD has experienced innovation and can improve student learning outcomes because students will find it easier to understand learning material (Ernawati et al., 2018; Rizkika et al., 2022; Salsabila et al., 2023). It can be concluded that E-LKPD can be used in learning because it can make it easier for students to learn. Advantages ofE-LKPD uses the Liveworksheet that will be developed, namelyE-LKPD uses an interactive digital form so that it is more effective and efficient in student learning. The urgency of this research is the development of E-LKPDusing Liveworksheetscan provide practical exercises to help students in their studies. Apart from that, E-LKPD is an innovative way to engage students and make learning more interactive. However, there has been no study regarding Electronic Student Worksheets (E-LKPD) using Liveworksheets for Middle School Science Digestive System Material. Based on this, the aim of this research is to develop an Electronic Student Worksheet (E-LKPD) using the Liveworksheet for Middle School Science Digestive System Material.

2. METHOD

This type of research is development research. The model used in developing media is Hannafin and Peck's development model consists of stages requirements analysis, design, development, implementation and evaluation of Tessmer (Desyawati et al., 2021). At the need's analysis stage, students and teachers are identified to support learning activities. At the design stage, the parts contained in the E-LKPD are designed. In the development stage, E-LKPD is developed based on the design that has been made previously. The implementation stage is the stage carried out to test the validity of the E-LKPD being developed. Formative evaluation is an evaluation based on a model that focuses on validating the prototype whether it can be used according to the expected plan so that it can be used to improve the quality and value of learning produced by students. The evaluations used are expert evaluations, one to one, small group and field tests.

The population in this study was all Class VIII students, totaling 30 people. The research subjects were experts including learning material experts, language experts, and learning media experts. This research was carried out at the Bina Ilmi Lemabang Integrated Islamic Junior High School. The methods used in collecting data in this research were observation, interviews, questionnaires and tests. Observations in this research were carried out to determine the implementation of learning, media and teaching materials used by teachers during classroom learning. The interview method is used to collect data from sources regarding learning problems. The questionnaire method is used to collect data in the form of scores given by experts. The test method is used to measure students' abilities after using E-LKPD using Liveworksheet. Data collection instruments include questionnaires and test questions. The instrument grid is presented in Table 1 and Table 2.

Table 1. The Validation Instrument Grid for Experts in the Material Field

No	Assessment Aspects	Indicator
1	Material	The learning objectives and materials are compatible
		Accuracy of the material
		Clarity of material
		Factuality of the material
		Systematic material
		CLS Achievement
2	Feasibility of presentation	Suitability of questions and material
		Suitability of method and student character
		Suitability of presentation of supporting information

Table 2. The Validation Instrument Grid for Language Experts

No	Assessment Aspects	Indicator
1	Language Presentation	Student language and level appropriate
		Correct language rules
		Vocabulary, terms and symbols are correct
2	Feasibility of presentation	Correct sentence structure
		The readability level of sentences is clear
		The effective sentence is correct
		Sentences are easy to understand

The techniques used to analyze the data are qualitative and quantitative descriptive analysis, as well as N-gain. Qualitative descriptive analysis was used to analyze data in the form of input provided by experts regarding the Electronic Student Worksheet (E-LKPD) using the Liveworksheet for Middle School Science Digestive System Material. Quantitative descriptive analysis was used to analyze data in the form of scores given by experts regarding the Electronic Student Worksheet (E-LKPD) using the Liveworksheet for Middle School Science Digestive System Material. The N-gain test is used to analyze the effectiveness of the Electronic Student Worksheet (E-LKPD) using the Liveworksheet for Middle School Science Digestive System Material.

3. RESULT AND DISCUSSION

Results

This research aims to develop an Electronic Student Worksheet (E-LKPD) using a Liveworksheet on Digestive System Material for Middle School Science using a model Hannafin and Peck consisting of stages needs analysis, design, development, implementation and evaluation. First, the needs analysis stage. Based on the results of interviews conducted by researchers, it shows that the learning outcomes of students show that the minimum completeness score (KKM) set by science subject teachers is 75, which has not been achieved optimally, only 30% of students completed or got a score above the KKM. especially in the Digestive System material. Another problem is that the media used by teachers so far still uses conventional student worksheets in the form of printed materials alone and has not used electronic student worksheets to support the science learning process. The student worksheet also does not include indicators of science process skills, because so far it only contains practice questions that only focus on science material concepts. Apart from that, students' understanding of the material is also a poor indicator, which can be seen from the students' low learning outcomes, as well as their lack of interest and enthusiasm in working on students' worksheets, which can be seen from the students' lack of activity in learning, tending to chat and play with their friends. Teachers who teach science subjects have never used student worksheets that use the liveworksheet application.

Second, design. At the design stage, a draft document has been obtained that will be used in making the E-LKPD in sequence starting from the cover, E-LKPD identity, learning objectives, instructions for using the E-LKPD, supporting information, learning videos, as well as to be completed with activities in E-LKPD then the development of the storyboard is obtained. learning such as evaluating matching images, dragging and dropping appropriate images, as well as conclusions and practice questions. After the design preparation and integration is complete, the LKPD document is formed in PDF format. Next, after the development stage is complete, the student worksheet is implemented by developing it using media in the form of a cellphone and using the liveworksheet application, so an interactive Electronic Student Worksheet (E-LKPD) is obtained which can be implemented with students and enter the next stage, namely evaluation. . The results of developing student worksheets using the liveworksheet application are presented in Figure 1.

Figure 1. The Results of Development of Electronic Student Worksheets (E-LKPD)

At the evaluation stage, the Tessmer model evaluation was used with four stages, namely self-evaluation, evaluation from experts, namely material experts, language experts and media experts. At this self-evaluation stage, the researcher carried out an evaluation with colleagues by assessing the product that had been designed to find out the deficiencies in the product, then improvements or revisions could be made to obtain a product in the form of prototype 1. Apart from qualitative data, experts also evaluate quantitative data by filling in a validation instrument sheet in the form of a statement that will obtain the value or level

of validity of the E-LKPD product, and if the results are valid it will proceed to the one-to-one stage. The results from the experts are presented in Table 3.

Table 3. The Recapitulation of Expert Review Results

No	Validation	Percentage (%)	Information
1	Material	86.67%	Very valid
2	Language	88.89%	Very valid
3	Media	98.46%	Very Valid

The results of data analysis show that the recapitulation of the results of material experts, language experts and media experts shows that the product developed in the form of E-LKPD teaching materials is very valid with an average value so it is suitable to be tested at the next stage, namely one-to-one evaluation. . Apart from qualitative data in the form of comments and interview results from students in one to one evaluations. Furthermore, quantitative data has also been calculated from the questionnaires that have been filled out by students. The recapitulation results show that the E-LKPD test results at this one to one stage are very practical, namely 9.473. Next, an evaluation is carried out at the Small group stage. The E-LKPD which has been revised based on experts and one to one evaluation is hereinafter called prototype 2. Prototype 2 which has been produced in the previous stage is based on the results of revisions from material experts, language experts and media experts and also one - to -one evaluation, then the stage Next, prototype 2 will be tested at the small group evaluation stage or evaluation on small groups consisting of eight students who have been selected by researchers who have a diversity of both levels of ability and different backgrounds and genders. At this stage the aim is to see the practicality of prototype 2 by looking at the results of the instruments that have been filled in by students. Based on the results of a questionnaire from eight students who evaluated the practicality of E-LKPD prototype 2. Based on the results of small group data analysis, the average score was 97.50, thus getting the very practical category. The percentage of small group evaluation results is presented in Figure 2.
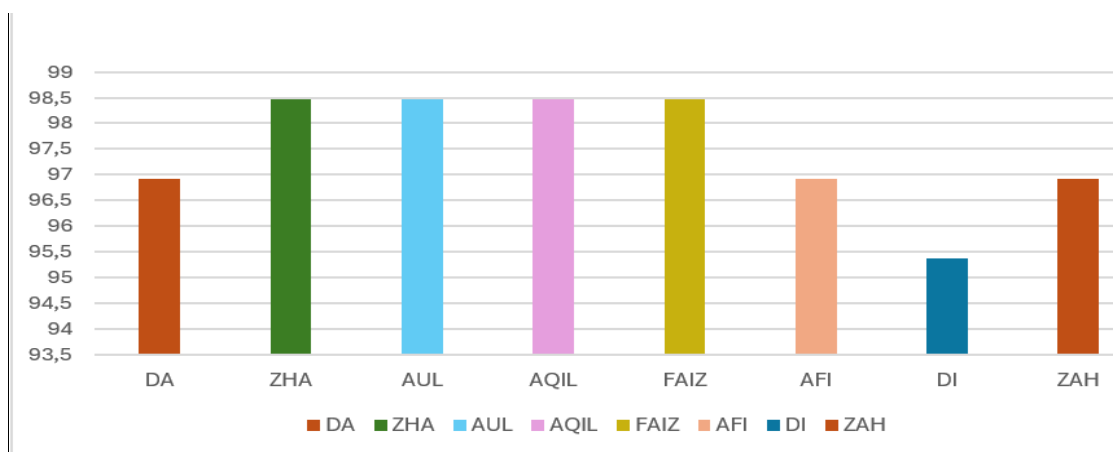
Figure 2. The Percentage of Small Group Evaluation Results

In the product resulting from the development of E-LKPD, an evaluation or trial has been carried out in small groups so that it has been revised and improved, then this E-LKPD is called prototype 3 and the next evaluation stage is field evaluation or field test to find out the effectiveness of E-LKPD using a live worksheet by looking at learning outcome data before and after the learning process using E-LKPD and looking at data on the results of students' science process skills. Based on the results of data analysis, there was an increase in the value of student learning outcomes with the average score at the time of the pretest, meaning that students had not used the E-LKPD live worksheet. The average value of student learning outcomes was 65.7 and experienced an increase in the average value of learning outcomes obtained. of 86.5. From the increase in the value of learning outcomes, an N-gain value of 0.64 was obtained, which is included in the medium category, so it is effective, that E-LKPD using live worksheets as teaching material can increase the value of students' learning outcomes. The percentage of learning outcomes during the pretest and posttest of students who were given 20 multiple choice questions which were tested on 30 students is presented in Table 4.

Table 4. The Percentage Recapitulation of Pretest and Posttest Learning Result Scores

Predicate	Mark	Pretest		Posttest	
		The number of students	%	The number of students	%
Very good	90 - 100	0 students	0	12 students	40.00
Good	80 – 89	3 students	10.00	11 students	36.67
Enough	70 – 79	13 students	43.33	7 students	23.33
Not enough	60 – 69	7 students	23.33	0 students	0
Very less	0 – 59	7 students	23.33	0 students	0

The results of the data analysis presented in Table 4 show data on the percentage of learning outcome scores during the pretest that the percentage of students who had a good category only reached 10%, so it can be seen that indeed students have a fairly low percentage of learning outcomes, but after using interactive E-LKPD or at during the posttest that students experienced significant learning outcomes, with no students falling into the very poor category or 0%. Based on the results of the data analysis of Minimum Completeness Criteria Learning Results, it was found that the minimum completeness criteria for student learning results during the pretest before using the live worksheet, the number of students who completed it was only 30% classically, meaning that few students completed it. Learning outcomes after using the live worksheet increased by 96.67% of students who completed the KKM score set by the science subject teacher

Discussion

The results of data analysis show that the Electronic Student Worksheet (E-LKPD) has received very valid qualifications from experts. It was concluded that the Electronic Student Worksheet (E-LKPD) was suitable for use in learning. This is caused by several factors, namely as follows. First, electronic student worksheets (E-LKPD) are suitable for use in learning because they can improve student learning outcomes. E-LKPD is suitable for use in learning because it is able to involve students and make learning more effective and efficient (Augustha et al., 2021; Puspita & Dewi, 2021; Wahyuni et al., 2021). Previous research findings also state that E-LKPD can reduce boredom, increase students' interest in learning, and improve learning outcomes in the cognitive, psychomotor and affective domains (Salsabila et al., 2023; Wahyuni et al., 2021). Valid E-LKPD can also improve decision-making skills and improve critical thinking abilities (Puspita & Dewi, 2021a, 2021b). The use of E-LKPD was especially emphasized during the COVID-19 pandemic because it was considered very necessary in online learning and was proven to be effective. In a short time, this technology has been widely used to facilitate learning and create E-LKPD teaching materials (Arisa, 2022; Monika & Ramadan, 2022). Therefore, evidence shows that E-LKPD can be a valuable medium for improving student learning outcomes. Student learning outcomes increased after being used in E-LKPD so that it can be used as a solution in choosing the delivery of subject matter in science learning during the pandemic.

Electronic Student Worksheets (E-LKPD) are suitable for use in learning because they increase student learning motivation. E-LKPD can be used by educators in their learning process as optional or alternative teaching materials (Fitria et al., 2020; Mawardi et al., 2020; Monika & Ramadan, 2022). Teaching materials in the form of images are a means of conveying messages that are easier for students to understand (Salsabila et al., 2023; Wahyuni et al., 2021). This is because the information presented in the form of images makes the information concrete so that it is easy for students to understand (Arisa, 2022; Septiana et al., 2019; Yuliani et al., 2018). In this way students are interested and do not get bored in learning. Apart from that, the characteristic of E-LKPD is that it has an attractive design containing videos, images and colors and is multimedia in nature which can make students motivated and enthusiastic in carrying out learning activities, so that it has implications for improving learning outcomes and science process skills. This is also confirmed by previous research findings which state that E-LKPD can significantly increase student learning motivation (Arisa, 2022; Desnita et al., 2021; Manalu et al., 2022; Septiana et al., 2019; Yuliani et al., 2018; Yulkifli et al., 2019).

Electronic Student Worksheets (E-LKPD) are suitable for use in learning because they can create fun learning activities. The developed E-LKPD also provides videos. Learning videos are one way to create a learning atmosphere that makes students interested when the material is presented by the teacher (Diah Purnami Dewi et al., 2022; Krishna et al., 2015; Suwardi et al., 2021). Student interest in learning can help improve student learning outcomes. Video learning makes learning less boring because of the variety of activities (Maharputrananda et al., 2020; Mertasari & Ganing, 2021; Panggabean et al., 2021). Apart from that, the use of learning media can also create fun learning activities so that it has an impact on increasing student learning outcomes.

This research has limitations that need to be noted. This research was only conducted on one subject matter, namely the digestive system in science subjects at junior high school level, so the results may not be generalizable to other materials or educational levels. The research sample is limited to one school and the number of students is relatively small, which may affect the generalization of the results of this study. Implementation of E-LKPD using the Liveworksheet application depends on the availability of technological devices and adequate internet access, which may not be available to all schools or students. This research has important implications for learning in junior high schools. With the discovery that E-LKPD can improve learning outcomes and student motivation, educators can consider integrating similar technology in their learning process. In addition, E-LKPD which is interactive and uses multimedia media can help create a more interesting and enjoyable learning atmosphere for students, which in turn can increase student involvement and participation in learning. This research also shows the importance of developing innovative and technology-based teaching materials to meet educational demands in the digital era. This research shows that developing E-LKPD using Liveworksheets has advantages. This e-LKPD has proven to be effective in improving student learning outcomes, as shown by a significant increase in posttest scores compared to the pretest. E-LKPD can increase students' learning motivation by presenting material that is interesting, interactive, and equipped with learning videos. The use of E-LKPD allows learning to be more flexible and can be accessed anytime and anywhere, as long as there is internet access. Validation results from experts show that the E-LKPD developed is very valid, indicating that this product is suitable for use in learning. These advantages show that E-LKPD can be an innovative and effective alternative teaching material in improving the quality of science learning in junior high schools.

Previous research findings also state that the use of valid Electronic Student Worksheets (E-LKPD) improves student learning outcomes (Apriyanto et al., 2019; Augustha et al., 2021; Wahyuni et al., 2021). Previous research also revealed that E-LKPD can also make it easier for students to learn so that it is suitable for use in learning (Augustha et al., 2021; Putra & Agustiana, 2021). Based on this description, it is very important and necessary to use E-LKPD in junior high school science learning to facilitate students who have high-level thinking abilities and science process skills as well as increasing social interaction. Advantages ofE-LKPD uses the Liveworksheet that will be developed, namelyE-LKPD uses an interactive digital form so that it is more effective and efficient in student learning. The implication of this research is that E-LKPD uses live worksheets as teaching materials that can be used in science learning. With the E-LKPD, it can be used as a learning resource on digestive system material. E-LKPD uses the live worksheet application as one of the innovative and interactive teaching materials to help the learning process on digestive system material. Apart from that, the E-LKPD that has been developed can be used as a reference source for teaching materials to enrich the choice of varied, innovative and technology-integrated teaching materials in accordance with the demands of learning in the 21st Century.

4. CONCLUSION

The results of data analysis show that the Electronic Student Worksheet (E-LKPD) has received very valid qualifications from experts. The results of the practicality test also show that the Electronic Student Worksheet (E-LKPD) is very practical to use in the learning process. The results of the N-gain test show that students experienced a significant increase in learning outcomes as seen from the N-gain results which were included in the medium category and were declared effective in improving participants' learning outcomes. It can be concluded that the E-LKPD product that has been developed can be declared valid, practical and effective in improving learning outcomes.

5. REFERENCES

Adnyani, N. K. M., Pudjawan, K., & Japa, I. G. N. (2020). Motivasi dan Hasil Belajar IPA dalam Pembelajaran Scramble Berbantuan Kartu Pertanyaan. *Jurnal Ilmiah Sekolah Dasar*, *4*(2), 270. https://doi.org/10.23887/jisd.v4i2.25622.

Apriyanto, C., Yusnelti, & Asrial. (2019). Pengembangan E-LKPD Berpendekatan Saintifik Larutan Elektrolit dan Non Elektrolit. *Journal of The Indonesian Society of Integrated Chemistry*, *11*(1), 38–42. https://doi.org/10.22437/jisic.v11i1.6843.

Arisa, R. (2022). Development of Student Worksheets (LKPD) Based on Contextual Teaching and Learning (CTL) on the Subject of the Association. *Jurnal Riset Ilmu Pendidikan*, *2*(2), 93–99. https://doi.org/10.56495/jrip.v2i2.111.

Ariyani, N. K. A., & Ganing, N. N. (2021). Media Power Point Berbasis Pendekatan Kontekstual pada Materi Siklus Air Muatan IPA Sekolah Dasar. *Jurnal Imiah Pendidikan Dan Pembelajaran*, *5*(2), 263. https://doi.org/10.23887/jipp.v5i2.33684.

Augustha, A., Susilawati, S., & Haryati, S. (2021). Pengembangan E-LKPD Berbasis Discovery Learning Menggunakan Aplikasi Ado. *Journal of Research and Education Chemistry*, *3*(1), 28. https://doi.org/10.25299/jrec.2021.vol3(1).6485.

Azizi, M., & Prasetyo, S. (2018). Kontribusi Pengembangan Media Komik IPA Bermuatan Karakter Pada Materi Sumber Daya Alam untuk Siswa MI/SD. *Al-Bidayah: Jurnal Pendidikan Dasar Islam*, *9*(2), 185–194. https://doi.org/10.14421/al-bidayah.v9i2.25.

Desnita, D., Putra, A., Hamida, S., Marsa, P. B., & Novisya, D. (2021). Quality Test of Student Worksheets Based on Contextual Teaching And Learning for Class XI High School Physics. *Jurnal Penelitian Pendidikan IPA*, *7*(1). https://doi.org/10.29303/jppipa.v7i1.600.

Desyawati, K., Maria Goreti Rini Kristiantari, & I Gusti Agung Oka Negara. (2021). Media Permainan Monopoli Berbasis Problem Based Learning Pada Pembelajaran Tematik di Sekolah Dasar. *Jurnal Penelitian Dan Pengembangan Pendidikan*, *5*(2), 168–174. https://doi.org/10.23887/jppp.v5i2.32466.

Diah Purnami Dewi, P., Wayan Suniasih, N., & Kunci, K. (2022). Media Video Pembelajaran Matematika Berbasis Etnomatematika pada Muatan Materi Pengenalan Bangun Datar. *Jurnal Edutech Undiksha*, *10*(1), 156–166. https://doi.org/10.23887/jeu.v10i1.44775.

Dwiqi, G. C. S., Sudatha, I. G. W., & Sukmana, A. I. W. I. Y. (2020). Pengembangan Multimedia Pembelajaran Interaktif Mata Pelajaran IPA Untuk Siswa SD Kelas V. *Jurnal Edutech Undiksha*, *8*(2), 33. https://doi.org/10.23887/jeu.v8i2.28934.

Ernawati, M., Yuni, E., & Malik, A. (2018). Pengembangan Lembar Kerja Peserta Didik Elektronik Berbasis Proyek pada Materi Termokimia di Kelas XI SMA. *Journal of The Indonesian Society of Integrated Chemistry*, *10*(1), 9–16. https://doi.org/10.22437/jisic.v10i1.5306.

Fitria, R., Suparman, Hairun, Y., & Ruhama, M. A. H. (2020). Student's worksheet design for social arithmetic based on PBL to increase the critical thinking skills. *Universal Journal of Educational Research*, *8*(5). https://doi.org/10.13189/ujer.2020.080541.

Haifaturrahmah, H., Hidayatullah, R., Maryani, S., Nurmiwati, N., & Azizah, A. (2020). Pengembangan Lembar Kerja Siswa Berbasis STEAM untuk Siswa Sekolah Dasar. *Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran*, *6*(2), 310. https://doi.org/10.33394/jk.v6i2.2604.

Halija, Khasna, F. T., & Arifin. (2021). Pengembangan Lembar Kerja Siswa (LKS) Berbasis Pendekatan Realistic Mathematics Education (Rme) Untuk Meningkatkan Hasil Belajar Pada Siswa Kelas Iv Mi Nurul Huda Kupang. *Jurnal Elementary: Kajian Teori Dan Hasil Penelitian Pendidikan Sekolah Dasar*, *4*(1), 49–52. https://doi.org/10.31764/elementary.v4i1.3786.

Hekmah, N., Wilujeng, I., & Suryadarma, I. G. P. (2019). Web-Lembar Kerja Siswa IPA terintegrasi lingkungan untuk meningkatkan literasi lingkungan siswa. *Jurnal Inovasi Pendidikan IPA*. https://doi.org/10.21831/jipi.v5i2.25402.

Krishna, P. D. M., Sudhita, I. W. R., & Mahadewi, L. P. P. (2015). Pengembangan Media Video Pembelajaran Pada Mata Pelajaran Ipa Siswa Kelas VIII Semester Genap. *E-Journal Edutech Universitas Pendidikan Ganesha Jurusan Teknologi Pendidikan*, *3*(1). https://doi.org/10.2387/jeu.v3i1.5701.

Kurniawan, D., Kuswandi, D., & Husna, A. (2018). Pengembangan Media Video Pembelajaran Pada Mata Pelajaran Ipa Tentang Sifat Dan Perubahan Wujud Benda Kelas Iv Sdn Merjosari 5 Malang. *JINOTEP (Jurnal Inovasi Dan Teknologi Pembelajaran) Kajian Dan Riset Dalam Teknologi Pembelajaran*, *4*(2), 119–125. https://doi.org/10.17977/um031v4i22018p119.

Maharputrananda, T. K., Cahyana, C., Studi, P., Vokasional, P., Kuliner, S., Teknik, F., & Jakarta, U. N. (2020). Penerapan Media Pembelajaran Video Klip Pembuatan Mock Up. *Jurnal Teknologi Pendidikan*, *13*(2), 115–118. https://doi.org/10.24114/jtp.v13i2.18446.

Makhrus, M., Harjono, A., Syukur, A. B., & Muntari, S. (2018). Identifikasi kesiapan LKPD guru terhadap keterampilan abad 21 pada pembelajaran IPA SMP. *Jurnal Ilmiah Profesi Pendidikan*, *3*(2), 124–128. https://doi.org/10.29303/jipp.v3i2.20.

Manalu, E. N. B., Hendri, M., & Rasmi, D. P. (2022). Analysis of STEM-Based Student Worksheet Development with Scaffolding using the Web. *Jurnal Penelitian Pendidikan IPA*, *8*(2). https://doi.org/10.29303/jppipa.v8i2.1145.

Maulidah, A. N., & Aslam, A. A. (2021). Penggunaan Media Puzzle secara Daring terhadap Hasil Belajar IPA Kelas V SD. *Mimbar Ilmu*, *26*(2), 281. https://doi.org/10.23887/mi.v26i2.37488.

Mawardi, M., Rusiani, J. A. F., & Yani, F. H. (2020). Effectiveness of student worksheets based guided inquiry on acid base material to improve students higher order thinking skill (HOTS). *In Journal of Physics: Conference Series*, *1481*(1), 012083. https://doi.org/10.1088/1742-6596/1481/1/012083.

Mertasari, P. S., & Ganing, N. N. (2021). Pengembangan Media Pembelajaran Powtoon Berbasis Problem Based Learning Pada Materi Ekosistem Muatan Ipa Kelas V Sekolah Dasar. *Jurnal Ilmiah Pendidikan*

Profesi Guru, *10*, 288–298. https://doi.org/10.23887/jippg.v4i2.

Monika, D., & Ramadan, Z. H. (2022). Student Worksheet Based on Realistic Mathematics Education Approach on Multiplication and Division Material for Grade V Elementary School. , 6(1), 11-20. https://doi.org/. *Jurnal Ilmiah Sekolah Dasar*, *6*(1). https://doi.org/10.23887/jisd.v6i1.41627.

Muslina, M., Halim, A., & Khaldun, I. (2018). Kelayakan Media Animasi Hukum Newton II Tentang Gerak Pada Bidang Miring Dan Katrol Di Sma Kabupaten Aceh Besar. *Jurnal IPA & Pembelajaran IPA*, *1*(1), 64–72. https://doi.org/10.24815/jipi.v1i1.9568.

Novita sari, D. (2018). Pengaruh Model Pembelajaran Scramble Berbantuan Permainan Crossword Fuzle terhadap Kompetensi Pengetahuan IPA. *Jurnal Penelitian Dan Pengembangan Pendidikan*, *2*(1), 68–74. https://doi.org/10.23887/jppp.v2i1.15340.

Oktafiani, D., Nulhakim, L., & Alamsyah, T. P. (2020). Pengembangan media pembelajaran IPA berbasis multimedia interaktif menggunakan Adobe Flash pada Kelas IV. *Mimbar PGSD Undiksha*, *8*(3), 527–540. https://doi.org/10.23887/jjpgsd.v8i3.29261.

Panggabean, F., Simanjuntak, M. P., Florenza, M., Sinaga, L., & Rahmadani, S. (2021). Analisis Peran Media Video Pembelajaran dalam Meningkatkan Hasil Belajar IPA SMP. *Jurnal Pendidikan Pembelajaran IPA Indonesia (JPPIPA)*, *2*(1), 7–12. https://doi.org/10.37148/bios.v1i1.3.

Pertiwi, U. D., Atanti, R. D., & Ismawati, R. (2018). Pentingnya Literasi Sains Pada Pembelajaran Ipa Smp Abad 21. *Indonesian Journal of Natural Science Education (IJNSE)*, *1*(1), 24–29. https://doi.org/10.31002/nse.v1i1.173.

Pribadi, Y. T., Sholeh, D. A., & Auliaty, Y. (2021). Pengembangan E-Lkpd Materi Bilangan Pecahan Berbasis Problem Based Learning Pada Kelas Iv Sekolah Dasar. *Prima Magistra: Jurnal Ilmiah Kependidikan*, *2*(2), 264–279. https://doi.org/10.37478/jpm.v2i2.1116.

Puspita, V., & Dewi, I. P. (2021a). Efektifitas E-LKPD berbasis Pendekatan Investigasi terhadap Kemampuan Berfikir Kritis Siswa Sekolah Dasar. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *5*(1), 86–96. https://doi.org/10.31004/cendekia.v5i1.456.

Puspita, V., & Dewi, I. P. (2021b). Efektifitas E-LKPD Berbasis Pendekatan Investigasi terhadap Kemampuan Berfikir Kritis Siswa Sekolah Dasar. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *5*(1), 86–96. https://doi.org/10.31004/cendekia.v5i1.456.

Putra, G., & Agustiana, I. (2021). E-LKPD Materi Pecahan dalam Pembelajaran Daring. *MIMBAR PGSD Undiksha*, *9*(2), 220–228. https://doi.org/10.23887/jjpgsd.v9i2.35813.

Putri, L. G. R. A., Japa, I. G. N., & Riastini, P. N. (2021). Media Pembelajaran Videoscribe-Hots Bermuatan IPA Pada Topik Struktur Dan Fungsi Bagian Tumbuhan Kelas IV SD. *Mimbar Ilmu*, *26*(3), 451. https://doi.org/10.23887/mi.v26i3.38830.

Rizkika, M., Pramudya, D., & Ahmad, N. (2022). Pengembangan E-LKPD Berbasis STEM pada Materi Tekanan Zat untuk Meningkatkan Kemampuan Berpikir Kritis Siswa SMP. *Pancasakti Science Education Journal*, *7*(1), 41–48. https://doi.org/10.4905/psej.v7i1.142.

Rositayani, N. P. E., & Surya Abadi, I. B. G. (2019). Pengaruh Model Pembelajaran Children'S Learning in Science Berbantuan Media Audio Visual Terhadap Kompetensi Pengetahuan Ipa. *Mimbar Ilmu*, *24*(1), 63. https://doi.org/10.23887/mi.v24i1.17452.

Salsabila, N. L., Patras, Y. E., & Lathifah, S. S. (2023). Pengembangan E-LKPD Berbasis Liveworksheet Pada Tema 7 Perkembangan Teknologi Produksi Pangan. *Didaktik : Jurnal Ilmiah FKIP Universitas Mandiri*, *9*(2), 1653–1663. https://doi.org/10.36989/didaktik.v9i2.825.

Saripudin, E., Sari, I. J., & Mukhtar, M. (2018). Using Macro Flash Animation Media on Motion Material to Improve Learning Achievement for Learning Science in Junior High School. *Jurnal Penelitian Dan Pembelajaran IPA*, *4*(1), 68. https://doi.org/10.30870/jppi.v4i1.3316.

Septiana, E., Rusminto, N. E., Caswita, C., & Ambarita, A. (2019). The Development of Student Worksheet Based on Pictorial Riddle Model to Improve Critical Thinking Ability in Elementary School. *Journal of Education and Practice*, *10*(3). https://doi.org/10.7176/JEP/10-23-01.

Suwardi, S., Sutama, S., Hidayati, Y., & Rahmawati, L. (2021). Pembelajaran pecahan melalui video: apakah dapat meningkatkan keaktifan dan prestasi siswa? *PYTHAGORAS Jurnal Pendidikan Matematika*, *16*(2), 163–173. https://doi.org/10.21831/pythagoras.v16i2.41864.

Vadilla, N. (2022). Pengembangan E-LKPD Berbasis Model Discovery Learning Pada Materi Termokimia Untuk mengukur Keterampilan SAINS Siswa. *Jurnal Ilmiah Pendidikan*, *1*(3), 152–164. https://doi.org/10.55904/educenter.v1i3.63.

Virgiana, A., & Wasitohadi. (2016). Efektivitas Model Problem Based Learning Berbantuan Media Audio Visual Ditinjau Dari Hasil Belajar IPA Siswa Kelas 5 SDN 1 Gadu Sambong - Blora Semester 2 Tahun 2014/2015. *Scholaria : Jurnal Pendidikan Dan Kebudayaan*, *6*(2), 100–118. https://doi.org/10.24246/j.scholaria.2016.v6.i2.p100-118.

Wahyuni, K. S. ., Candiasa, I. ., & Wibawa, I. M. . (2021a). *Pengembangan E-Lkpd Berbasis Kemampuan*

Berpikir. *5*(2), 301–311. https://doi.org/https://doi.org/10.23887/jurnal_pendas.v5i2.476.

Wahyuni, K. S. P., Candiasa, I. M., & I Made Citra Wibawa. (2021). Pengembangan E-Lkpd Berbasis Kemampuan Berpikir Tingkat Tinggi Mata Pelajaran Tematik Kelas Iv Sekolah Dasar. *PENDASI: Jurnal Pendidikan Dasar Indonesia*, *5*(2), 301–311. https://doi.org/10.23887/jurnal_pendas.v5i2.476.

Wahyuni, K. S. P., Candiasa, I. M., & Wibawa, I. M. C. (2021b). Pengembangan E-Lkpd Berbasis Kemampuan Berpikir Tingkat Tinggi Mata Pelajaran Tematik Kelas IV Sekolah Dasar. *PENDASI: Jurnal Pendidikan Dasar Indonesia*, *5*(2), 301–311. https://doi.org/10.23887/jurnal_pendas.v5i2.476.

Wahyuni, Margunayasa, & Wibawa. (2017). Pengaruh Model Pembelajaran Problem Based Learning Berorientasi Tri Hita Karana Terhadap Hasil Belajar Ipa Siswa Kelas VWahyuni, Margunayasa, & Wibawa. (2017). Pengaruh Model Pembelajaran Problem Based Learning Berorientasi Tri Hita Karana Terhadap Hasil . *Jurnal Pendidikan Multikultural Indonesia*, *5*(2), 1–10. https://doi.org/10.23887/jpmu.v1i2.20771.

Wina, D. R., Hindarto, N., & Prasetyo, A. P. B. (2017). Studi kasus pendekatan saintifik dalam pembelajaran ipa pada kurikulum 2013 di SMP Negeri 5 Semarang. *Journal of Innovative Science Education*, *6*(1). https://doi.org/10.15294/jise.v6i1.17045.

Winangun, I. M. A. (2020). Media Berbasis Budaya Lokal dalam Pembelajaran IPA SD. *Edukasi: Jurnal Pendidikan Dasar*, *1*(1), 65–72. https://doi.org/10.55115/edukasi.v1i1.529.

Witari, I. G. A., Mahadewi, L. P. P., & Rati, N. W. (2018). Pengaruh Model Pembelajaran Kooperatif Tipe Numbered Head Together terhadap Hasil Belajar IPA Siswa Kelas IV. *Journal PGSD Universitas Pendidikan Ganesha Jurusan PGSD*, *4*(1), 2017. https://doi.org/10.23887/jjpgsd.v5i2.10891.

Yuliani, T., Noer, S. H., & Rosidin, U. (2018). Guided Discovery Worksheet for Increasing Mathematical Creative Thinking and Self-Efficacy. *International Journal of Trends in Mathematics Education Research*, *1*(2), 30–34. https://doi.org/10.33122/ijtmer.v1i1.6.

Yulkifli, Y., Ningrum, M. V., & Indrasari, W. (2019). The validity of student worksheet using inquiry-based learning model with science process skill approach for physics learning of high school. *Jurnal Penelitian & Pengembangan Pendidikan Fisika*, *5*(2). https://doi.org/10.21009/1.05210.