



IMPLEMENTATION OF VIDEO TUTORIAL-ASSISTED WORKSHEETS TO IMPROVE THE LEARNING OUTCOMES OF JUNIOR HIGH SCHOOL STUDENTS ON ENVIRONMENTALLY FRIENDLY TECHNOLOGY

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Abstract

Effective learning requires innovative instructional media. This study aimed to determine (1) the improvement in learning outcomes following the implementation of video tutorial-assisted worksheets among students of SMP Nasional Makassar, and (2) whether there was a significant difference in learning outcomes before and after the implementation of video tutorial-assisted worksheets. This study employed a pre-experimental method with a one-group pretest-posttest design. The population comprised all ninth-grade students of SMP Nasional Makassar, totaling 179 students, from which a sample of 32 students was selected through purposive sampling. Learning outcomes were measured using a multiple-choice test that had been developed and validated prior to implementation. Data were analyzed descriptively and inferentially. The results showed that (1) learning outcomes improved, as indicated by an N-Gain of 0.51 (moderate category), and (2) there was a statistically significant difference between pretest and posttest scores after the implementation of video tutorial-assisted worksheets, as indicated by a significance value of less than 0.05. These findings demonstrate that worksheets combined with video tutorial media have a positive impact on the science learning process and help improve students' understanding and learning outcomes.

Keywords: worksheets, video tutorials, learning outcomes.

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INTRODUCTION

Science learning in the classroom demands discovery rather than merely understanding knowledge in the form of facts, concepts, and working principles; students should gain direct experience in order to understand the natural world scientifically (Murni & Yasin, 2021). Science instruction aims to develop curiosity through observation, which also trains students' science process skills so that problems encountered can be solved in real-life contexts (Putri Dewi, 2023). As a complex subject, science requires instructional media to make it easier for students to understand (Sehartian & Adriyani, 2023). The application of learning media can keep pace with rapid technological development, making it an effective tool in the learning process (Laato et al., 2023).



Learning media can create a more interactive atmosphere, allowing students to be actively engaged and more creative (Wardah & Meilana, 2025). Media serve as important facilities in learning, namely as aids used by teachers when presenting material. In this regard, teachers as facilitators should be able to create innovative learning media that are not boring for students, particularly in science learning (Kotimah, 2024). In the learning process, teacher achievement is reflected in the attainment of students' competencies, as demonstrated in the delivery of material and the media prepared (Ningsih et al., 2024).

In practice, however, classroom learning does not always align with these theoretical expectations. Science remains difficult for students to understand, and teachers at SMP Nasional Makassar had not yet found learning media suitable for classroom implementation. Observations revealed that the majority of student activities consisted of listening, taking notes, and completing assigned tasks. Practical work that students should have carried out was not prioritized by teachers, resulting in limited development of students' skills. This condition affects student learning outcomes, which serve as a measure of learning success. Learning outcomes are the evaluation of student activities during the learning process (Gulo, 2022). Several factors influence science learning, namely methods, models, and teaching materials complemented by media (Luh et al., 2022). This situation is partly caused by teachers' limited mastery of curriculum demands, so the quality of science learning has not been delivered as it should be (Indrawati & Nurpatri, 2022).

The problems described above require alternative solutions to restore the essence of science learning. One effort that can be made is to improve the quality of learning by placing students at the center (student-centered learning), with teachers acting as facilitators and students engaging in active discussion with their group members (Indayani & Hartini, 2024). Such implementation must be supported by innovative teaching materials and media to enhance learning efficiency. Students' process skills can be trained through practical activities presented in worksheets, after which students are directed to express all their creative ideas (Fredagsvik, 2023). Worksheets can prompt students to conduct investigations that later become material for scientific discussion within their groups, and teachers can identify how students think in solving problems, thereby improving student learning outcomes (Istiqomah, 2021).

Previous studies have addressed related interventions. Vianney et al. (2025) applied animated video media and Liveworksheet-based worksheets to improve learning outcomes; however, that study was limited to the respiratory system topic and employed a classroom action research design that did not measure students' initial abilities. Walidah and Rahmatan (2023) used worksheets to improve learning outcomes, but their study did not integrate video tutorials to support students' understanding of science. Aliyyah et al. (2021) used learning videos to improve science learning outcomes, but their study focused on the properties of light and did not use worksheets to help students record the results of practical work.

The use of worksheets assisted by video tutorials makes it easier for students to observe the practical steps they will subsequently report, thereby clarifying each stage of the practicum to be carried out (Annisa Izzania & Widhiastuti, 2020). In addition, video tutorials are designed to attract students' attention to the material being studied and to stimulate and encourage students to conduct experiments (Zefitri et al., 2024). Worksheets equipped with video tutorial media have proven effective in helping students understand investigative concepts (Fitriyah, 2021).

Based on the foregoing, this study aimed to determine the improvement in learning outcomes following the implementation of video tutorial-assisted worksheets and to determine whether there was a significant difference in learning outcomes before and after the implementation of video tutorial-assisted worksheets among junior high school students.

METHOD

This study employed a one-group pretest-posttest design, one of the designs within pre-experimental research. The population consisted of all ninth-grade students of SMP Nasional

Makassar in the 2021/2022 academic year, totaling 179 students. The sample comprised 32 students selected through purposive sampling. The study was conducted in several stages: preparation, implementation, and conclusion. In the preparation stage, initial observations were conducted, and the research instruments and learning materials were developed. The implementation stage began with the administration of a pretest, followed by three learning sessions using video tutorial-assisted worksheets; the video tutorials were sourced from YouTube and selected according to the material. A posttest was then administered. The final stage consisted of data processing and analysis using descriptive and inferential statistics, comprising a normality test using the Shapiro-Wilk technique and a paired sample t-test for hypothesis testing. Both analyses were performed with SPSS 24.0.

The research instrument was a multiple-choice test consisting of 17 items to measure learning outcomes. Students' raw scores were converted to a scale of 100 using a maximum score of 17, with the following conversion formula.

$$\text{Score} = (\text{obtained score} / 17 (\text{maximum score})) \times 100$$

Prior to use, the test items underwent analysis and validation. The results indicated that the items were suitable for use in this study based on item difficulty, discrimination power, and item validity.

RESULTS AND DISCUSSION

The descriptive analysis produced the pretest and posttest learning outcome scores of the experimental class during the learning process, as presented in Table 1.

Table 1. Learning Outcome Data Based on Descriptive Statistics

No	Statistic	<i>Pretest</i>	<i>Posttest</i>
1	Number of samples	32	32
2	Ideal score	100	100
3	Highest score	64.72	88.24
4	Lowest score	23.53	47.06
5	Mean	39.88	69.85
6	Standard deviation	9.994	9.995
7	Variance	99.88	99.9

As shown in Table 1, the highest pretest score was 64.72 and the lowest was 23.53, with a standard deviation of 9.994. On the posttest, the highest score was 88.24 and the lowest was 47.06, with a standard deviation of 9.995. These results were obtained from the learning outcome test administered to 32 students. The N-Gain analysis of learning outcomes is presented in Table 2.

Table 2. Learning Outcome Data Based on N-Gain Analysis

Class	Sample	<i>N-Gain</i>	Category
Experimental	32	0.51	Moderate

Table 2 shows the learning outcome scores before and after the implementation of video tutorial-assisted worksheets. The N-Gain value of 0.51 falls into the moderate category. This analysis was conducted using SPSS 24.0. The analysis of each learning outcome indicator for the environmentally friendly technology topic is presented in Table 3.

Table 3. N-Gain Analysis of Learning Outcome Indicators

Cognitive Level	Indicator	Items	Pretest	Posttest	N-Gain	Category
C1	Stating the definition of environmentally friendly technology	2	38	52	0.54	Moderate
C2	Understanding the principles of environmentally friendly technology	1	13	24	0.58	Moderate
C2	Explaining the principles of applying environmentally friendly technology	2	29	46	0.49	Moderate
C2	Identifying applications of environmentally friendly technology	2	28	49	0.58	Moderate
C2	Explaining applications of environmentally friendly technology in various fields	2	25	46	0.54	Moderate
C2	Giving examples of applications of environmentally friendly technology in various fields	3	16	37	0.44	Moderate
C3	Implementing energy-saving behavior in daily life and identifying environmentally unfriendly technology	1	12	22	0.5	Moderate
C4	Analyzing the principles of applying environmentally friendly technology	1	9	15	0.26	Low

Cognitive Level	Indicator	Items	Pretest	Posttest	N-Gain	Category
C4	Analyzing applications of environmentally friendly technology products in various fields	2	16	37	0.44	Moderate
C4	Analyzing the benefits of creating environmentally friendly technology projects	1	10	17	0.32	Moderate
Total		17	21.7	38	0.51	Moderate

Table 3 presents the N-Gain analysis across all learning outcome indicators, yielding a mean N-Gain of 0.51 in the moderate category. However, one indicator showed an unstable improvement, namely the C4 cognitive level indicator of analyzing the principles of applying environmentally friendly technology, which obtained an N-Gain of 0.26 in the low category. This occurred because the material on the principles of environmentally friendly technology was not fully incorporated into the worksheets and video tutorials, and students were not sufficiently focused on this material when completing the test items. Students need exploration in developing analytical skills; this is in line with Firdausi Nuzula and Sudibyo (2022), who state that analytical ability provides exploration through which students can critically examine contextual questions related to science concepts.

The normality data were obtained from the Shapiro-Wilk test using SPSS 24.0 for Windows. Normally distributed data are indicated by a significance level greater than 0.05. The results of the analysis are presented in Table 4.

Table 4. Normality Test of Pretest-Posttest Data

<i>Shapiro-Wilk</i>	<i>Pretest</i>	<i>Posttest</i>
Statistic	0.93	0.95
Degrees of freedom (df)	31	31
Significance	0.06	0.15

Table 4 shows the significance values obtained for the pretest and posttest. The pretest significance value was 0.06 and the posttest value was 0.15; both exceed the specified significance level of 0.05. Based on these results, the data are normally distributed.

Hypothesis testing was conducted using a paired sample t-test to examine whether learning outcomes improved significantly through the implementation of video tutorial-assisted worksheets. The threshold for hypothesis testing was $\alpha = 0.05$ with degrees of freedom (df) = 31. The results are presented in Table 5.

Table 5. Learning Outcome Data Based on the Paired Sample T-Test

Mean	Std. Deviation	Std. Error Mean	<i>t</i>	<i>df</i>	Sig. (2-tailed)
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Pretest– Posttest	-29.964	6.574	1.162	-25.783	31	0
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As shown in Table 5, the significance value (2-tailed) was less than 0.05; therefore, H_0 was rejected and H_1 was accepted. This result provides evidence that video tutorial-assisted worksheets can improve the learning outcomes of ninth-grade students at SMP Nasional Makassar.

Based on the descriptive analysis, the improvement in learning outcomes before and after the implementation of video tutorial-assisted worksheets is evident from the mean pretest score of 39.88, categorized as low, in contrast to the mean posttest score of 69.85, categorized as moderate. Similar results were reported by Dewi (2020), who found that worksheets assisted by audio-visual media improved student learning outcomes. Sujana et al. (2021) likewise reported an improvement in learning outcomes through the use of audio-visual media in science learning, with student engagement contributing a positive effect.

The N-Gain of 0.51, in the moderate category, further indicates the improvement in learning outcomes experienced by students of SMP Nasional Makassar. The indicator-level analysis details the improvements that occurred; for example, two of the ten indicators showed substantial improvement, namely understanding the principles of environmentally friendly technology and identifying its applications. This can be attributed to students' skill in understanding the concepts of environmentally friendly technology principles recorded in the worksheets and in applying the findings from these activities, thereby sharpening their process skills (Aldiyah, 2021). Meanwhile, the indicator with the weakest improvement was the analysis indicator at the C4 cognitive level. This can be attributed to students' limited training in decomposing information and comparing the causes and effects of an event (Purnawati et al., 2021).

The hypothesis test showed a significant difference between the pretest and posttest data, with a result of $0.000 < 0.05$, leading to the rejection of H_0 and acceptance of H_1 . Miftah (2022) argues that the role of media as visualization helps improve the quality of learning activities by explaining material through videos presented to and watched by students. The video tutorials used in this study were sourced from YouTube. YouTube provides practical and up-to-date videos and has undergone significant transformation, making it a popular and easily accessible video source for its users (Yensharti & Riyadi, 2024).

CONCLUSION

The findings of this study show that the learning outcomes of ninth-grade students at SMP Nasional Makassar improved after the implementation of video tutorial-assisted worksheets, as indicated by an N-Gain of 0.51 in the moderate category and a significant difference confirmed by the paired sample t-test result of $0.000 < 0.05$. These results indicate that the effectiveness of video tutorial-assisted worksheets is supported by the learning outcome data. Future research is recommended to examine concept mastery across all cognitive levels. Nevertheless, several limitations of this study should be noted, particularly the experimental design, which used only one experimental class without a control class, so the observed improvement cannot be attributed solely to the intervention. In addition, the worksheets used require student exploration to train analytical skills, which was not fully facilitated in this study.

REFERENCES

- Aldiyah, E. (2021). Lembar kerja peserta didik (LKPD) pengembangan sebagai sarana peningkatan keterampilan proses pembelajaran IPA. *Jurnal Inovasi Keguruan dan Ilmu Pendidikan*, 1(1).
- Aliyyah, R. R., Saraswati, S., Ulfah, S. W., & Ikhwan, S. (2021). Upaya meningkatkan hasil belajar IPA pada materi sifat-sifat cahaya menggunakan media video pembelajaran. *Aksara*:

- Jurnal Ilmu Pendidikan Nonformal*, 7(2), 317. <https://doi.org/10.37905/aksara.7.2.317-326.2021>
- Annisa Izzania, R., & Widhihastuti, E. (2020). Potensi penggunaan KIT praktikum dan video tutorial sebagai media pembelajaran jarak jauh. *Chemistry in Education*. <http://journal.unnes.ac.id/sju/index.php/chemined>
- Dewi, R. S. (2020). Penggunaan lembar kerja siswa (LKS) berbantuan media audio visual dalam pembelajaran IPA-Biologi pada pokok bahasan struktur dan fungsi jaringan tumbuhan sebagai upaya meningkatkan hasil belajar di MTs 5 Kota Jambi. *Jurnal Literasiologi*, 4(2).
- Firdausi Nuzula, N., & Sudibyo, E. (2022). Penerapan model problem based learning untuk meningkatkan kemampuan literasi sains siswa SMP pada pembelajaran IPA. *PENSA E-Jurnal: Pendidikan Sains*. <https://ejournal.unesa.ac.id/index.php/pensa>
- Fitriyah, D. (2021). Pengembangan video tutorial praktikum kimia umum berbasis kehidupan sehari-hari di masa Covid-19. *TANJAK: Journal of Education and Teaching*, 2(1), 63-69. <https://doi.org/10.35961/tanjak.v2i1.241>
- Fredagsvik, M. S. (2023). The challenge of supporting creativity in problem-solving projects in science: A study of teachers' conversational practices with students. *Research in Science and Technological Education*, 41(1), 289-305. <https://doi.org/10.1080/02635143.2021.1898359>
- Gulo, A. (2022). Penerapan model pembelajaran problem based learning dalam meningkatkan motivasi dan hasil belajar IPA. *Educativo: Jurnal Pendidikan*, 1(1), 334-341. <https://doi.org/10.56248/educativo.v1i1.58>
- Indayani, E., & Hartini, S. (2024). Analisa model pembelajaran student centred learning. *Jurnal Psikologi Prima*, 7(2).
- Indrawati, E. S., & Nurpatri, Y. (2022). Problematika pembelajaran IPA terpadu (kendala guru dalam pengajaran IPA terpadu). *Educativo: Jurnal Pendidikan*, 1(1), 226-234. <https://doi.org/10.56248/educativo.v1i1.31>
- Istiqomah, E. (2021). Analisis lembar kerja peserta didik (LKPD) sebagai bahan ajar biologi. *ALVEOLI: Jurnal Pendidikan Biologi*, 2(1).
- Kotimah, E. K. (2024). Meningkatkan pendidikan sains menjelajahi dampak video animasi Powtoon dalam instruksi IPA. *Jurnal Sains dan Teknologi*, 1(1).
- Laato, S., Mäntymäki, M., Islam, A. K. M. N., Hyrynsalmi, S., & Birkstedt, T. (2023). Trends and trajectories in the software industry: Implications for the future of work. *Information Systems Frontiers*, 25(2), 929-944. <https://doi.org/10.1007/s10796-022-10267-4>
- Luh, N., Karang Widiastuti, G., Ayu, D., Manu, M., & Priantini, O. (2022). Lembar kerja peserta didik berbasis kontekstual pada muatan pelajaran IPA. *Jurnal Ilmiah Pendidikan Profesi Guru*, 5. <https://doi.org/10.23887/jippg.v5i1>
- Miftah, M. (2022). Pemanfaatan video tutorial YouTube untuk alat bantu mengajar guru. *Edu Cendikia: Jurnal Ilmiah Kependidikan*, 2(1). <https://doi.org/10.47709/educendikia.v2i1.1429>
- Murni, A. W., & Yasin, F. N. (2021). Pengembangan lembar kerja peserta didik (LKPD) berbasis proyek pada materi siklus air kelas V sekolah dasar. *Jurnal Basicedu*, 5(6), 6196-6210. <https://doi.org/10.31004/basicedu.v5i6.1696>
- Ningsih, W., Arwita, W., Hardinata, A., Rahmawati, S., & Purwanto, E. (2024). *Buku ajar media pembelajaran*. Eureka Media Aksara.
- Purnawati, L., Hidayanto, E., & As'ari, A. R. (2021). Profil pertanyaan siswa dalam pembelajaran saintifik berbasis pengamatan pada materi teorema Pythagoras. *EDU-MAT: Jurnal Pendidikan Matematika*, 9(2), 109. <https://doi.org/10.20527/edumat.v9i2.10669>
- Putri Dewi, M. (2023). Studi tentang efek lembar kerja praktikum dalam meningkatkan keterampilan proses sains pada siswa kelas IV SD. *Jurnal Pelita Ilmu Pendidikan (JPIP)*, 1, 44-48.

- Sehartian, D. Y., & Adriyani, Z. (2023). The influence of flashcard media on science learning outcomes for Islamic elementary school grade. *Scaffolding: Jurnal Pendidikan Islam dan Multikulturalisme*, 5(1), 427-438. <https://doi.org/10.37680/scaffolding.v5i1.2561>
- Sujana, D. M. A., Ngurah Japa, G., & Yasa, L. P. Y. (2021). Meningkatkan hasil belajar IPA siswa melalui model problem based learning berbantuan media audio visual. *Jurnal Ilmiah Pendidikan dan Pembelajaran*, 5(2). <https://doi.org/10.23887/jipp.v5i2>
- Vianney, M., Bano, V. O., & Makatita, A. L. (2025). Penerapan model pembelajaran kooperatif tipe jigsaw berbantuan media video animasi dan LKPD Liveworksheet untuk meningkatkan hasil belajar. *BIODIK*, 11(1), 170-179. <https://doi.org/10.22437/biodik.v11i1.42498>
- Walidah, M., & Rahmatan, H. (2023). Penerapan lembar kerja peserta didik berbasis etnosains untuk meningkatkan hasil belajar di SMP Negeri 8 Banda Aceh. *Jurnal Pendidikan Sains Indonesia*, 11(1), 84-95. <https://doi.org/10.24815/jpsi.v10i4.26854>
- Wardah, S. J., & Meilana, S. F. (2025). Pengaruh media pembelajaran Powtoon terhadap minat belajar siswa pada pembelajaran IPA materi sumber energi. *Jurnal Pendidikan Matematika dan Sains*, 13(2), 380-388. <https://doi.org/10.21831/jpms.v13i2.87827>
- Yensharti, Y., & Riyadi, L. (2024). Peran media video tutorial YouTube sebagai sumber penunjang praktik instrumen gesek (violin). *KOLEKTIF: Jurnal Pendidikan, Pengajaran, dan Pembelajaran*, 1(2), 174-183. <https://doi.org/10.70078/kolektif.v1i2.40>
- Zefitri, Y., Hakim, L., & Selegi, S. F. (2024). Pengembangan media pembelajaran video tutorial project ecoprint kurikulum merdeka sekolah dasar. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 3.