

The Effect of Wordwall-Integrated E-LKPD on Senior High School Students' Learning Motivation in the Excretory System Topic

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Abstract

This study investigated the effect of Wordwall-integrated Biology E-LKPD on senior high school students' learning motivation in the excretory system topic. A quasi-experimental design with a posttest-only control group was employed. Participants included two eleventh-grade classes: one experimental group taught with Wordwall-integrated E-LKPD and a control group receiving traditional instruction. Data were gathered through a validated learning motivation questionnaire that assesses six indicators: willingness to learn, learning needs and motivation, persistence in completing tasks, resilience when facing difficulties, interest in learning activities, and enjoyment of problem-solving.. Data were analyzed with an independent samples t-test, revealing a significant difference between the experimental and control groups ($p < 0.05$). This indicates that Wordwall-integrated E-LKPD notably boosted students' learning motivation. These results imply that gamified digital worksheets can effectively increase student engagement and motivation in biology education.

Keywords: e-lkpd, excretory system, learning motivation, wordwall

INTRODUCTION

Modern learning emphasizes student-centered approaches, where students actively construct knowledge while teachers act as facilitators (Kusumawati, 2024). Facilitating learning activities is one of the main goals of technology in overcoming various challenges in the learning process. Technology, as software, has developed to provide systematic ways and tutorials for solving increasingly complex learning problems and has gained an important place in the world of education. The rapid development in the world of technology has a significant impact on the learning methods and strategies used. Every user can consider the benefits obtained from the development of this technology (Yasin *et al.*, 2023).

One of the fields of study that has received a positive impact from this technological advancement is biology learning. Biology learning is a systematic study and understanding of nature, so studying biology involves more than just memorizing facts and concepts; it also a process of discovery that requires critical thinking from students (Nasution *et al.*, 2021). The skills required in this process include observation, hypothesis submission, proper use of tools and materials, and attention to occupational safety and health (Wulandari *et al.*, 2021). In addition, students also need to ask questions, classify and interpret information, and communicate observations both orally and in writing (Geovana *et al.*, 2022). In biology education, students need to gather and organize relevant factual data to evaluate ideas or address everyday issues. The biology learning process is highly dependent on the preparation of learning tools, including determining the learning experiences students need and the learning media used (Jannah *et al.*, 2023).

Despite the importance of active engagement in learning, many students still show limited interest in examining concepts, carrying out investigations, and formulating conclusions based on available information. This issue may be attributed to instructional media that are not sufficiently engaging, resulting in low student participation during classroom activities (Junita et al., 2023). Such conditions can reduce students' motivation to learn, even though motivation is an essential factor in supporting the acquisition of knowledge and skills. Students who possess strong learning motivation tend to be more engaged in learning activities and demonstrate better academic achievement (Rofi'ah et al., 2023).

Learning motivation is crucial for supporting students in reaching their expected learning competencies and academic objectives. (Safiany, 2025). Research has indicated that learners with higher levels of motivation are more probable to attain satisfactory learning outcomes and successfully meet learning standards, which contribute to their overall academic success (Fernando et al., 2024). Therefore, teachers are advised to implement innovative teaching methods that can enhance students' engagement and motivation. The integration of technology-based learning media, such as interactive animations and simulations, has been recognized as an effective way to facilitate students' understanding of complex and abstract biological concepts (Mutmainnah et al., 2021). Moreover, utilizing creative and engaging learning resources can boost students' enthusiasm and motivation during the entire learning process. (Abadi et al., 2025).

Classroom observations and interviews with a Biology teacher at SMA Negeri 03 Bengkulu Tengah revealed that students' motivation to learn stayed fairly low. This was evident from students' limited enthusiasm during lessons, low participation in learning activities, lack of persistence in completing assignments, and reduced interest in addressing learning-related problems. These conditions were associated with the continued use of printed worksheets (LKPD) and conventional teaching practices, while technology-based learning media and educational games had not yet been incorporated into classroom instruction. As a consequence, students' academic performance was also affected, as approximately half of the students in each class failed to achieve the Minimum Completion Criteria (KKM) score of 75 on daily assessments. To address this issue, a more engaging learning approach is required. Therefore, Wordwall-integrated E-LKPD was chosen as an alternative learning resource because it combines structured activities with interactive game elements, which can improve students' motivation, participation, and engagement in learning.

One innovation that can be used in the learning process is the Electronic Student Worksheet (E-LKPD). E-LKPD is an interactive digital worksheet that contains exercises and can be accessed anytime and anywhere via electronic devices such as computers or mobile phones with internet access (Simamora et al., 2024). E-LKPD not only replaces the printed version but is also equipped with various elements such as learning achievements, materials, learning videos, worksheets, evaluation questions, attendance, assessments, and learning resources. E-LKPD has been shown to boost engagement in learning and effectively decrease students' passive attitudes during activities (Wiranti, 2023). The use of E-LKPD allows for more interactive and interesting learning, especially in today's learning context. One application that can be used to design E-LKPD is Canva, which is available in free and paid versions, is online-based, and is easy to use for designing learning media (Rahmatullah, Inanna, and Ampa, 2020).

In addition, E-LKPD can also be integrated with educational games based on Wordwall. Wordwall games are an example of learning media that utilize technology to facilitate independent learning and are innovative media. Wordwall is very suitable for use in learning evaluations because it is

interesting and makes students more active in learning activities (Hasram *et al.*, 2021). The advantage of Wordwall is that it is free for the basic option, with various templates available. The games on Wordwall also offer various types of games, such as crosswords, quizzes, random cards, and many others (Pradani, 2022).

The selection of Wordwall-integrated E-LKPD was based on its ability to combine guided learning activities with interactive digital features that encourage students' active participation and learning enthusiasm. Furthermore, the excretory system was chosen because it involves various physiological processes and interconnected concepts that students often find challenging to comprehend through traditional teaching methods (Wahidah *et al.*, 2023). Therefore, implementing Wordwall-integrated E-LKPD is expected to support students' understanding while fostering greater motivation during the learning process.

RESEARCH METHOD

A quasi-experimental method with purposive sampling was employed in this study. The participants were split into two groups: one experiencing the Wordwall-enhanced Biology E-LKPD and the other following traditional classroom teaching. The independent variable was the use of Wordwall-integrated Biology E-LKPD, while students' learning motivation served as the dependent variable. Table 1 illustrates the research design.

Table 1. Research Design

Group	Treatment	Observation
Experiment	X	O
Control	C	O

(Sugiyono, 2007)

Description:

X: Learning using Wordwall-integrated Biology E-LKPD

C: Traditional teaching methods involving lectures, question-and-answer sessions, and standard educational materials

O: Posttest measurement of students' learning motivation

This study was conducted at SMA Negeri 03 Bengkulu Tengah, located in Pasar Pedati Village, Pondok Kelapa District, Bengkulu Tengah Regency, Bengkulu Province, from January to February 2025. The population comprised all SMA Negeri 03 Bengkulu Tengah students, while the accessible population consisted of eleventh-grade students. Participants were chosen using purposive sampling, based on recommendations from the Biology teacher and similar academic characteristics. Accordingly, class XI Biology 5 was designated as the experimental group ($n = 33$), while class XI Biology 4 served as the control group ($n = 34$). The experimental group received instruction using Biology E-LKPD integrated with Wordwall, whereas the control group received traditional teaching methods. Before testing the hypothesis, normality and homogeneity checks were performed to verify that the data satisfied the assumptions for parametric analysis with an independent samples t-test.

Data were gathered through a learning motivation questionnaire given to both groups following the learning session. The instrument measured students' learning motivation across several indicators, including willingness to learn, learning needs and drives, persistence in completing tasks, resilience in facing difficulties, interest in learning activities, and enjoyment in problem-solving. The data were analyzed using normality and homogeneity before performing an independent samples t-test to assess if there was a significant difference in learning motivation between the experimental and control groups.

RESULT AND DISCUSSION

The research data were obtained through a student learning motivation questionnaire and presented descriptively in Table 2.

Table 2. Descriptive Analysis

	Experiment	Control
N	33	34
Maximum	98	82
Minimum	72	62
Mean	85.18 %	71.74 %

The learning motivation data were collected using a questionnaire that measured six indicators, namely students' desire to learn, learning needs and drives, diligence in completing assignments, perseverance in overcoming difficulties, interest in learning activities, and enjoyment in solving problems. Table 2 indicates that the experimental class attained a higher average score of 85.18%, compared to 71.74% for the control class. This finding indicates that students who learned using Wordwall integrated E-LKPD demonstrated higher learning motivation than those who experienced conventional learning.

Next, the prerequisite analysis tests are the normality and homogeneity tests. The following are the findings of the prerequisite normality and homogeneity tests.

Table 3. Results of the Normality Test of the Student Learning Motivation

	Class	Kolmogorov-Smirnov		
		Statistics	Df	Sig
Learning Motivation Questionnaire	Experiment	0.139	33	0.108
	Control	0.140	34	0.089

Based on Table 3, the results of the normality test on the student learning motivation questionnaire data were analyzed using the Kolmogorov-Smirnov method. In the experimental class, the significance value obtained was 0.108, while in the control class it was 0.089. Because both values exceed the significance limit of 0.05, it can be concluded that the data in both classes follows a normal distribution. This condition indicates that the data satisfy the assumptions necessary for proceeding with parametric statistical tests.

Table 4. Results of the Homogeneity Test of the Student Learning Motivation

Levene Statistic	Df1	Df2	Sig
0.008	1	65	0.930

Based on Table 4, the homogeneity test was performed to check if the variances in both groups were equal. The results were based on Levene's Test analysis; a significance value of 0.930 was obtained with degrees of freedom (df1) = 1 and (df2) = 65. Because the significance value is far above the $\alpha = 0.05$ limit, it can be concluded that the data exhibit homogeneity of variance. Thus, the data meet the homogeneity assumption required for further parametric testing.

Table 5. Results of the Independent Samples t-Test

Learning Motivation Questionnaire Results	Levene's Test for Equality of Samples			t-test for Equality of Means	
	F	Sig.	t	Df	Sig. (2-tailed)
Equal variances assumed	0.008	0.930	10.131	65	P < 0.001

Based on Table 5, the results of the Levene's Test analysis show a significance value of 0.930, which exceeds the 0.05 limit. This indicates that the data have homogeneous variance, so the t-test analysis was carried out with the assumption of equal variances. The independent samples t-test produced a t value of 10.131, with 65 degrees of freedom, and a p-value less than 0.001. Therefore, the null hypothesis was rejected, indicating that the implementation of Wordwall-integrated Biology E-LKPD significantly affected students' learning motivation.

Table 6. Effect Size Analysis of Students' Learning Motivation

Statistic	Value
Cohen's d	2.48
Interpretation	Very Large Effect

The effect size analysis showed a Cohen's d of 2.48, reflecting a very large effect. This indicates that the difference in learning motivation between the experimental and control groups was both statistically significant and educationally meaningful.

The findings of this study show that the use of Wordwall-integrated Biology E-LKPD contributes positively to students' learning motivation. The higher motivation scores achieved by the experimental group suggest improvements in several motivational aspects, including students' willingness to learn, learning needs and drives, diligence in completing assignments, resilience when facing challenges, interest in learning activities, and enjoyment in solving problems. Compared to students who participated in conventional learning, those in the experimental group showed higher enthusiasm and engagement during the learning process. These findings align with those of T. A. Lestari et al. (2023), who noted that interactive learning media can boost students' interest and motivation.

The interactive features available in Wordwall, such as quizzes, games, and puzzles, help create an engaging learning environment that encourages students to participate actively. These activities can strengthen students' desire to learn and increase their interest in classroom activities. In addition, access to scores and instant feedback motivates students to complete tasks more seriously and continue working even when they encounter difficulties. Such learning experiences are closely related to the development of intrinsic motivation because students become more involved in achieving learning goals (Sabatino et al., 2024).

Furthermore, integrating Wordwall into E-LKPD encourages students to take a more active role during instruction. Students are not limited to receiving information from the teacher but are also required to answer questions, complete tasks, and solve problems independently. This learning process can reinforce students' learning needs and encourage greater responsibility for their own academic progress (Pulungan et al., 2025). The immediate feedback provided by the platform also helps students recognize errors and improve their performance, thereby fostering perseverance and persistence in learning.

The excretory system is often perceived as a challenging topic because it involves complex biological processes and numerous scientific terms. Using Wordwall-integrated E-LKPD, the material is

presented in a more interactive and visually appealing format, simplifying the content to enhance student understanding. The combination of text, images, and interactive exercises helps maintain students' attention and reduces boredom during lessons. Consequently, students become more interested in learning and more enthusiastic about exploring and solving biology-related problems. This finding aligns with earlier research showing that attractive and interactive learning materials can enhance students' motivation. (Wicaksono et al., 2024; Firmansyah et al., 2025).

Overall, incorporating Wordwall-integrated E-LKPD supports various dimensions of learning motivation. The media not only promotes students' willingness to learn but also strengthens their persistence, resilience, participation, and enjoyment in problem-solving activities. Therefore, Wordwall-integrated E-LKPD is a valuable instructional tool for boosting students' motivation in biology learning. The results suggest that incorporating Wordwall into Biology E-LKPD effectively enhances students' learning motivation. Its interactive features, visual presentation, immediate feedback, and accessibility can boost student engagement and participation in learning activities. Therefore, the development and implementation of similar technology-supported learning media may be considered to support the quality of classroom instruction (Lubis et al., 2025).

CONCLUSION

This study's results showed that students who participated in learning through Wordwall-integrated E-LKPD achieved higher levels of learning motivation than those who experienced conventional instruction. The independent samples t-test revealed a significant difference between the two groups ($p < 0.001$), with an effect size indicating a very large impact (Cohen's $d = 2.48$). Therefore, it can be concluded that the implementation of Wordwall-integrated Biology E-LKPD significantly and substantially enhances the learning motivation of eleventh-grade students at SMA Negeri 03 Bengkulu Tengah.

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