



A Quasi-Experimental Study: The Influence of Web-Enhanced Learning on Student Learning Independence in the Human Movement System

Nurmuzayyana¹, Jamilah^{2*}, Andi Tenri Ola Rivai³, Muhammad Rijal⁴

^{1,2,3} Universitas Islam Negeri Alauddin Makassar, Indonesia

⁴ Institut Agama Islam Negeri Ambon, Indonesia

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*Correspondence email:

jamilah@uin-alauddin.ac.id

ABSTRACT

This study investigates the impact of web-enhanced learning on eighth-grade students' learning independence in the human movement system subject at SMPN Sinjai. Using a nonequivalent control group design, self-learning questionnaires and observation sheets were employed for data collection. Descriptive and inferential analyses included prerequisite tests and independent sample t-tests. Results indicate that students taught with the web-enhanced learning model achieved a high average learning independence score of 124.8, compared to a medium average score of 108.1 for students without this model. The inferential analysis yielded a significance value of $t_{count} 0.000 < 0.05$, supporting the rejection of H_0 and acceptance of H_1 . This finding implies a significant influence of web-enhanced learning on students' learning independence.

Studi Quasi-Experimental: Pengaruh Web-Enhanced Learning Terhadap Kemandirian Belajar Siswa Pada Sistem Gerak Manusia

ABSTRAK: Penelitian ini menyelidiki pengaruh web-enhanced learning terhadap kemandirian belajar siswa kelas VIII pada mata pelajaran sistem gerak manusia di SMPN Sinjai. Penelitian ini menggunakan non-equivalent control group design, kuesioner kemandirian belajar, dan lembar observasi untuk pengumpulan data. Analisis deskriptif dan inferensial dilakukan, termasuk uji prasyarat dan uji t sampel independen. Hasil menunjukkan bahwa siswa yang diajar dengan model pembelajaran web-enhanced mencapai skor kemandirian belajar rata-rata 124,8 (kategori tinggi), dibandingkan siswa yang tidak diajar dengan model tersebut dengan skor rata-rata 108,1, kategori sedang. Analisis inferensial menghasilkan nilai signifikansi $t_{hitung} 0,000 < 0,05$, yang berarti H_0 ditolak dan H_1 diterima. Hal ini menunjukkan adanya pengaruh yang signifikan dari web-enhanced learning terhadap kemandirian belajar siswa.

INTRODUCTION

Various factors affect the achievement of the learning process, both internally and

externally. Syaharani (2018) views learning as a cognitive process influenced by several factors, such as individual circumstances, previous knowledge, content, and way of

presentation. Knowing the factors that influence learning is crucial in determining the steps and strategies taken to improve the quality of learning. Anaman et al. (2022) said many factors, such as educators, teaching methods, materials, facilities, infrastructure, students' conditions, and environment, can affect the success rate of learning activities. Additionally, one of the internal factors that influence the success of student learning is the independence of learning.

Independent learning (self-regulated learning) is an active and constructive process by which students set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and contextual features in the environment (Nurutstsany et al., 2020). Unlike their passive classmates, independent learners proactively seek out information when needed and take the necessary steps to master it. They overcome obstacles like dull learning conditions, unengaging teachers, or confusing textbooks to succeed (Tokan & Imakulata, 2019). (Pratama et al., 2020) said individual work habits encompass factors such as work status, motivation, goal-oriented focus, self-management, time utilization, attitudes towards teachers, attitudes towards education in general, and the level of preparedness. Study habits serve as the foundation for academic proficiency. Having strong study habits minimizes the likelihood of failure and empowers students to make the most of their learning opportunities (Sadykhan et al., 2022).

Ranti et al., 2017 conducted research and found that students in several schools had the lowest awareness of independent learning. This situation can be seen from the results of research, which showed that at least some students were doing assignments within their abilities. Muhammad's (2019) research also shows that students lack the self-awareness to record lessons given by educators, feel disinterested and unhappy with individual assignments, and depend on their smarter friends to complete LKPD when

given group assignments, revealing the issue of learning independence. (Handoko et al., 2019) suggest that it is necessary to implement new approaches and tactics in education that could enhance the self-directed learning skills of students. Sugianto et al. (2020) state that students' deficiency in independent learning is evidenced by a lack of motivation, perseverance, seriousness, discipline, and responsibility in their approach to learning. On the other hand, developing student learning independence cultivates a strong determination and curiosity for knowledge that evolve and progress over time.

One of the learning innovations that can be used as a guide for teaching and learning activities is the information technology-based learning model using the Internet as a resource. This model is called online learning, which consists of several types, including web course learning, web-centric learning, and web-enhanced learning (Yolida et al., 2022). According to Mukhoyyaroh et al. (2022), one approach combines face-to-face classroom learning methods with methods that utilize technology and the Internet to achieve learning outcomes. Unlike full online learning, which does not allow in-school meetings, web-enhanced learning (often called hybrid or blended courses) generally meets face-to-face in the classroom. Engaging in learning activities that incorporate enhanced web-based learning is believed to positively impact student motivation and their capacity for independent learning (Schmidt et al., 2022).

Web-enhanced learning is the use of the Internet for educational purposes to enhance learning in the classroom (Iyamuremye et al., 2022). According to Elboshi (2021), technology-enhanced learning systems were introduced during the last two decades to support the learning and teaching processes. Learners and teachers can easily access and use many online educational platforms using computers, tablets, and smartphones. Such platforms are social media networks, web-based blogs, and many other

platforms that have produced much educational material. Web enhanced learning is a multifaceted approach combining traditional face-to-face instruction and online learning methods. It involves utilizing various delivery methods, including blogs, lectures, and interactive discussions facilitated by teachers (Turang & Made, 2022). This mode of learning does not replace in-person classroom learning; instead, it strengthens the delivery of educational materials by creating opportunities for students to exchange opinions and engage in online learning environments (Lawalata et al., 2022). Ridha et al. (2021) argue in online learning, students access learning materials through internet-connected devices such as smartphones or computers, utilizing the Internet as a medium for instruction. Astuti et al. (2020) discovered that web-based learning is an educational medium or website that functions as a platform for online education. What distinguishes web-based learning from other models is its utilization of web technology and internet connectivity. This idea agrees with Kumar et al. (2021), which enables learners to access educational resources from anywhere and anytime using devices and operating systems like Android, Windows, and others.

In summary, web-enhanced learning combines face-to-face and online learning, creating a dynamic and versatile educational experience. It integrates different delivery methods, embraces web-based technologies, and enables learners to access educational resources conveniently. Incorporating electronic devices and utilizing web-based platforms expands learning opportunities and promotes a blended learning environment.

After interviews with biology educators and several students at SMPN 7 Sinjai, the researcher learned that educators had tried to instill learning independence through various methods, such as giving assignments, lectures, discussions, and PPTs. However, this situation still does not provide significant changes, namely that the independence of students is not maximized, such as with students who are unable to take

the initiative to learn on their own, always depend on other students when given assignments, do not know the purpose of study, are unable to obtain relevant learning resources, do not evaluate the process and learning outcomes, and even some students still lack confidence and are embarrassed to express their ideas.

While extensive research has been conducted on learning models and their impact on fostering independent learning, there remains a gap in research concerning the application of web-enhanced learning models, specifically in understanding the movement system. It is widely recognized that misconceptions persist in biology classrooms, particularly regarding the complex topic of the human movement system. Previous research reported by Novitasari & Susantini, (2021) that misconceptions were present, with an average percentage of 32% and 30%, respectively, regarding muscle relaxation mechanisms and overall muscle structure. Another study also indicated the presence of misconceptions in four sub-topics, with the respective proportions being 41.43% for joints, 38.75% for disorders and health of the movement system, 19.17% for muscles, and 13.89% for bones. The overall average proportion of misconceptions across all sub-topics was 23.04%. These findings highlight that students frequently encounter misconceptions about the Human Movement System material.

METHOD

The research employed a quasi-experimental design, specifically the nonequivalent control group design (Sugiyono, 2015). It was conducted in the eighth grade of SMPN Sinjai, located at Jalan Husni Tamrin, Biringere Village, North Sinjai District. The study population comprised all eighth-grade students at SMPN Sinjai, with Class VIII 4 selected as the experimental group and Class VIII 5 as the control group using purposive sampling.

Data collection in this study used a closed Likert scale to measure students' perceptions, opinions, and attitudes toward

events or social phenomena. The Likert scale consisted of five alternative responses to the statements, ranging from one to five. The alternatives used were:

Table 1. Research Sample

No	Class	Number of students
1	VIII 4	25
2	VIII 5	25
	Total	50

Table 2. The Score Pattern of Students' Learning Independence Questionnaire Choices

Aspect	Response Alternatives				
	Strongly Disagree	Do not agree	Doubtful	Agree	Strongly agree
Negative	5	4	3	2	1
Positive	1	2	3	4	5

Source : (Sugiyono, 2015)

Table 3. Interpretation of the Category of Learning Independence

Range	Category
$X < (Mi - 1SDi)$	Low
$(Mi - 1SDi) < X < (Mi + 1SDi)$	Medium
$X > (Mi + 1SDi)$	High

Source : (Saifuddin, 2017)

Instruments are tools for collecting or measuring data to solve research problems (Khalifah, 2015), questionnaire sheets, learning implementation plans (RPP), and observation sheets as instruments. The independence questionnaire consisted of 33 statement items related to students' abilities, such as responsibility, confidence, initiative, creativity, motivation, problem-solving, reflection, and self-evaluation in learning.

Data processing involved two statistical techniques: descriptive statistics and inferential statistics. The researcher used descriptive statistics to analyze and summarize the collected data while they conducted inferential statistical analysis to test the formulated hypotheses. Prerequisite tests such as normality and homogeneity tests were performed before conducting the hypothesis test. The researcher used the

independent sample t-test in hypothesis testing for this study (Yusuf, 2016)

RESULTS AND DISCUSSION

The pre-post-test analysis of the class experiment can be seen in Table 4. Meanwhile, the results of students' learning independence taught with web-enhanced learning can be seen in Table 5.

Table 4. Pretest and Posttest Analysis in the Experimental Class

Parameter	Pretest	Posttest
Maximum Value	125	153
Min Value	84	106
Average	99.8	124.8
Standard Deviation	9.40	10.71
Variance	88.41	114.75

Table 5. Categorization of Independent Learning in the Experimental Class

Range	Category	Frequency		Percentage	
		pre	post	Pre	post
$X < 91,7$	Low	4	0	16%	0%
$91,7 < X < 106,3$	Medium	16	1	64%	4%
$X > 106,3$	High	5	24	20%	96%

The pretest and posttest analysis of the class control can be seen in Table 6. Meanwhile, the results of students' learning independence taught without web-enhanced learning can be seen in Table 7.

Table 6. The Analysis of the Pretest and Posttest in the Control Class

Parameter	Pretest	Posttest
Maximum value	118	131
Min value	84	88
Average	96.2	108.1
Standard deviation	8,68	11.43
Variance	75.5	130.6

Table 7. Categorization of Independent Learning in the Control Class

Range	Category	Frequency		Percentage	
		Pre	Post	Pre	Post
$X < 91,7$	Low	6	2	24%	8%

Range	Category	Frequency		Percentage	
		Pre	Post	Pre	Post
91,7 < X < 106,3	Medium	16	10	64%	40%
X > 106,3	High	3	13	12%	52%

Subsequently, hypothesis testing was conducted to determine the effect of the Enhanced Learning Web Learning Model on Learning Independence, following the normality and homogeneity tests. The results of the test can be seen in Tables 8 and 9.

Table 8. Results of Normality Test Data Analysis

Class	Normality Tes
Experimental Class	0.200
Control Class	0.200

Based on the results of the one-sample Kolmogorov-Smirnov test data analysis for the experimental and control groups, a p-value of 0.200 was obtained, greater than the value of $\alpha = 0.05$, indicating $p > \alpha$. This value indicates that both classes are normally distributed.

Based on the results of the homogeneity analysis using SPSS version 25, a significant value of 0.461 was obtained, while the α value was 0.05, indicating that the significant value was $> \alpha$. This value indicates that both groups come from homogeneous populations.

The results of the independent sample t-test analysis showed a sig. (2-tailed) value of 0.000 and an α value of 0.05. This value indicates that the value of sig. (2-tailed) is less than α , leading to the rejection of H_0 and the acceptance of H_1 . The hypothesis test determines the discrepancy between the experimental class's (VIII 4) and control class's (VIII 5) posttest scores. Based on the independent sample t-test analysis results, a sig value (2-tailed) of 0.000 was obtained. This value indicates that the value of sig. (2-tailed) $< \alpha$. So it can be concluded that H_0 is rejected and H_1 is accepted. Based on these results, there is a significant influence on the learning independence of students taught with the web-enhanced learning model.

Based on the analysis of the collected data, it is evident that the initial levels of student independence (pretest) in both the experimental and control classes were not significantly different. This statement suggests that neither class had a strong grasp of the motion system material at the start of the study. However, following the implementation of the web-enhanced learning model during the learning process, a notable disparity in the average posttest scores between the experimental and control classes was observed. The experimental class achieved an average posttest score of 124.8, indicating a high level of understanding with a 96% success rate. In contrast, the control class achieved an average posttest score of 108.1, indicating a high level of understanding but with a lower % success rate of 52%.

The results of this study indicate that the experimental or treatment group with the web-enhanced learning model has better learning independence than the control class. In the experimental group, 24 out of 25 students were classified as having good learning independence, compared to only 5 out of 25 in the control group. The findings provide evidence that students in the experimental class exhibited higher learning independence levels than those in the control class. The increased learning independence observed in the experimental class can be attributed to the impact of web-enhanced learning. This finding aligns with the research conducted by Haka et al. (2020), which demonstrates that a combination of face-to-face and online learning, such as web-enhanced learning, has the potential to enhance student learning independence. Fitriyani et al. (2018) support this notion by suggesting that while a combination of e-learning and face-to-face instruction does not necessarily outperform conventional learning in increasing student learning independence, blended learning approaches hold promise for fostering greater independence.

In biology, a subject that requires a solid understanding of accurate and robust concepts, high levels of learning

independence are crucial for long-term development and comprehension (Novitasari & Susantini, 2021). Consequently, a strong emphasis on cultivating learning independence becomes imperative to achieve favorable learning outcomes. This finding is consistent with the research conducted by Aliyyah et al. (2017), which establishes a significant correlation between learning independence and science learning outcomes.

Using Latin terminology in the movement system material makes it harder to remember and understand organ structure and function. Moreover, the complex mechanics of the system involve intricate interactions between organs, muscles, and bones, requiring a comprehensive understanding. The utilization of the Internet is anticipated to address students' challenges in comprehending the content related to the motion system. This subject primarily concerns abstract concepts that students may find difficult to grasp. It requires dedicated effort to ensure a thorough understanding. Web-based learning is a valuable tool for assisting students by providing information on the movement system. Through the web, students can engage in effective independent learning, thereby enhancing their comprehension of the topic. According to Cahyana et al., (2019), Web-based resources are anticipated to alleviate students' difficulties when grasping abstract concepts. Mastering these subjects requires comprehension at multiple levels, including microscopic, macroscopic, and symbolic understanding, which students often find challenging to integrate effectively. However, the web offers a solution by providing visual representations and interactive content. Through these means, students can enhance their understanding of complex concepts, even in molecular studies, and overcome the obstacles commonly encountered in traditional learning methods.

Web-based science inquiry is critical for learning science (Jariyah & Tyastirin, 2020). It promotes authentic learning by immersing students in real-world problem-solving

contexts. Through activities such as formulating research questions, making predictions, conducting experiments, gathering data, and drawing conclusions, students can approach problem-solving in a manner that mirrors the practices of scientists (He et al., 2022). Science learning through web-based platforms focuses on fostering students' self-regulation. Instead of simply receiving knowledge through passive lectures from teachers, students actively participate in learning activities, allowing them to acquire scientific knowledge and gain more control over their learning process. According to Ouahi et al. (2022), integrating interactive simulations into the educational space benefits science learners in various ways. It facilitates the development of essential scientific skills, promotes metacognition and reflection, enhances classroom motivation and interest, and effectively predicts outcomes and addresses misconceptions. By leveraging the power of interactive simulations, educators can create engaging and effective learning experiences that empower students to participate actively in their scientific education.

The web-enhanced learning model can increase student learning independence, as seen from several indicators that increased after the posttest in the experimental class. These indicators encompass aspects such as self-confidence, motivation to learn, autonomy, as well as the ability to reflect on and evaluate one's learning progress. Research conducted by Pratiwi & Laksmiwati (2016) supports that self-confidence significantly contributes to student learning independence, accounting for 68.3% of the variance. The remaining 31.7% is attributed to other variables, including motivation, responsibility, initiative, and more.

The first indicator, self-confidence, plays a crucial role in independent learning. Students with self-confidence are more assured in their decision-making process to attain desired learning outcomes. Conversely, students lacking self-confidence struggle to

cultivate an attitude of independent learning within themselves (Oktarin et al., 2018).

The second indicator is learning motivation. Students agree that they need an interesting learning model that can increase learning motivation, such as web-enhanced learning. Interactive simulations enhance classroom motivation and interest by offering an engaging and dynamic learning experience. The visual and interactive nature of simulations captures students' attention and makes learning more enjoyable. This increased motivation can lead to improved retention and application of knowledge.

The same idea was expressed by Popiyanto et al., (2021), who stated that the web-enhanced learning model can increase the enthusiasm and motivation of students in learning. Assignments and reading materials can also be provided to students through the website, making it an alternative to online learning.

The third indicator is the ability to solve their problems. According to Mihci & Satici (2020), given the hierarchy of cognitive skills, problem-solving is often considered challenging. The diverse nature of problems, which can vary in size and complexity, further adds to the difficulty of teaching effective problem-solving strategies. Students dare to take the consequences of their actions and can also help answer questions about material they have not mastered. This idea aligns with Firmansah (2021), which suggests that students can be considered independent learners when they can complete learning tasks without relying on external assistance or dependence on others.

Through web-enhanced learning, quiet students are more active and participatory when studying online. Learning materials are packaged in a form that attracts students' interest and motivates them to learn. Students can also find their learning resources without asking others for help. Besides, students can also reflect and evaluate the learning process and outcomes because, on the web (Google Site) that is distributed, there are examples of questions that can be reopened outside of

class hours. Quizzes are available to evaluate learning outcomes. This idea aligns with Yani's (2017) opinion that using web-enhanced learning can make quiet students more active in online class discussions. Students are more motivated when they have responsibility for their learning, and wider access to various media options allows for more complex discussions. (Haka et al., 2021) suggested that using web-based resources can enhance the classroom learning experience for students. Elboshi (2021) stated that, unlike traditional physical classrooms, online platforms allow students to return to web pages multiple times for review and reading. This distinct feature sets online learning apart, as the web page content remains accessible from anywhere, even for those unable to attend the classes. Additionally, the availability of online discussions proves highly advantageous for students who tend to forget most or parts of what they have learned.

The use of various learning models in the process of teaching and learning activities is a determining factor for the success of knowledge transfer. This claim is supported by Tibahary's (2018) opinion, which interprets the learning model as a teaching plan showing certain learning patterns in achieving learning goals and guiding teaching and learning activities. The more diverse the models and teaching methods used by educators, the more motivation it is for students to receive messages from the subject matter's content. To facilitate meaningful learning experiences, educators play a vital role in selecting appropriate models, methods, and media (Anas & Murti, 2021). Budiman et al. (2022) said that to meet the standards of learning achievement. Students require independent learning strategies.

In addition to selecting accurate models, methods, and media used, it is also influenced by positive interactions between educators and students. This statement is in line with Saputra (2019), which states that the learning process in the classroom can be effective if there is interaction between educators and

students. This idea is also consistent with Elyas (2018), who argues that combining face-to-face meetings with electronic learning can increase student distribution and interactivity. Through face-to-face interaction, students can get to know fellow students and educators who accompany them, greatly supporting their virtual collaborative work.

Therefore, recognizing and utilizing the potential of technology in independent learning activities is essential. It opens up new avenues for learners to acquire knowledge, develop skills, and become self-directed in their educational pursuits. By leveraging technology effectively, educators can empower learners to explore and exemplify the best practices for independent learning, equipping them with the tools they need to thrive in an increasingly digital and interconnected world. According to Tiyas & Febriyanti (2016), for learners to achieve independence, they need access to certain tools. The integration of technology is expected to enhance the quality of life. When technology is used effectively, it significantly enhances learners' ability to access educational resources without relying on external assistance. Recognizing the significance of technology is crucial to fully exploring and demonstrating effective practices for utilizing it for independent learning activities.

CONCLUSIONS AND SUGGESTIONS

The following conclusions can be drawn from the study's findings and discussion: First, students' learning independence in the human movement system material at SMPN Sinjai, who taught with the enhanced web learning model, obtained an average pretest score of 99.8 in the medium category and an average posttest score of 124.8 in the high category, with a percentage of 96%. Second, students' learning independence in the human movement system material at SMPN Sinjai, who taught without the web-enhanced learning model, obtained an average pretest score of 96.2 in the medium category and an

average posttest score of 108.1 in the high category with a percentage of 52%. Finally, using the enhanced web learning model has a significant effect on learning independence, with a significance value of 0.000 and an α value of 0.05. The analysis indicates that the value of sig. (2-tailed) $< \alpha$, leading to the rejection of H0 and acceptance of H1. Therefore, the web-enhanced learning model significantly influences the learning independence of students. Encouraging positive engagement between teachers and students is one idea for enhancing the quality of the educational experience.

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