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EFFECTIVENESS OF USING *THE SAINSLearn* WEBSITE IN IMPROVING JUNIOR HIGH SCHOOL STUDENTS' LEARNING OUTCOMES ON THE TOPIC OF FORCE AND MOTION

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Abstract

Penelitian ini bertujuan untuk mengetahui efektivitas penggunaan website SainsLearn dalam meningkatkan hasil belajar siswa SMP pada topik gaya dan gerak. Penelitian menggunakan metode quasi experiment dengan desain Nonequivalent Control Group Design. Sampel penelitian berjumlah 45 siswa, terdiri atas 23 siswa kelas VII H sebagai kelas eksperimen yang belajar menggunakan website SainsLearn dan 22 siswa kelas VII F sebagai kelas kontrol yang belajar menggunakan buku cetak. Perlakuan diberikan selama tiga kali pertemuan. Instrumen penelitian meliputi tes hasil belajar kognitif berupa 20 soal pilihan ganda, angket hasil belajar afektif, angket hasil belajar psikomotorik, dan angket tanggapan siswa. Analisis data dilakukan menggunakan uji normalitas Shapiro–Wilk, uji homogenitas, uji Independent Samples t-test, uji N-Gain, dan effect size berbantuan SPSS. Hasil penelitian menunjukkan bahwa terdapat perbedaan hasil belajar yang signifikan antara kelas eksperimen dan kelas kontrol dengan nilai Sig. = 0,000 ($< 0,05$). Rata-rata peningkatan hasil belajar kognitif berdasarkan N-Gain pada kelas eksperimen sebesar 0,714 (71,4%) dengan kategori tinggi, sedangkan pada kelas kontrol sebesar 0,415 (41,5%) dengan kategori sedang. Hasil uji effect size sebesar 2,471 termasuk kategori sangat besar, sehingga menunjukkan bahwa penggunaan website SainsLearn sangat efektif dalam meningkatkan hasil belajar siswa pada topik gaya dan gerak. Selain itu, tanggapan siswa terhadap penggunaan website SainsLearn berada pada kategori sangat baik.

Kata Kunci: *website SainsLearn*, hasil belajar, gaya dan gerak

Abstract

This study aims to determine the effectiveness of the use of the SainsLearn website in improving the learning outcomes of junior high school students on the topic of force and motion. The research used a quasi experiment method with a Nonequivalent Control Group Design. The research sample amounted to 45 students, consisting of 23 students in grade VII H as an experimental class who learned using the SainsLearn website and 22 students in grade VII F as a control class who learned using printed books. Treatment was given during three meetings. The research instruments included cognitive learning outcome tests in the form of 20 multiple-choice questions, affective learning outcome questionnaires, psychomotor learning outcome questionnaires, and student response questionnaires. Data analysis was conducted using the Shapiro–Wilk normality test, homogeneity test, Independent Samples t-test, N-Gain test, and SPSS-assisted effect size. The results showed that there was a significant difference in learning outcomes

between the experimental class and the control class with a value of $\text{Sig.} = 0.000 (< 0.05)$. The mean increase in cognitive learning outcomes based on N-Gain in the experimental class was 0.714 (71.4%) in the high category, while in the control class it was 0.415 (41.5%) in the medium category. The results of the effect size test of 2,471 are in the very large category, thus showing that the use of the SainsLearn website is very effective in improving student learning outcomes on the topic of force and motion. In addition, students' responses to the use of the SainsLearn website are in the very good category.

Keywords : *website SainsLearn*, learning outcomes, force and motion

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INTRODUCTION

The development of information and communication technology has driven the transformation of learning towards digital learning that is more interactive, flexible, and student-centered. In science learning, the use of digital media is important because many concepts are abstract and require visualization to make them easier to understand. Therefore, teachers are required to utilize learning media that not only present material, but also be able to facilitate the exploration of concepts, interactions, and learning evaluations effectively so that they can improve student learning outcomes (Ristiani *et al.*, 2025).

One of the learning outcomes in the science understanding element in the Independent Curriculum emphasizes that students have the ability to understand motion and force. Basic concepts such as motion and force cannot be understood well by students. This in depth understanding of matter is the basis for later physics material related to motion and will continue to grow more complex. Therefore, mastery of material motion as a whole needs to be understood for students (Parinduri *et al.*, 2025).

This condition has not been fully implemented in schools. Based on the results of observations at one of the junior high schools in Bengkulu City, science learning is still dominated by the use of printed books and student worksheets (LKPD) printed at

each meeting, while the use of website-based learning media has not been carried out optimally.

As a result, learning tends to be teacher centered and students have difficulty understanding force and motion materials that contain abstract concepts and calculations. This condition is strengthened by the results of the pretest which show that the initial ability of students is still low. The mean pretest score of the experimental class was only 46.52, while the control class was 49.32, all of which were still below the science KKM of 76. In fact, none of the students in both classes reached the KKM before the treatment was given. The data shows that the mastery of the concepts of force and motion is still not optimal, so more interactive learning media is needed to help students understand concepts and improve learning outcomes.

Various studies have reported that web-based learning media has a positive impact on learning processes and outcomes. Learning websites are able to increase motivation, learning independence, and facilitate access to learning materials. Research Putri *et al.*, (2021) indicates that Google Sites-based media is suitable for use as a learning medium. Meanwhile, Pahwani *et al.*, (2025) reported that web-based multimedia had a significant effect on students' science learning outcomes. Although previous studies have demonstrated that website-based media improve learning

motivation and feasibility, most studies focused on product development or validation rather than evaluating learning effectiveness through experimental comparison. Moreover, very few studies have investigated an integrated website combining concept mapping, virtual simulation, interactive worksheets, and game-based assessment for learning force and motion. Thus, there is still a research gap that needs to be studied further, especially related to the effectiveness of integrated learning websites on the learning outcomes of junior high school students.

To overcome these problems, this study uses SainsLearn, which is a website-based learning media that integrates various learning features in one platform. Unlike the website-based media in the previous study which generally only presented material or exercises, SainsLearn combines PhET simulations, Live Worksheets, and Quizizz/Wayground so that students can learn concepts, conduct simulations, do interactive exercises, and take part in online evaluations in one medium. This integration is a novelty for this research because it provides a more comprehensive learning experience compared to the use of one type of digital media separately.

This is in line with research Munawaroh & Indah, (2022) With the results of the presentation of the website accompanied by visual illustrations related to the material, supporting videos, and links to additional information sources proven to enrich students' insights. The integration of these elements not only clarifies the concepts learned, but also expands students' access to relevant references, making learning activities feel more memorable. Other research by Defianti *et al.*, (2021) which emphasizes that the application of virtual practicum based on PhET simulation has been proven to increase

students' knowledge of physics content as seen from mean scores, learning completeness, and increasingly active student activities.

The selection of features in SainsLearn is based on theoretical foundations and previous research results. PhET simulations help students visualize abstract science concepts making it easier to form conceptual understanding. Live Worksheets allow students to get feedback directly thereby increasing activity and independence of learning. Meanwhile, Quizizz/Wayground measures student understanding (game-based assessment) which is proven to be able to increase learning motivation, student involvement, and learning outcomes. The integration of these three features is expected to provide a more active, meaningful, and effective learning experience compared to conventional learning.

This is in line with research Adibowo *et al.*, (2025) which shows that website media increases students' understanding of concepts and participation throughout science learning activities. Website-type media provides a shortcut to creative, participatory, and flexible learning activities. In addition, this media supports independent learning, in line with technological improvements.

Based on this description, this study aims to test the effectiveness of the use of the SainsLearn website on the learning outcomes of junior high school students on force and motion materials and to determine students' responses to the use of these media. The results of the research are expected to provide an effective alternative to digital learning media and become a reference for teachers in optimizing the use of technology in science learning.

METHOD

The *SainsLearn* website was created as a web-based learning media that contains interactive content in the form of text, images, videos, and simple simulations associated with the topic of force and motion with learning outcomes discussing how students are able to understand force and motion. The student learning outcomes in this study are learning outcomes in cognitive, affective, and psychomotor aspects. Cognitive aspects include C2 (understanding), C3 (application) and C4 (analysis) skills, affective aspects include A1 (receiving), A2 (responding) and A4 (managing), and psychomotor aspects including P1 (imitation), P3 (precision) and P4 (articulation).

The type of research applied is *Quasi Eksperiment Design* with the use of *Nonequivalent Control Group Design*. Samples were taken through *Purposive Sampling* because the researcher could not randomize the research subjects (Sugiyono, 2013). This design involved two groups, namely the experimental class that obtained learning using the *SainsLearn* website and the control class that obtained learning using printed books. Both groups were given a pretest to determine the students' initial ability before treatment and posttest after learning to measure the improvement of learning outcomes.

Table 1. Desain Nonequivalent Control Group Design

Classes	Pretest	Treatment	Posttest
Experiment	O ₁	X	O ₂
Control	O ₁	-	O ₂

Description:

X : Application *website SainsLearn* Topics Force and motion in learning for 3 meetings

O1 : *Pretest* Experimental Class and Control Class

O2 : *Posttest* Experimental Class and Control Class

The research was carried out in one of the junior high schools in Bengkulu City in the even semester of the 2024/2025 Academic Year. The research population was all students of grade VII. The research sample was determined using the purposive sampling technique, which is a sample determination technique based on certain considerations. The selection of samples was based on the similarity of academic characteristics, a relatively balanced number of students, the same learning materials, and the recommendations of science teachers so that the two classes have representative conditions to compare. The school where the research is conducted is an Integrated Islam school where male and female students are not combined in one class.

Therefore, to avoid the influence of gender differences in this study, classes VII H and VII F, which are classes of female students, were selected as the sample of this study. The research sample consisted of 45 students, namely 23 students of class VII H as the experimental class and 22 students of class VII F as the control class. The research subjects were grade VII students with an age range of about 12–13 years. The equivalence of the initial ability of the two classes was proven by the results of the pretest which showed that there was no significant difference between the experimental class and the control class (Sig. = 0.484 > 0.05).

Table 2. Uji Independent T-Test Pretest

Independent T-Test								
Tests	Mean EC	Mean CC	df	t _{count}	t _{table}	Sig. Count	Sig. Reference (α)	Results
Pretest	46,52	49,32	43	-0,706	2,02	0,484	0,05	There is no significant difference (H ₀ was accepted, H _a was rejected)

This research procedure is carried out through three stages. The pre-research stage is to select the implementation site, observe

the school, select the population and sample, select experimental and control classes, design the instrument, validate the media and instruments, and test the validity and empirical reliability. Data collection techniques are in the form of interviews, tests and questionnaires. The research instruments consisted of cognitive learning outcome tests, media validation questionnaires, test instrument questionnaires, affective learning outcomes questionnaires, psychomotor learning outcome questionnaires, and student response questionnaires. Each instrument is arranged based on the indicators of each research variable.

Table 3. Research Instruments

Variabel	Instruments	Indicator	Number of Items	Rating Scale	Analysis
Media Validation	Questionnaire	Qualification of content, language, as well as presentation and use of media	20	1: Not Good 2: Enough 3: Good 4: Excellent	Percentage
Test Instrument Validation	Multiple-choice test questionnaire	Material, construction and language feasibility	30	1: Not Good 2: Enough 3: Good 4: Excellent	Percentage
Cognitive learning outcomes	Multiple-choice tests	C2, C3 and C4 Material Forces and Motion	20	1: True 0: False	N-Gain, <i>t</i> -test, effect size
Affective learning outcomes	Questionnaire	A1, A2 and A4 attitudes during learning	3	1: Not Good 2: Enough 3: Good 4: Excellent	Percentage
Psychomotor learning outcomes	Questionnaire	P1, P3 and P4 skills during learning	3	1: Not Good 2: Enough 3: Good 4: Excellent	Percentage
Student response	Questionnaire	Convenience, interest, benefits	15	1: Not Good 2: Enough 3: Good 4: Excellent	Percentage

Media validation is in the form of content feasibility, language feasibility, presentation/media feasibility and media use feasibility. Media validation was assessed by 4 expert validators, namely 2 lecturers and 2 teachers. The results of the media validation have a percentage of 94.69% which can be concluded that the designed media has a very high feasibility category for use.

Table 4. Media Validation Results

No.	Validator	Total Score	Maximum Score	Percentage (%)
1.	Validator 1 (Lecturers)	74	80	92.5%
2.	Validator 2 (Lecturers)	73	80	91.25%
3.	Validator 3 (Teacher)	76	80	95%
4.	Validator 4 (Teacher)	80	80	100%
Quantity		229	320	-
Mean Percentage		94.69%		
Eligibility Categories		Very High		

The validation of the test instrument is in the form of material feasibility, construction feasibility and language feasibility. The validation of the test instrument was assessed by 2 expert validators and the number of questions was 30 questions. The results of the validation of the test instrument have a percentage of 85.55% which can be concluded that the test instrument made has a very high feasibility category to be used.

Table 5. Test Instrument Validation Results

No.	Validator	Total Score	Maximum Score	Percentage (%)
1.	Validator 1 (Lecturers)	272	360	75.55%
2.	Validator 2 (Teacher)	344	360	95.55%
Quantity		616	720	-
Mean Percentage		85.55%		
Eligibility Categories		Very High		

After the test instrument was validated, a validity and reliability test was carried out with field trials in classes that were not research sample classes, namely classes VIII F and VIII G with questions totaling 30 questions.

Table 6. Validity Test Results

Category	Number of Items	r Value	Item Number	Decision
Valid	22	$r_{\text{count}} \geq r_{\text{table}} (0,355)$	1, 4, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28 and 29	20 valid questions were used as research instruments and 2 other questions were eliminated
Invalid	8	$r_{\text{count}} < r_{\text{table}} (0,355)$	2, 3, 5, 6, 15, 17, 24 and 30	Invalid questions are not used
Total	30	-	-	-

The validity test of question items is intended to assess whether each question item is able to measure properly, and is used to determine whether each question item is adequate or not to be applied to research. With the provision, if $r_{\text{count}} \geq r_{\text{table}}$ with a significant level (α) of 0.05, then the test instrument is declared valid. On the other

hand, if $r_{\text{count}} < r_{\text{table}}$ with a significant degree (α) of 0.05, then the test instrument is declared invalid. The value of r_{table} is 0.355 because the number of respondents is 31 students. From this data, 22 questions were obtained in the valid category and 8 questions in the invalid category. The questions that will be used are questions that have valid criteria as many as 20 questions, of which the questions are chosen with a difficulty level of 4 difficult, 12 medium, and 4 easy. With the distinguishing power of the questions chosen in the good category, for the bad and sufficient category questions are eliminated. Furthermore, the 20 questions were tested for reliability.

Reliability is defined as an indicator that shows the level of consistency of a test. Reliability is related to the stability of test results. If the results change, the changes that occur have no effect. With the provision, if $r_{11} > r_{\text{table}}$ with a significant degree (α) of 0.05, then the test instrument is said to be reliable. Conversely, if $r_{11} < r_{\text{table}}$ with a significant degree (α) of 0.05, then the test instrument is said to be unreliable. The interpretation criteria for the reliability coefficient to be used in the study refer to Guilford in Maulana, (2022).

Table 7. Value of Reliability Coefficient

r_{11} Value	Criteria
$r_{11} < 0.20$	Very low
$0.20 \leq r_{11} < 0.40$	Low
$0.40 \leq r_{11} < 0.70$	Medium
$0.70 \leq r_{11} < 0.90$	Height
$0.90 \leq r_{11} \leq 1.00$	Very high

The results of the reliability test showed that the 20 questions had a value of r_{11} is 0.836. This value is included in the high interpretation because 0.836 is located in the value range of $0.70 \leq r_{11} < 0.90$, so it can be

concluded that the question data is considered reliable.

Furthermore, the research stage is to carry out research by applying learning in experimental and control classes. The treatment was carried out during three meetings with a time allocation of 1×40 minutes per meeting. In the experimental class, learning uses the SainsLearn website which integrates learning materials, PhET simulations, Live Worksheets, and Quizizz/Wayground. The learning stages include: (1) giving pretests and perceptions, (2) measuring students' understanding using Quizizz/Wayground (3) delivering material using SainsLearn, (4) exploring concepts through PhET simulations, (5) exercises using Live Worksheets, and (6) providing posttests and student response questionnaires. Meanwhile, the control class followed learning using printed books and learning methods that teachers usually apply with the same material and time allocation.

Post-research is to process all the data that has been obtained, draw conclusions and compile reports. Data on learning outcomes (cognitive, affective and psychomotor), as well as student responses are counted as a percentage, then interpreted into certain categories. The percentage interpretation criteria are applied using interpretation standards according to Kurniawati (2011) in Fatayah *et al.*, (2022).

Table 8. Percentage Interpretation Criteria

P Value	Criteria
81% - 100%	Very high
61% - 80%	High
41% - 60%	Enough
21% - 40%	Low
0% - 20%	Very low

The data on cognitive learning outcomes were also statistically analyzed,

namely the normality test (Shapiro-Wilk), the homogeneity test (Levene's Test), the difference test for two means of two independent samples (Independent T-Test), the N-Gain test and *the effect size test*. The analysis was conducted to see the effectiveness of the *SainsLearn website* in improving student learning outcomes on the topic of force and motion.

The acquisition of two different tests on means of two independent samples was carried out with two criteria, namely:

1. If the Sig. count (2 tailed) < the Sig. reference 0.05, then it can be concluded: there is a significant difference in learning outcomes between the experimental class and the control class.
2. If the Sig. count (2 tailed) $\geq$ the reference Sig. 0.05, then it can be concluded: there is no significant difference in improvement in learning outcomes between the experimental class and the control class.

The interpretation criteria for the N-Gain score to be used in the study refer to Sukarelawan et al. (2024) in Gustati et al., (2025).

Table 9. N-Gain Interpretation Criteria

N-Gain Value	Criteria
$0.70 < g \leq 1.00$	High
$0.30 < g < 0.70$	Medium
$0.00 < g < 0.30$	Low
$g = 0.00$	There is no improvement
$1.00 \leq g < 0.00$	There is a decline

The interpretation criteria for the effect size score that will be used in this study apply the interpretation criteria of Cohen (1988) according to Suwarno et al., (2022).

Table 10. Effect Size Interpretation Criteria

Effect Size Value	Impact Criteria (Effects)
$0 < ES \leq 0.2$	Small
$0.21 < ES \leq 0.50$	Medium
$0.51 < ES \leq 1.00$	Large
$1 < ES$	Very Large

This research has obtained a permit from the Faculty of Teacher Training and Education, University of Bengkulu and a permit to carry out research from one of the junior high schools in Bengkulu City. The study was approved by the school principal. Permission was obtained prior to data collection, and all participants were informed that the collected data would be used solely for research purposes. The entire research process was carried out with the approval of the school, science subject teachers, and students as respondents and maintained the confidentiality of the respondents' identities.

RESULTS AND DISCUSSION

RESULTS

A. Differences in Cognitive Learning Outcomes in Experimental Class and Control Class

The acquisition of students' cognitive learning outcomes is obtained from tests as learning evaluations. The purpose of this evaluation is to obtain data that can prove the level of capability and success of students in achieving learning goals. The data can be obtained from the results of the evaluation, especially related to the cognitive aspect (Fauzi et al., 2023).

Table 11. Descriptive Statistics of Cognitive Learning Outcomes Test

Descriptive Statistics of Cognitive Learning Outcomes Test							
	Tests	N	Minimum Grade	Maximum Grade	Mean	Median	Standard Deviation
Pretest	Experimental Class	23	25	75	46,52	50	14,80
	Control Class	22	30	75	49,32	47,50	11,47
Posttest	Experimental Class	23	70	100	84,78	85	7,30
	Control Class	22	55	85	70,68	70	7,91

The KKM score of science subjects at the school is 76, so it can be seen that the pretest scores of the experimental class and the control class did not achieve the KKM score. The posttest score of the experimental class was 5 students below the KKM and 18 students who achieved the KKM score, while the control class as many as 17 students were still below the KKM and 5 students who achieved the KKM score. Based on Table 11, it can be seen that the mean value of the two classes increased, but the experimental class increased more when compared to the control class.

The analysis of students' initial abilities was carried out through pretests in experimental class and control class. The results of the Independent Samples t-test showed a significance value of 0.484 ($p > 0.05$), so there was no significant difference in initial ability between the two classes. This shows that both groups have equal initial capabilities before being given treatment.

Table 12. Independent T-Test Pretest, Posttest, and N-Gain Test Results

Independent T-Test							
Tests	Mean EC	Mean CC	df	t _{count}	t _{table}	Sig. Count	Sig. Reference (α)
Pretest	46,52	49,32	43	-0,706	2,02	0,484	0,05
Posttest	84,78	70,68	43	6,215	2,02	0,000	
N-Gain	0,714	0,415	43	8,319	2,02	0,000	

After the learning process is completed, both classes are given a posttest to measure

cognitive learning outcomes. The results of the analysis showed that the experimental class obtained a better improvement in learning outcomes than the control class. The N-Gain value of the experimental class of 0.714 was in the high category, while the control class obtained a value of 0.415 in the medium category. The results of the Independent Samples t-test on the posttest score showed a significance value of 0.000 ($p < 0.05$), so there was a significant difference in learning outcomes between the two classes.

Table 13. Effect Size Results

	Group 1 (Experimental Class)	Group 2 (Control Class)
Mean (M)	0,714	0,415
Standard deviation (s)	0,117	0,125
Cohen's d	2,471	

Furthermore, according to Cohen's interpretation, an effect size above 0.80 is considered large. Therefore, the obtained effect size (2.471) indicates an exceptionally strong educational impact of SainsLearn.

B. Differences in Affective Learning Outcomes of Experimental Class and Control Class

The results of the affective aspect assessment showed that students in the experimental class obtained a very good category. During the learning process, students show a high interest in learning, actively participate in learning activities, and have a positive attitude towards the use of website-based learning media. In contrast, the control class showed a lower category than the experimental class.

Table 14. Mean Affective Percentage

No.	Meetings	Percentage (%)	
		Experimental Class	Control Class
1	Meeting 1 (Force)	89,85	63,26
2	Meeting 2 (Motion)	89,85	64,01
3	Meeting 3 (Newton's Law)	87,68	57,95
Mean Percentage		89,19	61,74
Assessment Criteria		Very Good	Good

C. Differences in Psychomotor Learning Outcomes in Experimental Class and Control Class

The assessment of psychomotor aspects showed that students in the experimental class had better skills in following learning, operating learning media, completing exercises, and participating in learning activities. These results show that the use of the SainsLearn website is able to support student learning activities more optimally than conventional learning.

Table 15. Mean Psychomotor Percentage

No.	Meetings	Percentage (%)	
		Experimental Class	Control Class
1	Meeting 1 (Force)	86,23	53,41
2	Meeting 2 (Motion)	90,58	55,30
3	Meeting 3 (Newton's Law)	81,52	49,24
	Mean Percentage	86,11	52,65
	Assessment Criteria	Very Good	Enough

D. Student Responses

After the learning activity was completed, student response data was collected to the use of the SainsLearn website in the experimental class using a student response questionnaire. The questionnaire consists of 15 questions that must be answered by students.

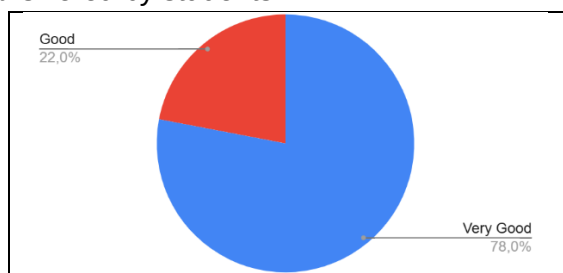


Figure 1. Pie Diagram of Student Response Results

The results of the questionnaire showed that students responded very well to the use of the SainsLearn website. Most students stated that the website is easy to use, the interface is attractive, the materials are easy

to understand, and the features available help the learning process. In addition, students feel more motivated to participate in learning because the media used is interactive and can be accessed easily, so students express their desire to use a similar website for other science materials.

DISCUSSION

The results of the study show that the use of the SainsLearn website has a significant influence on improving student learning outcomes in force and motion materials. The findings were supported by the results of the Independent Samples t-test which showed a significance value of 0.000 ($p < 0.05$), so that there was a significant difference in learning outcomes between the experimental class and the control class. In addition to being statistically significant, the effectiveness of using the SainsLearn website was also strengthened by an effect size value of 2,471 which is included in the very large category. This shows that the improvement in learning outcomes obtained is not only statistically significant, but also has a strong practical meaning in learning. These results are in line with research Mahardika *et al.*, (2022) which confirms that students' ability before and after learning to use interactive media has different results that mark improvement.

The increase in learning outcomes in the experimental class was shown by the N-Gain value of 0.714 in the high category, while the control class only obtained a value of 0.415 in the medium category. This difference shows that learning using the SainsLearn website is able to improve students' mastery of concepts more optimally than learning using conventional media. These results indicate that the use of integrated digital learning media can help students understand

abstract force and motion materials through the presentation of materials that are more visual, interactive, and easy to understand. These results are in line with research Uliyandari *et al.*, (2025) which indicates that interactive learning media has proven to be effective in improving student learning outcomes as seen from the increase in scores *Pretest* and *posttest*. This interactive media can become a science learning innovation by combining interactive technologies, models, and *discovery learning* and local cultural values.

The effectiveness of SainsLearn is allegedly influenced by the characteristics of the media that integrates several learning features in one platform, namely PhET, Live Worksheets, and Quizizz/Wayground. PhET simulations help students visualize concepts of force and motion so that abstract concepts become more concrete. The higher learning outcomes can be explained by the integration of multiple representations. Students were not only exposed to textual explanations but also interacted with simulations and immediate feedback, facilitating deeper conceptual processing. This is in line with the research of Fasya *et al.*, (2023) which explains that students can use PhET as a virtual lab on a simulation page where they have the opportunity to conduct experiments virtually. Through this activity, students are able to interpret data scientifically based on the results of the simulations they have carried out.

Live Worksheets provide students with the opportunity to practice independently with live feedback. This is in line with the research of Raudatul Mispa *et al.*, (2022) who said that the use of e-LKPD makes it easier for teachers to present teaching materials and assignments through visual media, while saving time and costs. The use of e-LKPD

also facilitates students to complete assignments online with the flexibility of time and place as long as internet access is available.

Quizizz/Wayground presents game-based evaluations that increase student motivation and engagement. This is in line with research Munawaroh & Indah, (2022) With the results of the presentation of the website accompanied by visual illustrations related to the material, supporting videos, and links to additional information sources proven to enrich students' insights. The integration of these elements not only clarifies the concepts learned, but also expands students' access to relevant references, making learning activities feel more memorable.

The findings of this study are in line with the multimedia learning theory by Mayer (2024) which states that learning will be more effective if information is presented through a combination of text, images, animation, and interaction. The presentation of information through various representations helps students build better conceptual understanding while reducing cognitive load during the learning process. Therefore, the use of the SainsLearn website is able to facilitate a more meaningful learning process than conventional learning.

These results are supported by research Ummah & Subiantoro, (2024) who have carried out biology learning using SSI-based websites with the value of *effect size* of 1.33 is categorized as very large. Thus, it can be concluded that learning activities using websites have a greater impact on students. *Website* There are several features that can train students' critical thinking and argumentative processes, such as videos, LKPD and digitally packaged materials as student discussion materials, facilitating students to learn and give opinions on the

given problems, measuring students' knowledge and argumentation skills, as well as the presence of interactive texts, videos and images that attract students' attention.

The results of this study also support previous research by Adibowo *et al.*, (2025), Putri *et al.*, (2021), and Pahwani *et al.*, (2025) who reported that website-based learning media was able to improve student learning outcomes. However, this research has a novelty because it not only develops a website-based learning medium, but also tests the effectiveness of websites that integrate virtual simulations, digital worksheets, and game-based evaluation in a single learning platform on force and motion materials. The integration of these features provides a more comprehensive learning experience so that students not only receive material, but also conduct continuous concept exploration, exercises, and evaluations.

In the affective aspect, the use of the SainsLearn website has a positive impact on students' learning attitudes. During learning, students show better enthusiasm, attention, and participation than conventional learning. This condition shows that interesting and interactive learning media are able to increase learning motivation and create a more enjoyable learning atmosphere. High motivation to learn contributes to improved learning outcomes because students are more active in participating in each stage of learning. These results are supported by research Ningrum *et al.*, (2025) who have implemented web-based teaching media *google sites* in IPAS learning activities to increase learning attention that says that web media *google sites* Presenting material in an interesting, interactive, and practical way to use at any time, is able to increase the motivation to learn from students, which is

with learning media that encourages students to learn.

Improvements also occurred in the psychomotor aspect. Students become more skilled in operating learning media, conducting simulation exploration, completing digital exercises, and taking evaluations independently. This shows that the use of the SainsLearn website not only improves cognitive abilities, but also supports the development of students' learning skills through student-centered learning activities. These results are supported by research Ayuti & Ekohariadi, (2025) who have developed web-based learning media Emomart using PjBL to develop students' psychomotor skills which shows that this medium helps students to apply theoretical knowledge to real phenomena. The integration of various psychomotor skills in student activities supports balanced learning outcomes, fostering analytical abilities and hands-on practical skills.

The response of students who are in the excellent category further strengthens the effectiveness of the SainsLearn website. The positive response shows that students find the media easy to use, interesting, and helpful in understanding the material. Positive perception of learning media affects student motivation and involvement during the learning process, which ultimately has an impact on improving learning outcomes. Thus, the effectiveness of SainsLearn is not only demonstrated through improved grades, but also through improved quality of student learning experience. These results are supported by research Auliani *et al.*, (2024) which indicates that interactive multimedia is a type of android that is built worthy of science learning. This media is able to provide junior high school students' science literacy in terms of content, context and process. Therefore,

this media can be an innovation to increase students' interest in learning and understanding.

However, this study has some limitations. The study only involved 45 students at one school with treatment time for three meetings, so the results of the study could not be generalized to a wider population. In addition, research is only carried out on force and motion materials so that the effectiveness of the SainsLearn website on other science materials still needs to be studied further.

The findings of this study contribute to the development of web-based science learning by showing that the integration of virtual simulations, interactive exercises, and digital evaluations in one platform is able to simultaneously improve student learning outcomes, attitudes, and skills. Therefore, the SainsLearn website can be used as an alternative digital learning media that supports the implementation of science learning that is more interactive and student-centered.

CONCLUSION

This study shows that the use of the SainsLearn website is effective in improving the learning outcomes of junior high school students in force and motion materials. This effectiveness was supported by the results of statistical analysis showing a significant difference in learning outcomes between the experimental class and the control class ($p < 0.05$), accompanied by an increase in better learning outcomes in the experimental class. In addition, students responded very well to the use of SainsLearn, which showed that the medium was well received and supported student engagement during the learning process.

The main contribution of this study lies in testing the effectiveness of learning websites that integrate PhET, Live Worksheets, and Quizizz/Wayground simulations in a single platform on force and motion materials. The integration of these features provides a more interactive learning experience, facilitating concept visualization, self-practice, and feedback-based evaluation, thus supporting improved student learning outcomes. These findings enrich the development of website-based science learning media which previously focused more on media development or feasibility testing.

Practically, the results of this study show that SainsLearn can be used as an alternative digital learning media for science teachers to create more interactive, student-centered, and support the implementation of technology-based learning at the junior high school level. However, this study still has shortcomings.

Therefore, the next research is expected to develop this research by adding even better website features, such as adding propositions or descriptions in each direction of the arrow on the concept map, adding "previous page", "next page" and "home" buttons so that it is easier for students to move pages according to their needs, adding a discussion column containing questions and asking students to answer each of these questions so that Teachers can track or monitor students to ensure that students have opened every page of the material learned, and every content displayed (images or videos) is given instructions that reflect on whether students understand and the material can be continued or not and must be repeated.

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