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[Research Article]

THE EFFECT OF INTERACTIVE LEARNING MEDIA ON STUDENT'S CONCEPTUAL UNDERSTANDING

Dewi Sriyani, Irwan Koto, Aprina Defianti, Indra Sakti, Mellyta Uliyandari

Pendidikan IPA, FKIP Universitas Bengkulu, Bengkulu, Indonesia
E-mail: dewiyani2604@gmail.com

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ABSTRACT

The objective of the study was to determine the effect of interactive learning media on the conceptual understanding of the pressure on substances for Grade VIII students. This type of research was a quasi-experimental design with a non-equivalent control group design involving the experimental and control groups. The experimental group was exposed to an interactive media storyline 3 integrated with PhET simulation, while the control group used the presentation graphic (PowerPoint). A total of 62 students from the state junior high school in Bengkulu Tengah district in Bengkulu province. The data collection instrument was a conceptual understanding test. The data analysis technique employed the independent t-test and Cohen's effect size. The result of the effect size test indicates that the use of storyline 3 interactive media integrated with PhET simulation induced students' conceptual understanding of class VIII on the concepts of pressure indicated by the effect size with large criteria (d = 1.082).

Keywords: interactive media, concept understanding, pressure

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1. INTRODUCTION

Physics is the branch of science focused on the nature and motion of matter and energy in the form of facts, theories, principles, or laws. All of these are obtained from thought processes and scientific activities that have been proven scientifically (Wulandari, Sutrio & Rahayu 2017). Physics can be said to be a provision given to students in facing life in the future because physics has an important role in human life.

Most students think physics is a difficult subject as compared to biology and chemistry though they all are fields of science. From students' views, students need to memorize formulas in the form of mathematical equations prior to solving a problem (Hammer & Elby, 2003). In fact, physics is the scientific study of physical phenomena that requires understanding rather than memorizing (Charli, Amin & Agustina, 2018). In other words, the student's ability to understand concepts, theories, and laws in physics lessons is the key to success in learning physics.

Meaningful learning requires understanding concepts rather than rote memorization (Widiyatmoko & Shimizu, 2017). Understanding the concept of physics is an ability to find abstract ideas in physics to classify objects stated in a term and then to transform them into examples and non-examples to understand a physics concept (Ilyas, Liu & Sara, 2022). Furthermore, understanding concepts is a very important aspect of learning physics because students who understand concepts can apply the concept learned to solve a problem. Rosengrant, Heuvelen and Etkina (2009) stated that students who understand correctly are more likely to be successful in achieving the right answer for the problem.

One of the physics topics in junior high school syllabuses that requires an understanding of the concept is the pressure on substances. The pressure on substances is abstract concepts, so students have difficulty understanding the physics concepts. The pressure on the substance needs to be visualized so that students can perceive the real phenomena. The visualization of the phenomenon can help students understand the concept as a whole (Rahmawati, Hidayat & Rahayu, 2016).

Interviews with science teachers at SMPN 2 Bengkulu Tengah obtained information that the concept of pressure on substance was difficult for students to understand because it was related to physics formulas. Based on the results of paper-pencil tests on pressure, only 40% of class VIII students were able to achieve the minimum mastery criteria (score of 72). The causative factor is the student's interest in physics decreased so they are not paid attention to the teacher's explanation. Its' influence is the student's understanding of physics concepts decreased.

The learning media used at SMPN 2 in Bengkulu Tengah are whiteboards, torsos, and poster media. From the results of the interviews, it is known that practicum at SMPN 2 Bengkulu Tengah is not optimal. Due to the lack of a classroom, the laboratory room was converted into a classroom. Consequently, laboratory work cannot be carried out appropriately.

Based on these conditions, teachers need to apply science learning, especially physics, by using innovative and interactive media related to content. The main goal is to have students engaged in the learning process so that students' conceptual understanding can be achieved. Hasian, Situmorang, and Tapilouw (2020) state that accuracy in

choosing learning media can support the achievement of learning objectives.

Learning media as a tool to overcome the problems faced by students and teachers is using interactive media. One of the media that can be used is interactive media based on articulate storylines 3 integrated with PhET (Physics Education Technology). Since PhET simulation can be accessed online and copied freely and saved as web pages that can play on a Flash player, PhET the interactive simulation activities has become one of the best education software (Wieman, et al., 2010).

Media articulate storyline 3 is integrated in interactive media that can clarify abstract concepts (Fajar, Sari & Irhasyuarna, 2022). Sesilia and Manurung (2022) stated the use of articulate storyline 3 learning media in science learning are feasible and practical for using to have student understand the physics concept deeply.

Interactive media which is integrated with PhET simulations can be applied in the learning process to overcome practicum problems that cannot be carried out in the laboratory so that the practicum can be carried out virtually. PhET simulation is the software providing simulations of physics, chemistry, biology, and mathematics, developed by the University of Colorado (Team Phet, 2015). Physics Education Technology (PhET) includes a virtual laboratory or known as a virtual lab which is the development of computer technology as a form of the interactive multimedia object to simulate laboratory experiments on a computer (Agustine, Wiyono & Muslim, 2014). The effectiveness of PhET in physics lessons has been proven by previous researchers. For example, Rizaldi, Jufri and Jamaluddin (2020) developed and implemented PhET simulation media was used to explain abstract concepts .

In connection with the description above, research has been carried out on the effect of interactive learning media on the conceptual understanding of pressure on substance for Grade VIII students. The purpose of this study was to determine the effect of using interactive learning media on conceptual understanding.

2. RESEARCH METHODS

The research method used in the study was a quasi-experimental design with a nonequivalent control group model. The experimental and the control group were selected by nonprobability sampling techniques. Convenience sampling technique was employed to select the subject in this research since the researcher has limited access to schools and time (Etikan, Musa, & Alkassim, 2016).

The students involved in this research were students from the state junior high school in urban Bengkulu Tengah district in Bengkulu province. The subjects consisted of 31 students of class VIIIA (experimental group) and 31 students of class VIIIB (control group). The experimental group is the class that receives treatment in the form of using interactive learning media while the control group is the class that applies PowerPoint as a learning media of delivering lesson.

The research instrument was a written test of conceptual understanding which consists of 40 multiple choices questions with four alternative answers. The development of the items involved two experts to review the content coverage of every item to enhance content validity of the instrument. A test blueprint as shown in the appendix provides guidelines to authors in the alignment of competence and the indicators of conceptual understanding and intended item test. Figure 1 displays an example of the item test.

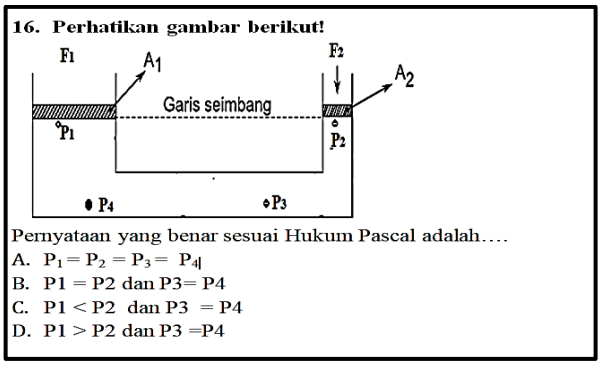

Figure 1. The example of conceptual understanding questions

The data collected from students' answers was taken from the pretest and posttest. The hypothesis was tested with an unpaired t-test and effect size test to determine the effect of interactive media in learning science (physics) in the experimental group compared to the control group. When differences between means are statistically significant, Cohen formula (1988) is employed to indicate a measure of effect size and practical significance (Cohen, 1988).

$$d = \frac{\bar{X}t - \bar{X}c}{S_{pooled}} \quad (1)$$

with

$$S_{pooled} = \sqrt{\frac{(n_t - 1)Sd_t^2 + (n_c - 1)\,Sd_c^2}{n_t + n_c - 2}} \quad (2)$$

Note:

S_{pooled} = combined standard deviation
$\bar{x}$ = mean
Sd_t^2 = experimental group standard deviation
Sd_c^2 = control class standard deviation
n_t = the number of students in the experimental group
n_c = the number of students in the control group

Table 1. Interpretation of effect size scores according to Cohen

Value	Category
0,8 ≤ d ≤ 2,0	Big
0,5< d < 0,8	Medium
0,2 ≤ d ≤ 0,5	Small

Source: Cohen (1988).

The hypothesis in this study is:

Ho : There is no effect of the application of interactive learning media on students' understanding of the material pressure material

3. RESULTS AND DISCUSSION

3.1 RESULT

3.1.1 Validity, Reliability, Difficulty Index, and Discrimination Index.

After two experts reviewed the 40-item test, the final draft of test item was field testing the test to 64 junior high students who have learned the content of the test.

The results of empirical try out were calculated to determine validity (product-moment correlation), reliability (Alpha Cronbach), difficulty index (TK), discrimination index (DP). Based on the validity test, the number of questions that fulfill the validity criteria ($r_{count} > r_{table}$) were 30 items shown in Table 2. The data were computed by using SPSS software version 22.

Internal consistency reliability was utilized to test the instrument. The inter-item correlation was computed by the use of Cronbach's coefficient Alpha of over 0,70 (Pallant, 2007). The computed value is 0.908 which confirmed the reliability of the conceptual understanding test.

Based on Table 2, there are 30 items valid. However, the questions used as the instrument to test the understanding of the concept were 21 questions. The value of the difficulty index (TK) is acceptable when it ranges from 0.30 to 0.70. Consequently, there are 21 item tests in Table 2 with difficulty index ranging from 0.38 to 0.69 and retained the 21 items in the conceptual understanding test as the research instrument.

Table 2 Validity Test Results

No	r_{count}	criteria	TK	criteria	DP	criteria
1	0,612**	valid	0,81	easy	0,58	good
2	0,591**	valid	0,38	medium	0,54	good
3	0,427*	valid	0,54	medium	0,37	enough
4	0,403*	valid	0,65	medium	0,35	enough
5	0,477**	valid	0,73	easy	0,60	good
6	0,487*	valid	0,62	medium	0,40	good
7	0,47*	valid	0,27	difficult	0,44	good
8	0,534**	valid	0,46	medium	0,48	good
9	0,437*	valid	0,46	medium	0,38	enough
10	0,468*	valid	0,50	medium	0,41	good
11	0,489*	valid	0,23	difficult	0,44	good
12	0,502**	valid	0,38	medium	0,48	good
13	0,490*	valid	0,50	medium	0,43	good
14	0,610**	valid	0,46	medium	0,56	good
15	0,405*	valid	0,69	medium	0,35	enough
16	0,523**	valid	0,46	medium	0,47	good
17	0,524**	valid	0,54	medium	0,47	good
18	0,534**	valid	0,46	medium	0,48	good
19	0,405*	valid	0,46	medium	0,34	enough
20	0,518**	valid	0,58	medium	0,46	good
21	0,502**	valid	0,46	medium	0,45	good
22	0,471*	valid	0,65	medium	0,42	good
23	0,638**	valid	0,58	medium	0,59	good
24	0,647**	valid	0,27	difficult	0,61	good
25	0,537**	valid	0,27	difficult	0,49	good
26	0,519**	valid	0,73	easy	0,47	good
27	0,629**	valid	0,23	difficult	0,59	good
28	0,480*	valid	0,46	medium	0,42	good
29	0,440*	valid	0,42	medium	0,38	enough
30	0,549**	valid	0,27	difficult	0,50	good

Note: r_{table}: 0,388; (Sig 2-tailed) *: 0,05; (Sig 2-tailed) **: 0,01

3.1.2 Description of student learning activities in both groups.

Learning activities in the experimental and control groups were carried out face-to-face learning. The students in the experimental group learned through interactive media storyline 3 integrated with PhET simulations but learning process in the control group used with the presentation graphic (PowerPoint). The learning model in both groups used Engelmann's (1980) Direct Instruction (DI) model which consists of five phases: (1) Introduction of new concept based on previously mastered skills and knowledge; (2) Presentation: learning process designed to elicit interpretation of concept (3) Students are provided with opportunities to respond questions or tasks. (4) Feedback: Teacher confirms correct students' response (5) Independent practice: Students engage in self- directed practice when answers are incorrect
directed practice in students' worksheet. Learning in both groups is described below.

1. Student Learning Activities in the Experimental Group

Lesson 1: The teacher informed the lesson topic verbally and then wrote "pressure on solid substance" as the topic of lesson on board. *In the first phase*, the teacher provides stimulation to arouse students' curiosity about the subject matter through a video showing an experiment of popping a balloon in interactive media. After the video was shown, the teacher asked two questions: "*Why does a balloon pop when it is hit by a pine needle*? but "*why don't balloon pop when placed on a large number of pine needles?*". Student responses varied to these questions. The teacher writes all students answers on the whiteboard. Furthermore, the teacher explains and writes down the objectives.

In the second phase, the teacher presented the subject matter, namely, pressure on solid matter through interactive media related to the factors that affect pressure on solid substance, examples and nonexample.

After explaining the target concept, the teacher conducted a guided practice *in the third phase*. Students do exercises to answer questions contained in interactive media. The teacher guides students to work on the questions if students ask.

In the fourth phase, the teacher checks students' understanding by asking questions to find out students' understanding of the subject matter. If the

student's answer is correct, the teacher provides reinforcement. But if it is wrong or incomplete, the teacher provides feedback by repeating the subject matter in Phet's interactive simulation.

In the fifth phase, the independent practice phase was done by giving individual assignments to do at home and the teacher informed assignment was submitted at next meeting.

Lesson 2; the topic of lesson was hydrostatic pressure in lesson 2. The teacher invited students to do a virtual hydrostatic pressure practicum with PhET simulation in interactive media. Students use interactive media in groups with teacher guidance. Interactive media was accessed through each student's mobile phone (see Figure 2). Schools allowed students to use cell phones (android) as media or learning resources in the class.

In the first phase, a video was shown of the ball being pressed into the water. Students are asked to watch the video and write down questions related to the events observed in the video.

In the second phase, the use of interactive media and class discussions employed at this phase, the teacher explained the concept of hydrostatic pressure, the factors that affected pressure, and examples of its application in everyday life. Students carried out Phet virtual simulations to prove the concept of hydrostatic pressure via cell phones in a group.

The teacher guided students to do a virtual hydrostatic pressure experiment. Students appeared enthusiastic and active in carrying out experiments, so the classroom was filled with the sound of students asking questions to their friends or teachers. Even though the experiment was carried out virtually by using the cell phone screen, the students were happy and enthusiastic. Then the teacher directed students to present the results of experimental data in tables available in interactive media.

The teacher confirmed the correct student responses or provided corrections. The lesson was closed with a question from the students, "Are we going to study science (Physics) like this next, Miss?" It seemed that the questions pictured the learning activities with the interactive media storyline integrated with PhET simulation is enjoyable.

Lesson 3; the lesson topic included the laws of Archimedes, Pascal, and their application in everyday life. The learning process at this lesson was relatively like the second lesson.

In the first phase begun with a video showing about cruise ships sailing on the seas. After watching video, the teacher asked a question about the cruise ship observed in the video "Why can a cruise ship float and sail in the sea with big waves?" The purpose of the question was to explore prior knowledge of Archimedes' law.

In the second phase, with the help of interactive media, the teacher explains the concepts underlying Archimedes and Pascal law, examples of its application such as human blood circulation, and osmosis and capillary events in plant tissue.

In the third phase, the teacher explains examples of questions that apply Archimedes' law. Students are guided to work on questions related to the application of Archimedes' and Pascal's laws.

In the fourth phase, the teacher asks questions to check student understanding about the factors that affect hydrostatic pressure. Feedback is given by the teacher if the student answer is incomplete or wrong. The In the fifth the fifth phase; independent practice phase was carried out by students at home by answering questions contained in interactive media with cell phones.

During three lessons, observation of teacher practices was conducted to get the information on whether learning took place. Two observers observed teacher practices in both groups with an observation check list. The results are used to improve learning. At the end of the teaching process, the two observers and the teacher discussed the learning process.

Figure 2. Students use interactive media.

2. Student Learning Activities in Control Class

The students and teacher activities of Lesson 1 to Lesson 3 were quite similar because the teacher did the lesson by following the teaching procedure of DI. Each lesson used PowerPoint with a similar learning topic to the experimental group.

In the first phase, the teacher showed pictures of boots and high heels via PowerPoint, followed by asking a question "Why is walking on muddy soil easier with boots than high heels?".

In the second phase, the teacher displayed pictures of divers and asks the question "Why do divers need to use oxygen cylinders and diver kits?".

In the third phase, the teacher showed pictures of plants and their roots via PowerPoint, asking the question "Why can plants absorb water from the soil". These three questions were asked to students to explore prior knowledge and stimulate student's curiosity (see Figure 3).

Figure 3. Students listen to the teacher's explanation.

In the presentation phase from the first to the third face-to-face, students observe and listen to the teacher's explanation displayed via PowerPoint about the subject matter (a) the concept of solids pressure, factors that affect solids pressure, and examples of applying solids pressure in everyday life - daily life, (b) hydrostatic pressure, (c) the concept of hydrostatic pressure, the factors that affect hydrostatic pressure, examples of the application of hydrostatics in everyday life, and (c) Archimedes' law, Pascal, and its application in everyday life. During the learning process, the teacher gave examples followed by guided practice questions. The teacher observed students when they worked on exercises guided by the teacher.

In the fourth phase of checking student understanding, the teacher asked questions classically or individually by mentioning the names of students. The teacher provides

feedback by paying attention to the answers from students.

In the fifth phase: Teacher provided individual assignments contained in the Science book as the independent. The learning process in the control group is shown in Figure 3.

3.1.3 Description of Conceptual Understanding Data

The research data were obtained from students' answers to 21 multiple-choice questions (four answer choices) after the validation process was carried out. The test was administered one day before learning process (pre-test) and one week after learning process (post-test). Thirty-one students in the experimental and control groups answered 21 questions in 30 minutes. The pre-test and post-test were carried out by researchers and teachers. The tes included the indicators of conceptual understanding adopted from Sumarmo (2014) which consist of (a) restating (b), classifying objects according to certain characteristics; (3) giving examples and non-examples; (4) presenting the concept in various forms of representation. Concept understanding data were analyzed descriptively (Mean and SD) and shown in Figure 4.

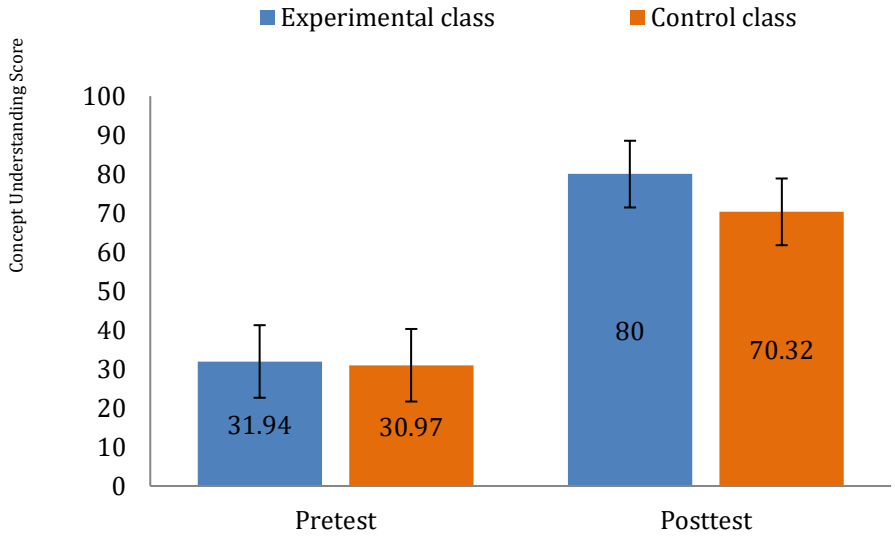

Figure 4. The average understanding of students' concepts

Based in Figure 4, the average pre-test scores of the experimental and control groups were relatively the same, which means that students' initial conceptual understanding in both groups was the same. However, the average score in the post-test of the experimental group (80.00 ± 9.31) was higher than that of the control group (70.32 ± 8.56). The difference in average scores might be interpreted as the influence of differences in the learning process carried out between the experimental group with the application of interactive multimedia and the control group with the use of presentation graphics (PowerPoint). Although the results of descriptive data processing show differences between the two groups, it is necessary to test the differences inferentially to determine the statistical significance of the differences by testing the hypothesis.

Before the hypothesis test is carried out, the normality test and homogeneity test are required to determine the parametric or non-parametric hypothesis test. The two prerequisite tests were carried out with the help of SPSS software version 22. The results of the normality test calculations are shown in Table 3.

Table 3. Data Normality Test Results Pre and Post-test Understanding Concepts

Test	Class	Shapiro-Wilk		
		Statistic	df	Sig.
Pre	experimental	0,945	31	0,115
	control	0,952	31	0,182
Post	experimental	0,956	31	0,223
	control	0,946	31	0,118

The normality test was carried out on the pretest and posttest data in the experimental and control groups to determine whether the pretest and posttest data were normally distributed or not. The results of the Shapiro-Wilk (S-W) statistical test were used because the number of research subjects was <50 or the sample was small (Liang, Tang, Chan, 2009). The data in Table 3 states that the results of the S-W test show a p-value greater than the significant level (α = 0.05) or (Sig.> 0.05) so the data distribution is in the form of a normal curve. For example, the results of the data normality test with the S-W test for pre-test data in the experimental group obtained 0.115 (p-value) > 0.05 (threshold). Therefore, the requirements of the parametric hypothesis test are met. The results of the homogeneity test calculations can be seen in Table 4.

Table 4. Homogeneity Test Results

Data	Levene Statistic	df1	df2	Sig.
Understanding the concept	0,52	1	60	0,820

Based on Table 4, the results of the Levene test obtained a p-value (Sig. 0.820) > 0.05. This means that the variance of the data is considered homogeneous, or the conceptual understanding data comes from a homogeneous population.

Because the requirements for the parametric test are met, the analysis of research data can use the parametric test, with an independent t-test. Data processing is assisted with SPSS version 22 software and the calculation results are summarized in Table 5.

Tabel 5. T-test results with independent sample t-test

Test	Assumption	Test F	Sig	t	df	Sig. (2-tailed)	Mean difference
Pre	Same variant	0,111	0,916	0,350	60	0,727	0,968
	Different variants	-	-	0,350	59,933	0,727	0,968
Post	Same variants	0,520	0,820	4,261	60	0,000	9,677
	Different variants	-	-	4,261	59,579	0,000	9,677

Summary of the results of the analysis of hypothesis testing with the independent t-test (Table 5) on the pretest data of the experimental group and the control group obtained p-value (0.727) > α (0.05). Based on these data, it can be stated that there is no statistically significant difference between the average score of students' understanding of concepts in the experimental class and the average score of students' understanding of concepts in the control class. Thus, students' conceptual understanding of solids pressure in the experimental group was relatively the same as students' conceptual understanding in the control class before being given treatment. Therefore, before learning,

student's initial knowledge about stress on substances in the two groups was statistically relatively similar.

Based on the data in Table 5, the results of the independent t-test on the average score data in the experimental and control groups show that the p-value (Sig. 2-tailed = 0.00) <α (=0.05), with t_{count} (4.26) > t_{table} (2.00). Thus, the average score of students' understanding of concepts in the experimental group differed statistically significantly from the average score of students' understanding of concepts in the control group. Therefore, there is a statistically significant difference in the average score of understanding the concept of stress on substances between students in class VIII A (experimental) and students in class VIII B (control) which can be caused by the application of interactive learning media storyline 3 integrated PhET simulation. In other words, the use of interactive media has a statistical effect on the conceptual understanding of class VIII A students if compared to the conceptual understanding of class VIII B students who take part in science learning about pressure on substances using power point media.
Determination of the influence of the application of PhET simulation interactive media on the understanding of the concept of pressure on substances using effect sizes. The effect size is calculated using formulas (1) and (2) and the calculation results are consulted in Table 1 as an interpretation of the effect size score according to (Cohen, 1998)). The result of the calculation of the effect size (*d*) is 1.082 with the criteria for a large effect. This means that learning science with the application of Phet interactive simulation media in class VIIIA has a major influence on understanding the concept of pressure on solids when compared to understanding the concept of students in class VIIIB who take lessons using PowerPoint media.

3.2 Discussion

Science learning (Physics) in both groups applied a direct learning model with the storyline-3 interactive learning media in the experimental group and with PowerPoint media in the control group. The interactive media articulating storyline-3 integrated in the PhET simulation used in this study was adopted from learning media developed by Lestari, et al (2022) and PowerPoint media developed by the researchers.

The application of articulate storyline interactive media with the help of PhET Simulation in science learning with a material emphasis on substances has a major effect on students' conceptual understanding of class VIIIA when compared to class VIIIB students who study using PowerPoint media. Various relevant research results have been published on the effect of articulate storyline-3 interactive learning media and PhET simulation media with direct teaching approach.

The application of direct learning models with PhET simulation media can improve students' understanding of concepts (Mubarrok & Mulyaningsih, 2014). More specifically, (Novitasari, 2016) states that the application of interactive multimedia affects students' ability to understand concepts because interactive multimedia conveys information in a form that is fun, interesting, and easy to understand (Satria & Egok, 2020).

Regarding interactive learning media articulate storyline-3, Sesilia and Manurung (2022) state that it can improve students' understanding of concepts. The students' conceptual understanding who learns with storyline-3 interactive media is significantly different (0.05) from students learning with PowerPoint because the storyline-3 interactive media can provide feedback to users.

In addition, the storyline-3 interactive media used in the study consisted of a combination of text, images, animations, videos, virtual simulations, sample questions, practice questions, and reviews for each question answered by students. The use of interactive media is not limited by space and time so practicum activities cannot be carried out due to limited laboratory space and time, as well as practicum equipment and materials can be overcome by virtual experiments with PhET simulations which can be integrated in storyline 3 interactive media.

According to (Nana, 2020), virtual experiments are effective as learning media and provide solutions to limited practicum equipment/materials, and laboratory space. Besides that, the advantages of PhET simulations are effectively used to explain abstract physics concepts (Rizaldi, Jufri & Jamaluddin, 2020) and high risk such as experiments on the half-life of radioactive materials (Marpaung et al., 2021)

The ability of students to understand concepts, theories, and laws in physics lessons is the key to success in learning physics. According to (Ahied & Ekapti, 2019), students are said to understand if they can construct the meaning of learning messages, whether oral, written, or graphic, which are conveyed through teaching, books, or computer screens. Students can understand when they can connect new knowledge with old knowledge. To help students comprehend the concept, teachers need learning media. However, creativeness and skills in using and choosing the appropriate media determine the achievement of learning objectives. Because the appropriateness in choosing learning media can support the achievement of competencies that students will master (Hasian, Situmorang & Tapilouw, 2020).

Storyline 3 Interactive learning multimedia is one of the media that can be used as a learning tool to convey the concept of pressure on substances to students (Wibawanto, 2017). Interactive multimedia used in learning can provide opportunities for students to participate actively according to each student's ability, time, and speed (Widayat, Kasmui & Sukaesih, 2014).

4. CONCLUSION

Based on the results of research conducted in class VIII SMPN 2 Bengkulu Tengah, it was concluded that the application of storyline 3 interactive media with a direct teaching model influenced the significance level (0.05) on students' conceptual understanding of the concepts of pressure on substances. The influence of the application of interactive media on conceptual understanding is shown by the effect size with the large criterion (d = 1.082).

The conclusion of this study implies that educators (science teachers) are recommended to use interactive media in learning science (physics) in class VIII which is developed by themselves or using available ICT-based media, specifically in the subject matter of the concept of stress on substances.

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APPENDIX

Table. Test Blueprint

Indicators of Competence	Aspects of Understanding the Concept	Question Number		Question Source
		C2	C3	
Explain the concept of solid-state pressure	Restating a concept	1, 2		Handono (2010)
	Classify objects according to certain properties according to the concept	3		Lembar PTS
		4		Nurazizah (2015)
	Presenting concepts in various forms of representation	5		Darmiasih (2020)
Find the relationship between force, pressure, and surface area to the magnitude of the force	Classify objects according to certain properties according to the concept	6		Nurazizah, (2015)
		7		Lembar PTS
Give examples of the application of the principle of solid-state pressure in everyday life	Give examples and not sample concepts	9,10	8	Darmiasih (2020)
Calculate the pressure of solid explanatory factors affecting the pressure in a liquid	Presenting concepts in various forms of representation	11, 12		Nurazizah (2015)
Explain the concept of hydrostatic pressure	Classify objects according to certain properties according to the concept	13		Handono (2010)
		14		Nurazizah (2015)
		15		Lembar PTS)
Explain the concept of hydrostatic pressure	Restating a concept	16, 18		Nurazizah, 2015)
		17		Darmiasih (2020)
	Classify objects according to certain properties according to the concept	19		Nurazizah (2015)
Calculate the amount of hydrostatic pressure	Presenting concepts in various forms of representation	20, 21		(Zubaidah et al., 2017)
Understand the application of hydrostatic pressure in everyday life	Give examples and not sample concepts	22	23	Darmiasih (2020)
			24	Nurazizah (2015)
Explain the principles of Archimedes' law Apply Archimedes' law	Restating a concept	25, 26		Nurazizah (2015)
Apply Archimedes' law	Give examples and not sample concepts	27	29	Nurazizah (2015)
			28	Darmiasih (2020)
Describe the concept of Pascal's law	Restating a concept	30, 31		Nurazizah (2015)
	Classify objects according to certain properties according to the concept	33	32	Lembar PTS
Apply Pascal's law	Give examples and not sample concepts	35, 36	34	(Regeg, 2020)
Explain the principle of blood pressure	Classify objects according to certain properties according to the concept	37	38	(Zubaidah et al., 2017) Darmiasih (2020)
Describe the effect of osmotic pressure on the transport of substances in plants	Classify objects according to certain properties according to the concept	40	39	(Zubaidah et al., 2017) Lembar PTS