UTILIZATION OF *V-EDUSPACE* IN ENHANCING STUDENTS' UNDERSTANDING AND CRITICAL THINKING OF SOLAR SYSTEM MATERIALS

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Abstract

This research is motivated by the inappropriate use of learning media and the lack of use of technology, resulting in low learning outcomes, where in the 21st century learning emphasizes the use of technology. This is based on the fact that in the field there are still many teachers using inappropriate learning media, resulting in students not understanding the material and hampering students' ability to develop their critical thinking skills. The purpose of this study is to determine the level of conceptual understanding and critical thinking skills of students after using the V-Eduspace application in solar system learning. This study used quasi-experimental design research with non-equivalent control group. The sample of the research consists of 68 students in grade VI. Data collection techniques through two tests, namely the concept comprehension test and the critical thinking test. Data analysis using SPSS 29. The results showed that learning the solar system by utilizing the V-Eduspace application obtained higher assessment results compared to learning without the application. Therefore this application is able to further improve understanding and critical thinking skills. And proven by the results of the N-gain test, the effectiveness of using the V-Eduspace application in learning is in the high category.

***Keywords:** v-eduspace; learning outcomes; understanding concepts; critical thinking*

Abstrak

Penelitian ini dilatarbelakangi oleh penggunaan media pembelajaran yang tidak tepat serta kurangnya pemanfaatan teknologi sehingga mengakibatkan hasil belajar yang rendah, dimana pada abad ke-21 pembelajaran lebih menekankan terhadap penggunaan teknologi. Hal ini didasarkan fakta di lapangan masih banyak guru menggunakan media pembelajaran yang kurang tepat sehingga mengakibatkan siswa tidak memahami materi dan menghambat kemampuan siswa dalam mengembangkan kemampuan berpikir kritisnya. Tujuan dari penelitian ini yakni untuk mengetahui tingkat pemahaman konseptual dan kemampuan berpikir kritis siswa setelah menggunakan aplikasi *V-Eduspace* dalam pembelajaran sistem tata surya. Penelitian ini menggunakan penelitian *quasi experimental design* dengan *non-equivalent control group*. Sampel penelitian terdiri dari 68 siswa kelas VI. Teknik pengambilan data melalui dua tes, yaitu tes pemahaman konsep dan tes berpikir kritis. Analisis data menggunakan SPSS 29. Hasil penelitian menunjukkan bahwa pembelajaran sistem tata surya dengan memanfaatkan aplikasi *V-Eduspace* memperoleh hasil penilaian yang lebih tinggi dibandingkan dengan pembelajaran tanpa aplikasi. Maka dengan itu, aplikasi ini mampu lebih meningkatkan pemahaman dan kemampuan berpikir kritis. Serta dibuktikan dengan hasil uji N-gain efektivitas pemanfaatan aplikasi *V-Eduspace* dalam pembelajaran termasuk kategori tinggi.

Kata Kunci: *v-eduspace;* hasil belajar; pemahaman konsep; berpikir kritis

Introduction

Science and technology are growing rapidly, along with the increasingly advanced times. The use of technology is increasingly expanding to various areas of life, including education. Various developments in the field of education can be seen through changes in components

such as changes in the curriculum, learning processes, and the use of learning resources (Supriadi &; Hignasari, 2019). In addition, advances in technology have brought a paradigm shift in the field of education that has a repercussion on learning (Susilawati, 2022). The development of this technology is crucial for the learning process, including at the basic education level. Moreover, education is currently facing the industrial revolution 4.0 of the 21st century, transmitting smart technology, so teachers must be equipped with the latest technology to foster creative efforts utilizing technology in the learning process (Effendi &; Wahidy, 2019). The use of technology in the digital integration in elementary schools will bring progress to the processes and learning outcomes of students (Jannah et al., 2020).

The importance of using technology in education is also an effort to build understanding of concepts in students. Mastery of concepts is a competency that should be mastered by every student, especially in elementary school science subjects, with the purpose that students are scientifically adept to understand science both in theory and in its implementation in everyday life (Wahyuni et al., 2020). Therefore, integrity and mastery of science learning concepts are very important for every student to be able to determine how much success the student has in participating in learning to suit learning objectives (Juneli et al., 2022). The process of strengthening material in elementary school students' learning activities must be carried out appropriately in order to stimulate students' cognitive development and critical thinking competencies (Astuti Salim &; Vrita Tri Aryuni, 2022).

Critical thinking in science learning is a systematic process that involves mental activities such as analyzing assumptions and making decisions. Students who have critical thinking skills can think carefully when making decisions about certain statements, which is important for the development of students' potential (Prasetyo et al., 2022). Therefore, critical thinking is the capacity to engage in advanced or sophisticated levels of thinking (Isrokatun et al., 2023). Critical thinking can encourage students to build more directed and measurable communication and be able to adapt to increasingly rapid technological advances, which is a very important component of educational orientation in the 21st century (Halim, 2022). Therefore, every student is required to have critical thinking skills, however, at the elementary school level this ability is still difficult to apply (Rahmawati &; Harun, 2019). One of the skills necessary for critical thinking is utilized during process of learning science in elementary schools because in science learning students are expected to engage ini critical thinking and independently in understanding scientific concepts and natural phenomena that are around to be applied in everyday life, besides that this critical thinking ability fosters a great curiosity for students and provides experience and active participation of students in the material that studied (Ramadan, 2021).

Science learning, especially in elementary schools, needs active participation from students to obtain learning experiences that have a positive impact on their learning outcomes (Myori et al., 2019). To obtain a good learning experience for students, not all material can be delivered theoretically but requires the use of special media in its delivery. Moreover, the use of learning media in elementary schools is very important because children's ability to understand concepts or abstract materials is still limited (Putra &; Negara, 2021). Based on observations in one of the elementary schools in Majalengka, there are still many teachers who only use still image media in textbooks as a learning medium. The use of this media is less effective, and as a result students tend to be passive and less able to understand the material studied. This problem results in low learning outcomes, so it does not meet the expected assessment standards. This is because students lack mastery of the concepts of the topic. With these problems, it is essential to utilize appropriate media in order to enhance the

learning experience for students. The utilization of appropriate educational media affects the degree of conceptual understanding students in learning (Suparlan, 2020).

Learning media is part of achieving science literacy in elementary schools because it will help students better understand the material presented (Ayu et al., 2021). The achievement of science literacy in elementary school is very important to determine student success in mastering learning material (Winarni et al., 2020) as well as making students understand various scientific concepts (Arlis et al., 2020). In science learning, media serves as a tool used by teachers to clarify the understanding of science concepts learned by students in elementary school to be more concrete in realizing an effective learning process and improving the quality of learning (Arief, 2021). In addition, using media in learning comprehensively helps students improve critical thinking and be able to understand various concepts in the subject matter (Astuti Salim & Vrita Tri Aryuni, 2022). Solar system material is one of the materials that requires the right learning media to explain learning material concretely (Fitriyani, 2020). Solar system material is theoretical, students are required to posses the ability to provide explanations various celestial bodies found within the solar system. Therefore, special interactive and innovative media is needed to simplify the learning process of the solar system concept in elementary school to ensure students' thorough understanding (Deti Nurhamidah et al., 2022).

Science learning problems concerning the lack of accuracy in the utilization of learning media need to be overcome immediately to ensure that science learning objectives is attainable effectively accomplished in improving the cognitive abilities and critical thinking power of elementary school students, where in fact they have not followed the development of science learning at this time (Ramdani et al., 2020). Digital media is the right choice for teachers to use communicate meaningful understanding to students as well as an inovation in the process of learning in the 21st century (Rahmawati et al., 2022). The utilization of digital technology that is used as a solution to this problem is the *V-Eduspace* application by utilizing virtual reality (VR) technology. This technology makes it possible to provide information virtually in the world of education (Altmeyer et al., 2020). This media is an alternative solutions used so that students deepen their understanding of the concepts of the solar system material because it gives the immersion, presence, and embodiment, so that they can display visual objects (Eldiana et al., 2022). In addition, VR technology is a digitally integrated element that simulates real-world conditions in cyberspace and can be applied to mobile devices so that they can project images from the Android screen to be more real (Asikin et al., 2019).

Learning media with VR technology is able to display 3D objects of the solar system through the Assemblr Studio website, which is integrated with the *Assemblr edu* application. The *Assemblr Studio* website is a 3D animation platform with VR and AR editor features and various 3D assets (Nurhasana et al., 2022). The app can also be accessed through the *Assemblr edu* app, in addition to its accessibility via QR scanning to display virtual objects. In addition, it has also collaborated using the *Smart Apps Creator* (SAC) application to enable student access access the solar system learning media via android. SAC is an application that can create mobile-based multimedia learning media without the need for programming code (coding), has other advantages, namely supporting various types of fonts and has web services (Mahuda et al., 2021). SAC is an application to create the latest interactive digital media to be able to create multimedia learning resources using android (Suhartati, 2021).

The previous research has shown that the utilization of 3D-Virtual *Reality* in learning can facilitate learning easier for students to understand (Purwati et al., 2020). In addition, using VR in learning allows teachers to visualize abstract learning material and facilates students

understanding of the content (YILDIRIM et al., 2020). Subsequent research showed that by implementing 3D applications using *Assemblr* edu with technology VR Able to encourage students to think critically during learning and help students understand the material, based on a significant t-test score of 0.000, meaning that there is an increase in students' *posttest* scores (Hayati, 2022). The same is the case with research conducted by (Alifteria et al., 2023) utilizing VR learning media has the potential to enhance students' critical thinking skills and make learning more fun and as a means for teachers to introduce technology to students, but the shortcomings of this study do not target specifically elementary school learning. Other studies also prove that VR as a science learning medium facilitates the learning process by adding visualizations of the solar system. But the drawback of this study is that it uses various applications and websites that consist of applications *Unity, Vuforia Engine, Microsoft Visual Studio Community* with enough memory cache as well as need coding or programming (Feri et al., 2021).

Based on this background, the formulation of the problem in this study is how to increase the understanding of students who use and do not use the *V-Eduspace* application in solar system learning to determine the effectiveness of the use of this *V-Eduspace* application on the level of student understanding and as a solution to the lack of student understanding due to the lack of appropriate use of learning media used before, as well as how to increase ability critical thinking of students who use and do not use the *V-Eduspace* application in learning the solar system to find out the effectiveness of the use of the *V-Eduspace* application in overcoming the problem of low critical thinking skills of students due to the inaccurate use of learning media and the lack of use of supporting technology in learning where this is measured from the results of post-test learning by using and not using the *V-Eduspace* application. In this *V-eduspace* application there are various interesting features that make students feel the atmosphere of learning while playing, namely there is a structured menu of learning objectives, the basic concepts of solar system material presented with the theme of space so that it becomes more interesting and interactive, virtual reality for 3D views of the solar system that is able to bring up various images and objects in 3D that seem real and can be seen and played by students Of course, it is the most important part to overcome problems in research, educational 3D video animation and interactive games from quizwhizzer with a unique appearance but can be accessed easily only through Android with a memory cache that is not so heavy.

This study aims to determine the level of understanding and critical thinking skills of students who use and do not use the *V-Eduspace* application in learning focused on solar system material in class VI based on research conducted in two elementary schools in Majalengka Regency.

Research Methods

This research uses an experimental method. Experimental research is systematic research to test causal hypotheses that are the core of research (Rochmania &; Restian, 2022). The research design used was quasi experimental design with nonequivalent control group. The study consisted of a control class and an experimental class. In the learning control class, the learning uses conventional media, while the experimental class uses digital media in the form of the *V-Eduspace* application. The research design is listed in the following table:

Table 1. Research Design

Group	Pre-test	Treatment	Post-test
Experimental Class	O^1	X^1	O^2
Control Class	O^3	X^2	O^4

Source: (Sugiyono, 2013)

Description:

O^1 and O^3 :	Pre-test	X^1 :	Treatment with Digital Media (*V-Eduspace* Application)
O^2 and O^4 :	Post-test	X^2 :	Treatment with Conventional Media (Image)

The approach used is a descriptive-quantitative approach, which is used to process research data by describing variables measurably and obtaining numerical data for statistical analysis. The research was conducted in one of the elementary schools in Majalengka. The source of the data was obtained from Grade VI elementary school students. The population of this study is Grade VI elementary school students in Majalengka Regency. Sampling using purposive non probability sampling technique. The sample was Class VI students of SDN X and SDN Y in Majalengka Regency with 34 students each.

Table 2. Research Sample

School	Manly	Female	Number of Students
SDN X	11	23	34
SDN Y	15	19	34

Data collection techniques through two tests, namely the concept comprehension test and the critical thinking test. The research instrument uses test questions. This question consists of a pretest and a posttest to measure how much the increase in students' mastery of concepts and critical thinking power refers to the cognitive realm. Research instruments in quantitative research must be valid and reliable, and use correct data analysis (Sugiyono, 2013). Data analysis uses descriptive and inferential statistical analysis consisting of prerequisite tests with normality tests and homogeneity tests, hypothesis tests using Independent Sample t-Test and N-gain tests. The hypothesis is this research are:

H_{01} : There was no significant improvement in the understanding of the concepts of students in class VI in solar system learning by utilizing the *V-Eduspace* application compared to using conventional learning

H_{a1} : There is a significant improvement in the understanding of student concepts in class VI in solar system learning by utilizing the *V-Eduspace* application compared to using conventional learning

H_{02} : There was no significant improvement in the critical thinking skills of students in grade VI in solar system learning by utilizing the *V-Eduspace* application compared to using conventional learning

H_{a2} : There is a significant improvement in the critical thinking skills of students in grade VI in solar system learning by utilizing the *V-Eduspace* application compared to using conventional learning

The criteria are known based on:
1) H_a rejected if the value of Sig. (2-tailed) > 0.05 and the average score of the experimental class was lower than the average score of the control class, this showed that there was no significant improvement in the understanding of concepts and critical thinking skills of students in grade VI in solar system learning by utilizing the *V-Eduspace* application

2) H_a accepted if the value of Sig. (2-tailed) < 0.05 and the average score of the experimental class was higher than the average score of the control class, this shows that there is a significant improvement in the understanding of concepts and critical thinking skills of students in grade VI in solar system learning by utilizing the *V-Eduspace* application

The validity and reliability test of the research instrument was carried out before the study consisting of a concept understanding test totaling 10 questions and a critical thinking test totaling 12 questions given to 30 students. The validity test of concept knowledge questions and critical thinking problems shows valid results. Then the reliability test of concept knowledge problems showed results of 0.71 and reliability tests of critical thinking problems showed results of 0.78, so these results stated that the instruments tested were reliable.

Results and Discussion

The study was conducted in two elementary schools in Majalengka Regency, namely SD X as a control class and SD Y as an experimental class. The research was conducted by following a quasi-experimental research pattern, starting from conducting a pretest at the beginning of learning followed by treatment for 3 days in the control class and experimental class using different learning media. Furthermore, a posttest is carried out at the end of learning to determine the level of understanding of student concepts and students' critical thinking. The pretest and posttest results on the concept comprehension test are contained in the following table:

Table 3. Conceptual Understanding Pretest and Posttest Value

Description	Experimental Class		Control Class	
	Prestest	Posttest	Prestest	Posttest
Number of Students	34	34	34	34
Lowest Value	35	65	30	55
Highest Value	70	100	70	100
Standard Deviation	10.1	8.9	10.8	11.1
Average	54.1	88.7	52.7	82.8

Table 3. shows the results of the concept comprehension test, the average pretest score for the experimental class was 54.1 while the average pretest score for the control class was 52.7. The average posttest score for the experimental class was 88.7 and the posttest average score for the control class was 82.8. Thus, there is an increase in students' understanding of concepts in learning the solar system in control classes and experimental classes. However, in the experimental class by utilizing *V-Eduspace* learning media there was a greater increase of 34.6 compared to the control class which only increased by 30.1. Then, here are the result of the pretest and posttest assessment in the critical thinking test in the following table:

Table 4. Critical Thinking Pretest and Posttest Value

Description	Experimental Class		Control Class	
	Prestest	Posttest	Prestest	Posttest
Number of Students	34	34	34	34
Lowest Value	34	58.3	33	52
Highest Value	66	100	66	100
Standard Deviation	8.9	11.3	9.5	12.8
Average	50.6	84.9	50.4	78.8

Based on Table 4, the average score of the experimental class pretest was 50.6 while the average score of the control class pretest was 50.4. This means that the average score of the experimental and control class pretests is equal to the average score of 50. Then the average posttest score for the experimental class was 84.9 and the average posttest score for the control class was 78.8. So, as well as the results of the concept understanding test, there is also an increase in students' critical thinking skills in learning the solar system both in the control class and in the experimental class. However, the experimental class utilizing *V-Eduspace* learning media experienced a greater increase of 34.3 compared to the control class which only increased by 28.4. In critical thinking skills, there are several assessment criteria, namely:

Table 5. Critical Thinking Criteria

Category Procurement Scale	Criteria
$81.25 < x \leq 100$	Very High
$71.50 < x \leq 81.25$	High
$62.50 < x \leq 71.50$	Medium
$43.75 < x \leq 62.50$	Low

The following table shows the assessment criteria and scale of acquisition of critical thinking ability categories. From the data from the study, the average score of the experimental and control class pretest included low criteria because it only had an average score of 50 which was entered on a scale of $43.75 < x \leq 62.50$. However, after treatment for three consecutive meetings, there was an improvement. The average posttest score of the control class was 78.8 and entered on a scale of $71.50 < x \leq 81.25$ which is based on the criteria of having high critical thinking skills. While the average posttest score of the experimental class of 84.9 entered on a scale of $81.25 < x \leq 100$ which means that based on the criteria have very high critical thinking skills after getting treatment using different learning media in learning the solar system in class VI.

After analyzing the descriptive statistical result data, an inferential statistical analysis was carried out consisting of prerequisite tests, hypothesis tests and N-gain tests. The prerequisite test with the normality test uses the Shapiro Wilks test to produce more accurate data because the study sample is less than 50 to identify a normal distribution with a significance level of α = 0.05 based on statistical analysis. Followed by homogeneity test using the Levene test. Then an Independent Sample t-Test was carried out which aimed to see the difference in average scores based on research data and the N-gain test to was used determine the increase in students' understanding of concepts and critical thinking power based on the learning that has been done in determining student proficiency criteria. Here are the results of the normality test of the concept understanding test:

Table 6. Normality Test Results of Concept Understanding Test

Class	Shapiro Wilks		
	Statistic	*df*	*Sig (2-tailed)*
Experimental Pretest *(V-Eduspace)*	0.954	34	0.163
Experimental Posttest *(V-Eduspace)*	0.942	34	0.073
Pretest Control (Conventional)	0.939	34	0.059
Posttest Control (Conventional)	0.944	34	0.083

The normality test results of the concept comprehension test both in the experimental class and in the control class are normally distributed, according to the results of the Shapiro

Wilks test which reached a significance value of > 0.05. After knowing the results of the normality test from the experimental class and control class, then the results of the normality test of the critical thinking test in the experimental class and control class are as follows:

Table 7. Normality Test Results Critical Thinking Test

Class	Shapiro Wilks		
	Statistic	df	Sig (2-tailed)
Experimental Pretest *(V-Eduspace)*	0.966	34	0.371
Experimental Posttest *(V-Eduspace)*	0.938	34	0.055
Pretest Control (Conventional)	0.966	34	0.362
Posttest Control (Conventional)	0.961	34	0.252

The normality test results of the experimental class critical thinking test and the control class are normally distributed with the results of the Shapiro Wilks test reaching a significance value of > 0.05. Furthermore, a homogeneity test was carried out with a statistical Levene test which aimed to show that data samples were taken from populations that had the same variant. This homogeneity test is satisfied if the value of sig. It meets a significance level of > 0.05 and the data variance is homogeneous. The following are the results of the homogeneity test of the concept understanding test:

Table 8. Homogeneity Test Results Concept Understanding Test

Concept Comprehension Test			
Levene statistic	df1	df2	Sig.
0.983	1	66	0.325

The results of the Levene statistical concept understanding test obtained a significance value of 0.325 so it reached a significance value of > 0.05 and showed that the data was homogeneous. As for the homogeneity test results of the critical thinking test are:

Table 9. Homogeneity Test Results of Critical Thinking Test

Critical Thinking Test			
Levene statistic	df1	df2	Sig.
0.513	1	66	0.476

The results of the *Levene statistical* critical thinking test obtained a significance value of 0.476 so that it reached a significance value of > 0.05 and showed that the data was homogeneous. Then a hypothesis test was carried out to increase students' understanding of concepts and critical thinking in learning the solar system in class VI.

The hypothesis test showed that the increase in concept understanding and critical thinking skills of grade VI students in solar system learning using the *V-Eduspace application* was significant. This is indicated by the average value of experimental class learning outcomes is higher than the average value of control class learning outcomes. Furthermore, this is evidenced by the results of the hypothesis test which has a Sig. (*2-tailed*) value of less than 0.05. To strengthen the results of the hypothesis test, two averages were tested using the Independent Sample t-Test test with SPSS version 29. This Independent Sample t-Test serves

to test the descriptive hypothesis of a variable with interval data. The results of the t-test showed the following results:

Table 10. Independent Sample t-Test Results for Concept Comprehension Test

	Independent-sampel test *Sig. (2-tailed)*
Posttest	0.010

It is known that the probability value of the hypothesis test results in a value of Sig. (2 tailed) 0.010 < 0.05. The average posttest results in the two classes showed an increase in differences among students, meaning that the increase in understanding of the concepts of grade VI students in learning the solar system in the experimental class and the control class was not the same.

Furthermore, the results of the t-test (Independent Sample t-Test) for critical thinking tests in class VI on solar system learning in experimental classes and control classes are:

Table 11. Independent Sample t-Test *Results* for Critical Thinking Test

	Independent-sampel test *Sig. (2-tailed)*
Posttest	0.020

From table 11. the probability value of the hypothesis test results obtained was *Sig. (2 tailed) 0.020* < 0.05. The average *posttest* results in the two classes obtained an increase in difference among students, meaning that the increase in the critical thinking power of grade VI students on solar system learning in the experimental class and the control class was not the same. Thus, it can be stated that H_0 is rejected and H_a is accepted, which means:

1) There is a significant improvement in the understanding of student concepts in class VI in solar system learning by utilizing the *V-Eduspace application*
2) There is a significant improvement in the critical thinking skills of students in grade VI in solar system learning by utilizing the *V-Eduspace application*

Based on the results of the Independent Sample t-Test, a significant difference was obtained between the average posttest scores of the experimental class and the control class and it can be seen that the use of the *V-Eduspace* application can improve students' understanding of concepts and critical thinking skills. To strengthen this result, an N-gain test was conducted which aimed to see the level of effectiveness of utilizing the *V-Eduspace application* in learning based on the following categories:

Tablel 12. N-gain Score Value Procurement Category

Gain Score Division	
N-gain **Value**	**Category**
g > 0,7	High
$0.3 \leq g \leq 0.7$	Keep
g < 0.3	Low

Source : (Melzer dalam Syahfitri, 2008:33)

The N-gain score can determine the level of effectiveness of learning applications (*V-Eduspace applications*) in improving students' understanding of concepts and critical thinking skills. Test results show:

Table 13.
N-gain Test Results Concept Understanding Test

Average Score	Category
0.7724	High

Based on the results of the N-gain test, it can be stated that the average N-gain score on the student concept understanding test in the use of the *V-Eduspace* application in solar system learning is 0.7724 or 77.2% and is included in the high category. Then for the N-gain test the critical thinking test is:

Table 14. N-gain Test Results Critical Thinking Test

Average Score	Category
0.7109	High

The results of the N-gain test can be stated that the average N-gain score on the students' critical thinking test in the use of the *V-Eduspace* application in solar system learning is 0.7109 or 71% and is included in the high category.

Based on research, it can be stated that the use of appropriate learning media is very important because it affects the extent of student mastery in understanding the material delivered by the teacher during learning. Therefore, a teacher must always pay attention to the media that will be used during the learning process. This level of student understanding is also one of the supports for building students' critical thinking skills. In the present there are many kinds of learning media that can be used but not necessarily all of these media are in accordance with the needs of students to better understand the various concepts they learn. From the research conducted, the average posttest score of the experimental class that utilizes the *V-Eduspace* application obtained a higher value compared to the average posttest score of the control class that only uses conventional media in its learning.

The learning scheme carried out on the experimental class and the control class is the same, namely pretesting in each class and obtaining low scores from both classes, both concept understanding tests and critical thinking tests, followed by providing treatment or learning for three days with a scientific approach but there are differences in the use of learning media so that the next day when the posttest implementation gets results which is different and shows the posttest score of the experimental class is higher than the control class so that it can be stated that the understanding of concepts and critical thinking skills of students in class VI in solar system learning has increased significantly by utilizing the *V-Eduspace* application as evidenced also by the t-test also shows that the probability value of Sig. (2 tailed) is less than 0.05.

Untuk memperkuat hasil tersebut, dilakukan uji *N-gain* pada hasil *posttest* kelas eksperimen yang memperoleh skor 71-77% dimana hal ini menunjukkkan masuk dalam kategori tinggi baik tes pemahaman konsep maupun tes kemampuan berpikir kritis siswa. Sama halnya dengan penelitian lain, nilai *N-gain* menunjukkan hasil belajar yang meningkat dari 39,45% menjadi 65,75% ketika menggunakan media berbasis *virtual reality (VR).* Oleh karena itu, pemanfaatan *virtual reality* dalam pembelajaran mampu lebih meningkatkan pemahaman siswa dan mepengaruhi hasil belajaranya. Maka berdasarkan hasil penelitian dapat dinyatakan bahwa terdapat peningkatan terhadap pemahaman dan kemampuan berpikir kritis siswa setelah menggunakan aplikasi *V-Eduspace* dengan teknologi VR didalamnya. Hasil penelitian ini mendukung hasil dari penelitian (Purwati et al., 2020) dan

(YILDIRIM et al., 2020) bahwa menggunakan VR dalam pembelajaran mepermudah siswa memahamai materi pelajaran. Selain itu penelitian ini mendukung hasil dari penelitian Hayati, 2022) dan (Alifteria et al., 2023) bahwa menggunakan VR dalam pembelajaran mampu mendorong siswa untuk berpikir dengan kritis saat pembelajaran.

Conclusion

Based on the results of research that has been conducted by researchers in two elementary schools in Majalengka Regency, it can be concluded that there is a significant increase in the understanding of concepts and critical thinking skills of students in grade VI in solar system learning, especially by utilizing the *V-Eduspace* application which obtained higher assessment results compared to learning without using the *V-Eduspace* application. In addition to the results of the N-gain test, it also states that the level of effectiveness of utilizing the *V-Eduspace* application in increasing students' understanding of concepts in solar system learning is included in the high category, as well as the effectiveness of using the *V-Eduspace* application in improving students' critical thinking skills in solar system learning is also included in the high category. Therefore, researchers advise teachers to be able to use the *V-Eduspace* application in solar system learning because it has high effectiveness in improving the quality of learning and is an innovation that can be applied to be able to follow the increasingly rapid technological advances in the 21st century.

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