EDUMASPUL
JURNAL PENDIDIKAN
Vol. 7 – No. 1, year (2023), page 722-731
| ISSN 2548-8201 (Print) | 2580-0469) (Online) |

Implementation of the Virtual Education Model in Solar System Learning for Class VII MTS Negeri 1 Sidenreng Rappang

Budiman[1]*, Wahyu Hidayat[2], Rustan Effendy[3]
[1] *(Postgraduate of Science Education, Indonesia University of Education , Indonesia)*
[2] *(Faculty of Tarbiyah and Teacher Training, UIN Sultan Maulana Hasanuddin Banten, Indonesia)*
[3]*(Faculty of Tarbiyah, IAIN Parepare, Indonesia)*.

* Corresponding Author. E-mail: [1]budiman84@iainpare.ac.id

Receive: 10/01/2023	Accepted: 10/02/2023	Published: 01/03/2023

Abstrak

Tujuan penelitian ini adalah untuk mendeskripsikan model Virtual Education dan menganalisis pemahaman konsep Tata Surya dengan menggunakan Virtual Education pada siswa kelas VII MTs Negeri 1 Sidenreng Rappang. Penelitian ini menggunakan penelitian tindakan kelas (PTK). Pengumpulan data dilakukan dengan observasi, tes, dan dokumentasi. Data skor hasil pengujian materi Tata Surya disajikan secara deskriptif yaitu frekuensi, persentase, grafik, mean, dan standar deviasi. Data hasil observasi menggunakan teknik analisis kualitatif, yaitu dengan merangkum dan mendeskripsikan hasil penelitian melalui observasi observasional. Hasil penelitian menunjukkan bahwa penerapan model pendidikan virtual membuat siswa antusias dimana siswa senang dan senang dalam proses pembelajaran. Sedangkan persentase siswa yang nilainya di atas KKM pada siklus I mencapai 78,60%, sehingga masih belum dapat mencapai kriteria keberhasilan penelitian. Pada siklus II langkah-langkah penerapan model Virtual Education dilakukan dengan memberikan motivasi, menayangkan video menggunakan LCD dan virtual reality, serta memberikan kesempatan presentasi kelompok hasil gambar di depan kelas. Untuk persentase nilai siswa di atas KKM pada siklus II meningkat menjadi 92,85%.

Kata Kunci: *Model Pendidikan virtual, Tata Surya*

Abstract

The purpose of this study was to describe the Virtual Education model and analyze the understanding of the concept of the Solar System using Virtual Education in class VII students of MTs Negeri 1 Sidenreng Rappang. This research uses classroom action research (CAR). Data was collected using observation, test, and documentation. The score data of the Solar System material test results are presented descriptively, namely frequency, percentage, graph, mean, and standard deviation. Data of observations used qualitative analysis techniques, namely by summarizing and describing the results of research through observational observations. The results of the study indicate that the application of the virtual education model makes students enthusiastic where students enjoy and are happy in

the learning process. Meanwhile, the percentage of students whose scores were above the KKM in the first cycle reached 78.60%, so they still could not achieve the research success criteria. In cycle II, the steps for implementing the Virtual Education model were done by giving motivation, showing videos using LCD and virtual reality, and providing opportunities for group presentations on the results of the pictures in front of the class. For the percentage of students' scores above the KKM in the second cycle, it increased to 92.85%.

***Keywords**: virtual education model, solar system.*

Introduction

Currently the world has entered the industrial revolution 4.0, which is marked by increased connectivity, interaction, and the development of digital, artificial intelligence, and virtual technology. Information and communication technology has an impact on various aspects of life because there are more centralized barriers between humans, machines, and other resources. One of them is the impact on the education system in Indonesia. Changes in this era cannot be ignored, therefore Human Resources must be well prepared to adapt and compete globally. Human resource development through education from primary and secondary schools to universities is very important to be able to keep up with the development of the industrial revolution (Lase, 2019).

The success of a country in facing the industrial revolution 4.0 is also determined by the quality of educators such as teachers. Teachers must have the necessary capabilities to adapt to changing technology and global challenges. Like students, students are expected to be able to learn technology in order to remain universally competitive. Under these circumstances, every educational institution must really prepare for a new orientation of education and literacy. New literacy, such as data literacy, technology, and human resources, must be prepared to complement the old literacy based on reading, writing, and mathematics. The capacity to understand, evaluate and use data in a digital society is known as data literacy. The capacity to understand mechanical systems and technology in the workplace is referred to as technological literacy. Meanwhile, human resource literacy is defined as the ability to engage effectively, not tense, and with character (Hermann et al., 2016).

Then in facing the era of the industrial revolution 4.0, education is needed that can form a generation that has creative, innovative, and competitive thinking in the world of education. This can be achieved by maximizing the use of technology as an educational tool which is expected to provide results that can balance or influence times for the better. Indonesia, like other countries in the world, must improve the quality of its graduates to meet the expectations of the modern world of work and digital technology.

Current technological advances can be a solution the problem (Chandel & Chauhan, 2014). Virtual Reality technology can be used as a media. Virtual reality or VR is a technology designed to generate a simulation of a three-dimensional (3D) environment, in which the user can see and manipulate the contents of that environment (Chandel & Chauhan, 2014). The goal of Virtual Reality is to create an experience that makes users feel immersed in the appearance of the actual virtual world. Virtual Reality Technology using 3D graphics and sound that surrounds the screen displayed. Users who explore the world of Virtual Reality using hardware

assistance, such as goggles or electronic gloves.

Virtual reality technology has been widely proposed as an advancement significant technology that can offer a new form of education. Potency Virtual reality technology can facilitate learning processes that go beyond the main limitations that characterize an education (Georgiou et al., 2007). The main goal is provides highly realistic, immersive, interactive, and 3D virtual world

Virtual reality is the observation of a virtual environment through a system that displays objects and allows interaction, thereby creating virtual presence (Novak et al., 2014). A virtual environment is defined by its content (objects and files). This content is displayed through various modalities (visual, aural and haptic), and is perceived by the user through sight, hearing, and touch

Virtual reality is also one of the effective technologies for solving real-world problems today. For educational purposes in general, virtual reality has been widely proposed as a significant technological breakthrough that has great potential to facilitate learning activities (Chou, 2017; Sun et al., 2010).

Research shows that VR can improve students' science skills (Hermansyah et al., 2015; Purwati et al., 2020). Virtual Assisted Research on Solar System Materials helps students' learning process (Hermawan et al., 2020).

Based on preliminary observations at class VII MTs Negeri 1, it shows that science teacher learning methods are less varied and tend to be monotonous, this makes students less motivated to follow the learning material that is being discussed or presented so that learning becomes less effective and causes students' low understanding, and becomes less accomplished in study. The media used are generally books. This media is very classic or traditional compared to today's technological developments. The interest of students in the subject of the solar system is considered low because it is considered boring and only knows the theory without being able to visualize it.

From these problems that have been described, the authors want to apply and research a learning model, namely Virtual Education on the Solar System material in class VII MTs Negeri 1 Sidenreng Rappang. The use of virtual education learning models can help students learn on their own and not be bored, so as to improve science learning outcomes for students of class VII MTs. MTs Negeri 1 Sidenreng Rappang.

Research Methods

This research is Classroom Action Research (CAR). This research also includes descriptive research, which discusses how certain learning strategies are used and how the desired results are obtained. Classroom Action Research is a type of self-reflection research in which participants in social (including educational) settings reflect on their own practices to improve their own performance (Suhardjono et al., 2006; Hopkins, 2008). The subjects in this study were students in class VII. G Madrasah Tsanawiyah (MTs) Negeri 1 Sidenreng Rappang which has the lowest average score in science learning compared to other classes.

The procedure in this study consists of planning, action, observation, reflection. As for the data collection technique using observation and tests (pretest and posttest) (Costello, 2011). Where the test questions are taken from the question bank, such as the Ujian Nasional (UN) questions. In the research, the data in the test results were analyzed using descriptive analysis techniques, namely frequency, percentage, mean, standard deviation, table and graph. Meanwhile, qualitative

data in the form of observations were analyzed descriptively.

The effectiveness of the Actions in this Classroom Action Research is based on the criteria for improving student learning outcomes, with an average class score reaching the KKM of 75 and the percentage of students who complete at least 85%. This is in accordance with the KKM score in MTs Negeri 1 Sidenreng Rappang class VII IPA subjects for the Solar System material is 75.

Result and Discussion

This research has two cycles. In cycle 1, it was completed in one meeting which lasted twice 30 minutes. While the second cycle was completed in one meeting this lasted three times 30 minutes. At the initial stage, pre-action is carried out to determine the initial abilities of students. In the Pre-Action, students are taught material about the solar system using a lecture and question and answer approach during the pre-action stage. The researcher is still in charge of the class scenario. The researcher only explained a brief description of the material in the solar system, then offered sample questions on the blackboard and then discussed them

After the material was delivered, the researcher gave a post-test about the material in the solar system. All students take the questions very seriously. When time runs out, all posttest answer sheets or pre-action answers are collected. From the pre-action carried out the test results obtained data in the form of scores obtained by each student. The results of the quantitative descriptive analysis show that the class average score is 45.36 with the highest score of 80 and the lowest being 10.

Students who have met the minimum completeness criteria (KKM) which is 75 there are 10 students (35.72%). And for those who have not reached the KKM target, there are 18 students (64.28%). Here's the table.

Table 1. KKM score in pre-action

KKM	Frequency	Percentage (%)
< 75	18	64.28%
≥ 75	10	35.72%

Based on Table 1, it shows that the ability of students about the solar system material before the action was taken was still categorized as low. Therefore, it is necessary to take action to improve the understanding of the material of the solar system. Before doing the action, the researcher gave a little explanation about the material of the solar system with the lecture and question and answer method. When explaining the material of the solar system, the researcher gave a brief explanation, and then gave examples of the material. After the material was delivered, the researcher gave directions about what things needed to be prepared for the next meeting or the implementation of Cycle 1 Actions.

Cycle I

The data obtained at the pre-action stage is used as a reference in carrying out actions in the first cycle, with the aim of obtaining an increased understanding of the solar system material in science subjects. The activities carried out in first cycle are:

Planning

This stage, the researcher develops a plan that can improve the ability to recognize colors through scientific experiment methods. The activities carried out by researchers in action planning are: 1) Determine the research time; 2) Determine the science material to be taught to students in accordance with basic competencies (KD), namely analyzing the solar system, rotation and revolution of the moon, and their impact on earth life; 3)

Develop RPP/ *Rencana Pelaksanaan Pembelajaran* (Learning Implementation Plan) in accordance with the indicators to be achieved; 4) Prepare LKPD/*Lembar Kerja Peserta Didik* (Student Worksheet) and evaluation; 5) Develop assessment guidelines based on reference books; 6) Prepare an observation sheet which contains observation sheets about the activities of researchers and students during the learning process by using the Virtual education model; 7) Prepare learning tools and resources that will be used in the learning process

Implementation

The implementation of classroom action research is carried out in collaboration with classroom teachers. In the apperception activity, the researcher asked the students about the place and name that we now occupy. Students take turns answering "on Earth". After answering the teacher gave a little description and information that in outer space there is not only planet earth, but there are several planets such as Mars, Venus, Jupiter, and others and there are also celestial objects that we often see, moon, stars, and meteors or often referred to as shooting stars.

After giving apperception, the researcher gave directions to the students to sit in groups according to the groups that had been determined. After the students sat together in their respective groups, the researcher displayed a learning video about the solar system and the condition of the earth. After showing the video, the researcher continued by adding an explanation of the material about the material of the solar system.

Then after the material was explained, the students were given directions by the researcher to draw a planet that had been shown in a group video. Students seemed enthusiastic about asking to draw the planet freely or with their own creativity. The number of student questions is a sign that a student's interest in the material to be studied has emerged. After understanding what to do, students begin to draw in groups, some help color and some help to find any good pictures to draw.

Observation

The results of the observations show that the learning activities have not been carried out properly. This is indicated by indicators: students cannot be fully independent, student activity is still lacking, group work results are not optimal because there is no visible collaboration between group members, researchers have not succeeded in guiding students to make conclusions and encourage students to ask questions and researchers have not delivered essential material which is a important steps in virtual education, such as learning to use Virtual Reality.

Indicators of the learning process that has not been going well can also be seen from the class atmosphere that still sounds crowded with student chatter that is not relevant to learning, such as talking about food and so on. Most of the students did not dare to express their opinion and were still selfish. However, the students were enthusiastic when it was announced that there would be group work and virtual education learning.

Evaluation

Class conditions are still noisy with student conversations that are not related to learning, such as talking about food and so on. The majority of students are still selfish and do not dare to express their opinions. Meanwhile, the score obtained shows that the average score received by all students in the first cycle evaluation is 76.43 with the highest score of 95 and the

lowest being 45. The description of the Cycle Evaluation is shown in table 2.

Based on table 2 shows that student who meets the minimum completeness criteria (KKM) there are 19 students (78.60%), there are 9 students (32.14%) who do not meet the minimum completeness standard (KKM).

The following table 3 shows the comparison of values between pre-action and cycle I.

Table 2.Comparison Pre-Action and Cycle 1

Observed criteria	Pre Action	Cycle 1
The highest score	80	95
The lowest score	10	45
Score Mean	45.36	76.43
students who have not reached the KKM	18 (64.28%)	9 (32.14%
Students who have reached KKM	10 (35.71%	19 (78.60%

Based on table 2, it can be stated that the value of learning results increased after the first cycle of action was completed. The average value of the class in the pre-action was 45.36, while the average value of the class in the first cycle was 76.43. For all students, the percentage of students who completed the KKM increased. At the pre-action level were 35.71 percent of students completed, while in the first cycle it was 78.60%.

In cycle 1, the mean score has met the KKM, but the proportion of completeness has not reached 85%. So that the second cycle of research was continued.

Reflection

Based on the results of observations, basically the virtual education model in science learning is quite effective. Through virtual education, most students are more enthusiastic in participating in the learning process. This can be seen when researchers show videos to students. Students really pay attention and listen to the video well.

The weakness of this virtual education is that students focus more on seeing the beauty of the video than on understanding the learning and delivery of the video so that some students cannot distinguish between planets and objects in the solar system. Meanwhile, for drawing students, there is a shortage of colored pencils so that students reduce their creativity in drawing planets. However, overall the implementation of virtual education learning is felt to be quite effective in improving student learning outcomes.

The effectiveness of the virtual education approach in science learning has an impact on the results of student evaluation scores in cycle I which have increased compared to pre-action scores. Therefore, the virtual education model learning method can be said to be able to arouse students' curiosity and not be boring.

Cycle II

The learning results in the first cycle illustrate that the percentage of students who have reached the KKM has only reached 78.60% and in accordance with the results of reflection in the first cycle, it is necessary to carry out the next action, namely the second cycle, with the aim that the results obtained by students can meet the success criteria.

Planning

The first stage in cycle II is action planning. Researchers Arrange learning improvements that will be carried out in cycle II. Action planning in cycle II is as follows: 1) determine the research schedule that is adjusted to the lesson schedule for science subjects for class VII G MTsN 1 Sidenreng Rappang; 2) determine

the material to be taught to students according to basic competencies (KD), namely Analyzing the Solar System, the rotation and revolution of the moon, and their impact on Earth's life; 3) develop RPP in accordance with the indicators to be achieved; 4) develop assessment guidelines based on reference books; 5) compile an observation sheet which contains an observation sheet for the activities of researchers and students during the learning process using a virtual education model; 6) prepare learning tools and resources that will be used in the learning process.

Implementation

In general, the implementation of the second cycle has similarities with the implementation of the first cycle, but the difference lies in the use of video with LCD instead of using video display using virtual reality. Where students take turns being asked to come forward to use virtual reality where students can virtually feel they are in space and can virtually see firsthand the shape and characteristics of the planet and the shape of the earth. Not only seeing the shape of the earth, but also seeing and explaining how the process of lunar and solar eclipses can occur and the rotations of planets in outer space.

Furthermore, at the end of the second cycle, an evaluation was carried out to see the behavior of the achievement of student learning outcomes. Measurement of student learning outcomes is done by giving student evaluation questions.

Students work on individual evaluation questions. When the students were working on the questions, the researcher went around while checking the students' work, but in the second cycle, the researcher was more strict in monitoring the evaluation than before. After the evaluation results were collected, the researcher gave reinforcement to students to be more diligent in studying at home so that they become smart and achievers so that they can achieve their goals.

Observation

The results of observations show that learning using the virtual education model has been going better, researchers have been able to make the class a virtual class where students enjoy and are happy in the learning process. In the learning process students look very active in the learning process, some even ask to repeat the learning process using virtual reality with different materials. At the beginning of the meeting, everyone seemed unenthusiastic in the learning process because they only used books, but when they used virtual education, everyone seemed enthusiastic, especially nowadays, students are easier to learn if they use technology.

Seeing the activeness of students in asking questions also proves that the learning process is effective and when the researcher explains only a few do not pay attention, the rest they are silent and focused on the material being taught. As for the assignments that were carried out, all of them looked very enthusiastic in doing their work because they had seen it in detail using virtual reality so that in carrying out their drawing tasks they were more creative in drawing celestial objects and planets in outer space.

After the question and answer session, they were already fluent in distinguishing planets and could explain how the lunar and solar eclipses could occur. Students who were initially confused in distinguishing their planets are still memorizing and distinguishing celestial bodies and planets in outer space.

Evaluation

The evaluation obtained shows that the average score achieved by all students in the second cycle evaluation is 85.18,

with the best score being 95 and the lowest being 70. In this second cycle, it shows that all students have fulfilled the KKM as many as 26 (92.85%). The following table 3:

Table 3. Evaluation of Cycle II

KKM	Frequency	Percentage (%)
< 75	9	32,14%
≥ 75	19	78,60%

Because these results meet the indicators of research success, it will not be continued in the next cycle.

Reflection

In general, the implementation of the actions in the second cycle did not find any serious obstacles, because the implementation of the second cycle was an improvement from the suggestions put forward in the first cycle and the results of discussions with peer teachers as collaborators. Based on the results of the reflection in cycle II, it can be said that almost every step in the lesson plan (RPP) that has been prepared has been carried out well.

The aspects observed in learning using the virtual education model have also been fulfilled, although there are still imperfections in it. For example, when working in groups, there are still students who have not discussed well and must be reprimanded in order to return to the discussion, when asked to ask questions about material that is not clear, there are still students who do not dare to ask. Therefore, the researcher had to ask the students again to find out which material the students had not mastered.

The weakness that occurs is that the use of virtual reality takes a lot of time because it only uses one tool because it is expensive so that the teaching and learning process exceeds the allotted time. But basically the application of the virtual education model in science learning can increase students' interest and interest in learning science so that learning outcomes can also increase.

In the second cycle, they still use the Virtual Education model, but there is the addition of the Virtual Reality method. Observation results show that in the learning process students looks very active in the learning process, some even ask to repeat the learning process using virtual reality with different materials.

At the beginning of the meeting, all of them seemed not enthusiastic in the learning process because they only used books, but when they used Virtual Education in cycle II, everything seemed enthusiastic, especially for students it was easier to learn if they used technology. Seeing the activeness of students in asking questions also proves that the learning process is effective and when the researcher explains only a few do not pay attention, the rest they are silent and focused on the material being taught.

Discussion

Researchers used a virtual education model to be applied to the solar system material, which resulted in an increase in students' science learning outcomes in cycle I. Virtual education has helped children in learning and promoted retention of a greater understanding of the concept of solar system material through learning media that can give the impression of students being in a real world environment so that students during learning activities can directly observe the form of concepts conveyed by the teacher (Abdussalam et al., 2018).

The use of VR-IPA media can elicit attitude reactions from users. Some of the attitudes that emerge are enthusiastic attitudes in carrying out activities virtual reality practicum, the attitude of explaining

what is observed as it is and the attitude of criticizing the object findings in the virtual reality practicum with looking for relevant references (Lege & Bonner, 2020).

Virtual learning allows students to interact with the subject matter. Students can offer facts or ideas about various subjects related to the lesson or students' personal development needs (Subir, 2020). The use of this virtual education model is effectively applied or applied in learning the solar system. This model has an impact on students to be more active and interested in learning, students can also feel and use technology in learning (Pratiwi & Sujarwanto, 2020)

Several studies have shown that when technology is used 'successfully' in learning, children can learn richer, deeper, and more meaningful (Hermawan et al., 2020; Hermansyah et al., 2015; Putrawangsa & Hasanah, 2018; Purwati et al., 2020).

Conclusion

The results of the study indicate that the application of the virtual education model makes students enthusiastic where students enjoy and are happy in the learning process. Meanwhile, the percentage of students whose scores were above the KKM in the first cycle reached 78.60%, so they still could not achieve the research success criteria. In cycle II, the steps for implementing the Virtual Education model were done by giving motivation, showing videos using LCD and virtual reality, and providing opportunities for group presentations on the results of the pictures in front of the class. For the percentage of students' scores above the KKM in the second cycle, it increased to 92.85%

.

References

Abdussalam, Sulthoni, & Munzil. (2018). Media Virtual Reality Tata Surya untuk Meningkatkan Kemampuan Retensi. *Jurnal Pendidikan*, *3*(9), 1160 — 11 67. doi: 10.17977/jptpp.v3i9.11527

Chandel, D., & Chauhan, A. (2014). Virtual Reality. *International Journal of Science and Research (IJSR)*, *3*(10), 1223–1224. https://www.ijsr.net/get_abstract.php?paper_id=OCT14534

Chou, C. C. (2017). An analysis of the 3D video and interactive response approach effects on the science remedial teaching for fourth grade underachieving students. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(4), 1059–1073. doi: 10.12973/eurasia.2017.00658a

Costello, P. J. M. (2011). *Effective Action Research* (*2nd Ed*). Continuum International Publishing Group.

Georgiou, J., Dimitropoulos, K., & Manitsaris, A. (2007). A Virtual Reality Laboratory for Distance Education in Chemistry. *World Academy of Science, Engineering and Technology*, *11*, 356–363.

Hermann, M., Pentek, T., & Otto, B. (2016). Design Principles for Industrie 4.0 Scenarios. *Proceedings of 49th Hawaii International Conference on System Sciences HICSS*, 3928–3937. doi:10.1109/HICSS.2016.488

Hermansyah, Gunawan, & Herayanti, L. (2015). Pengaruh Penggunaan Laboratorium Virtual Terhadap Penguasaan Konsep dan Kemampuan Berpikir Kreatif Siswa Pada Materi Getaran dan Gelombang. *Jurnal Pendidikan Fisika Dan Teknologi*, *1*(2), 97–102. doi:10.29303/jpft.v1i2.242

Hermawan, I. K. W., Subagia, I. W., & Juniartina, P. P. (2020). Pengemabangan Modul Pembelajaran IPA Berbantuan Laboratorium Virtual pada Materi Tata Surya. *JPPSI: Jurnal Pendidikan Dan Pembelajaran Sains*

Indonesia, *3*(1), 83–93. doi:10.23887/jppsi.v3i1.24632

Hopkins, D. (2008). *A Teacher's Guide to Classroom Research* (4th Ed). McGraw-Hill Education.

Lase, D. (2019). Pendidikan di Era Revolusi Industri 4.0. *SUNDERMANN: Jurnal Ilmiah Teologi, Pendidikan, Sains, Humaniora Dan Kebudayaan*, *12*(2), 28–43. doi: 10.36588 / sundermann.v1i1.18

Lege, R., & Bonner, E. (2020). Virtual reality in education: The promise, progress, and challenge. *The Jalt Call Journal*, *16*(3), 167–180. doi: 10.29140/jaltcall.v16n3.388

Novak, M., Domen, M., & Beguš, S. (2014). *Virtual Reality Technology and Applications*. Springer. doi:10.1007/978-94-007-6910-6

Pratiwi, Y. A., & Sujarwanto. (2020). Virtual Reality Dan Augmented Reality Berbasis Android untuk Memotivasi Belajar Siswa Cerebral Palsy SDLB. *Jurnal Pendidikan Khusus*, *16*(1), 1–11. https://jurnalmahasiswa.unesa.ac.id/index.php/38/article/view/36519%0Ahttps://jurnalmahasiswa.unesa.ac.id/index.php/38/article/download/36519/32481

Purwati, Y., Sagita, S., Setyo, F. U., & Baihaqi, W. M. (2020). Pengembangan Media Pembelajaran Tata Surya berbasis Virtual Reality untuk Siswa Kelas 6 Sekolah Dasar dengan Evaluasi Kepuasan Pengguna terhadap Elemen Multimedia. *Jurnal Teknologi Informasi Dan Ilmu Komputer (JTIIK)*, *7*(2), 259–266. doi:10.25126/jtiik.202071894

Putrawangsa, S., & Hasanah, U. (2018). Integrasi Teknologi Digital dalam Pembelajaran di Era Industri 4.0: : Kajian dari Perspektif Pembelajaran Matematika. *Jurnal Tatsqif*, *16*(1), 42–54. doi:10.20414/jtq.v16i1.203

Subir, M. S. (2020). Fungsi Virtual Learning Dalam Sistem Pembelajaran. *Transformasi : Jurnal Studi Agama Islam*, *13*(1), 20–37.

Suhardjono, Arikunto, S., & Supardi. (2006). *Penelitian tindakan kelas*. Bumi Aksara.

Sun, K. T., Lin, C. L., & Wang, S. M. (2010). A 3-D Virtual Reality Model of The Sun and the Moon for E-Learning at Elementary Schools. *International Journal of Science and Mathematics Education*, *8*(4), 689–710. doi:10.1007/s10763-009-9181-z