ISSN: 2502-2318 (Online)
ISSN: 2443-2911 (Print)
Omega : Jurnal Fisika dan Pendidikan Fisika
Vol **6**, No **1** (2020)

Homepage : https://journal.uhamka.ac.id/index.php/omega

The Effect of Quantum Learning Model Using Roulette Game on Physics Learning Outcomes

Tutumai Lestari[1*], Dra. Hj. Yulia Rahmadhar[2], Feli Cianda Adrin Burhendi[3]

[1, 2, 3]Department of Physics Education, Universitas Muhammadiyah Prof. DR. HAMKA, Indonesia

[1]tutumai.siahaan@gmail.co.id

ABSTRACT

It has been investigated the influence of quantum learning models using roulette games on physics learning outcomes. The method used is quantitative methods pre-experimental type, one group pretest-posttest. The sampling technique is purposive sampling, data collection techniques using research instruments in the form of essay questions. The analysis prerequisite test used in this study is the normality test using the Liliefors error estimation test obtained L_{count} (0.142, 0.132 and 0.122) $< L_{table}$ (0.147) with $\alpha = 0.05$. For homogeneity test using Bartlett test obtained χ^2_{count} (18.44, 29.93, 22.79) $< \chi^2_{table}$ (30.10) with $\alpha = 0.05$ and degrees of freedom db = 19. In the hypothesis test using the t-test obtained t_{count} the first posttest = 30.78, in the second posttest t_{count} = 45.09, and in the third posttest t_{count} = 61.71. While t_{table} = 1.69 at $\alpha = 0.05$ and t_{table} = 2.44 at $\alpha = 0.01$. Then H_1 is accepted, so it is concluded that there is a very significant influence on the application of the quantum learning model using roulette game media on physics learning outcomes.

Keywords: roulette, quantum learning, learning outcomes

INTRODUCTION

In the world of education the curriculum becomes an educational response to the needs of the nation. In creating a creative and innovative generation, the government improves the quality of education by developing a curriculum that is implemented. Physics is one part of natural science, which is a study of natural phenomena, events, or phenomena and reveals all the secrets of the laws of the universe [1].

Physics as a science that seeks to describe and explain the laws of nature and natural events with images according to the human mind [2]. Physics is the study of natural phenomena and revealing the secrets of nature depicted with concepts gradually from concrete to abstract according to human thought.

Based on the experience of researchers at the time of carrying out apprenticeship 3 and observations at school, students feel bored and have no interest in learning physics because the learning model used by monotonous educators which explain physics is just formulas without a clear concept. As a result, the learning process becomes ineffective and student learning outcomes are classified as low. Evidenced by the data observations of researchers at SMAN 113 Jakarta which shows the value of physics as follows:

Table 1. Recapitulation of physics learning outcomes

No	Nama Kelas	KKM	Nilai Rata-rata
1	XI MIPA 1	75	77
2	XI MIPA 2	75	73
3	XI MIPA 3	75	74

Based on the data above, the KKM value is used as a benchmark for the success of students. Physics learning outcomes are said to be low because the scores obtained by students are still below the KKM value. One of the factors that influence learning outcomes is the learning model and learning media used. The learning

ISSN: 2502-2318 (Online)
ISSN: 2443-2911 (Print)
Omega : Jurnal Fisika dan Pendidikan Fisika
Vol **6**, No **1** (2020)

model is a plan that is used to design, the contents of which are teaching strategies used to achieve instructional goals [3]. The learning model is a conceptual framework that describes procedures systematically to achieve certain learning goals, functioning as a guide in planning teaching and learning activities.

Problems that often occur in the learning process, especially science subjects in general, students are not encouraged to find their knowledge, but only remember what is given by educators. As a result, students find it very difficult to find solutions to solve problems related to science and learning outcomes [4], [5]. Learning outcomes to be achieved by students are strongly influenced by the selection of learning models. In the learning process, the involvement of the learning model influences the learning experience for students. The learning model has significant effectiveness in providing learning experiences for students. So that the selection of a very interesting learning model becomes important in increasing the enthusiasm of students' learning in following the estuary process ultimately making students understand the material provided. This learning process is called meaningful learning [6], [7].

Learning models can run optimally if supported by learning media that is suitable for the use of learning models and learning media that are monotonous and not following the material will make the learning process ineffective. Learning media can be interpreted as anything that can be used to channel messages (messages), stimulate thoughts, feelings, attention, and abilities of students so that they can encourage the learning process [8]. Learning media can deliver and channel messages from sources in a planned manner, to create a conducive learning environment where the recipient can carry out the learning process effectively [9]. Learning models and instructional media are supporting components of the implementation of a good learning process if it is in line with the material to be taught and interesting for students.

Educators must use appropriate learning models and instructional media and involve students in the learning process. Students prefer learning that feels like playing and is more relaxed. In making the learning process relaxed and enjoyable, students must play an active role in in-class activities. Researchers have an alternative learning model and the media that can be used is a quantum learning model using roulette games. Learning with quantum learning can create a pleasant learning atmosphere that has an impact on the acquisition of values [10]. Hasil belajar fisika dapat meningkat dengan menggunakan model pembelajaran *Quantum Learning* [11]. This learning model has several advantages, namely: (1) humanistic, (2) more constructive, (3) emphasizing meaningfulness and (4) integrating context and content [12].

An educator must be able to use learning media that can make learning active and creative so that it can attract students' attention to be focused on learning. A game can be used as a learning medium that is quite effective because students will play a direct role and learning become fun. Roulette game is a circular tool that can move and rotate and is used as a tool in supporting learning [13].

In its use as a learning media circular roulette board which is divided into several during as needed. Roulette games can be made from used items such as cardboard, paper plates, or use wall clocks. The choice of roulette game media can also easily make students more actively involved during learning so that students are expected to be more interested in learning physics [14]. This roulette game can be used as a learning medium because this roulette game includes educational play tools that can help in teaching according to the conditions, time, and material to be delivered. The advantage of roulette game media or smart wheels is a tool or media that is easy to make and use, and students will be interested in using it because this media can learn students casually

ω omega
Homepage : https://journal.uhamka.ac.id/index.php/omega
ISSN: 2502-2318 (Online)
ISSN: 2443-2911 (Print)
Omega : Jurnal Fisika dan Pendidikan Fisika
Vol **6**, No **1** (2020)

while playing [15].

Based on these descriptions, the researchers wanted to examine the "Effect of Quantum Learning Models Using Roulette Game Learning Media on Physics Learning Outcomes." With the aim that the quantum learning model of learning using roulette game media can make the learning process more enjoyable and students can better understand the subject matter so that the outcome of the students gets better learning outcomes.

RESEARCH METHODS

In this study, the method used was a pre-experiment method with one group pretest-posttest design. Where our tests of our students do twice at the beginning (pre-test) and end (post-test) [16]. The research design is presented as table 2.

Table 2: One group pretest-posttest research design.

O1	**X**	**O2**
Pretest	Treathment	*Posttest*

The population is students of class XI MIPA at SMAN 113 Jakarta, while the sample is students of class XI MIPA 3 at SMAN 113 Jakarta, who are selected using a purposive sampling technique. The independent variable in this study is the Quantum Learning model using Game Roulette learning media. Physics learning outcomes are the dependent variable in this study. The source of data in this study is in the form of an essay test. The test was previously validated by one of the physics education lecturers at FKIP UHAMKA and one of the teachers at SMAN 113 Jakarta.

In analyzing the data that has been obtained is by calculating the pre-test and post-test scores. To determine the magnitude of the influence of the use of quantum learning models using roulette game media using a t-test using a prerequisite test that is normality test and homogeneity test.

RESULTS AND DISCUSSION

A. Data Description

Before the treatment is carried out in the study first given a pre-test to measure the initial ability of students obtained an average of 14.3 data is still below the magnitude of KKM 76. In this study researchers took three times the data on the material Dynamics of Rotation and moment of force, which was carried out every meeting. As for knowing the effect of treatment on physics learning outcomes can be seen in figure 1.

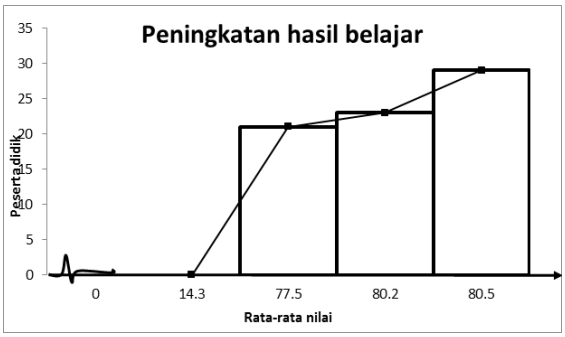

Figure 1. Improved learning outcomes

Based on graph 4.5 it can be seen that an increase in the average value from 14.3 increased to 77.5 at the next meeting increased again to 80.2 and the last increased to 80.5. The increase occurred not only in grades but also in the number of students who achieved the KKM value ie starting from no students reaching KKM then becoming 21 students then increasing to 23 students and finally becoming 29 students who could meet the criteria of completion or reach KKM.

B. Testing Requirements Analysis

Test the normality of posttest scores in the experimental class using the Liliefors error estimation test with a significant level α = 0,05 the number of samples there were 36 students and L_{table}= 0,147. In the first posttest L_{count}= 0,142, the second L_{count}= 0,132, Whereas in the third posttest L_{count}= 0,122. Based on the results of the three posttest normality tests

ω omega
Homepage : https://journal.uhamka.ac.id/index.php/omega
ISSN: 2502-2318 (Online)
ISSN: 2443-2911 (Print)
Omega : Jurnal Fisika dan Pendidikan Fisika
Vol **6**, No **1** (2020)

it can be concluded that the value L_{count} < L_{table} means the data has normal distribution criteria.

C. Homogeneity Test

In this study the researchers' homogeneity test uses calculations with the Bartlett test formula to the value of the posttest results with a significant level α = 0,05 Homogeneity test results on the posttest results with a total sample of 36 students and χ^2_{table} = 30,100. The results obtained are χ^2_{count} = 18,448 in the first posttest, in the second posttest χ^2_{count} = 29,931, while the third posttest has results χ^2_{count} = 22,791. From the three results, it can be concluded that $\chi^2_{count} < \chi^2_{table}$ so the data obtained on the posttest results are derived from a homogeneous population.

In this study roulette games are used in quizzes. Roulette game contains practice questions in accordance with the material of the day. In the use of roulette games students are active directly in playing, so practice questions become more interesting. With a gift or recognition for students who answer the questions correctly can make students become enthusiastic in answering questions. This roulette game media is in line with the learning model of quantum learning that together makes learning interesting and relaxed so that the learning atmosphere becomes fun for students. Based on the results of research and calculations of posttest values obtained, physics learning outcomes have increased. This increase can be seen from the average posttest score that increases every meeting.

The calculation of the results of the pretest concluded that the learning outcomes or the initial ability of students is very low because the range of values between 1 to 100 obtained the lowest pretest value of 6 and the highest 26. While with the same range of values the first posttest results obtained an average of 77, 5 then in the second posttest the average rose to 80.2 and the third posttest averaged 80.5. From the results of the posttest conducted at each meeting, there was a change because the treatment increased so that students gained more experience and became more accustomed to the treatment so that students felt more comfortable being able to take part in learning the thing which made the learning outcomes of the students' physics increase each meeting.

In line with the understanding of quantum learning is one of the learning models that activates students who are done happily, comfortably, easily and with a high level of success [10]. Based on the posttest results obtained, the hypothesis testing was carried out with significance α = 0,05 dan α = 0,01 diperoleh hasil $\boldsymbol{t_{count}}$ each posttest is greater than $\boldsymbol{t_{table}}$, then $\boldsymbol{H_0}$is rejected. Because of the rejection of $\mathbf{H_0}$ then $\mathbf{H_1}$ which means there is an influence of the use of the learning model of quantum learning using roulette games on physics learning outcomes. thus, the quantum learning model of learning using roulette game media was successfully applied well at the school.

CONCLUSION

Based on the discussion of research results regarding the influence of the quantum learning model using roulette game media on physics learning outcomes, it can be concluded that:

1. Before using the quantum learning model of learning using roulette game media students were not interested in learning physics and resulted in low physics learning outcomes seen from the pretest results obtained there were no students who were able to achieve the KKM value of 75
2. When the implementation of learning with quantum learning models using roulette game media on the subject of rotational dynamics and object equilibrium students become enthusiastic during learning so that it can be said that the application of

ISSN: 2502-2318 (Online)
ISSN: 2443-2911 (Print)
Omega : Jurnal Fisika dan Pendidikan Fisika
Vol **6**, No **1** (2020)

quantum learning models using roulette game media affects the learning outcomes of physics can. Seen from the posttest calculation results at each meeting, the acquisition of learning outcomes has increased from 79.2 up to 80.2 then the last posttest rose to 80.5. So the quantum learning model of learning using roulette games can improve physics learning outcomes.

3. From the results of testing the hypothesis with the t test that degrees of freedom db = 35 with a significant level α = 0,05 t_{table} = 1,69 and significant level α = 0,01 t_{table} = 2,44 the results are obtained t_{count} *first posttest* = 30,78, the second posttest t_{count} = 45,09, and in the third posttest t_{count} = 61,71. The amount $t_{count} > t_{table}$ then **H_1** is accepted. So it can be concluded that there is a very significant influence on the application of the quantum learning model using roulette game media on physics learning outcomes.

ACKNOWLEDGEMENT

Thank you to Universitas Muhmadiyah Prof. DR. Hamka to everything i ever had.

REFERENCES

[1] D. P. Damanik, "Pengaruh Model Pembelajaran Group Investigation Terhadap Hasil Belajar Siswa Pada Materi Pokok Gelombang Elektromagnetik Di Kelas X Semester II SMA Kebangsaan Medan," *J. Pembang. Perkota.*, vol. 6, no. 1, pp. 59–62, 2018.

[2] Nofiza, A. Hamid, and Susanna, "Penerapan Model Pembelajaran Open Ended Untuk Meningkatkan Hasil Belajar Fisika Siswa Di MA Ulumul Qur'an Banda Aceh Tahun Ajaran 2016/2017," *J. Ilm. Mhs. Pendidik. Fis.*, vol. 2, no. 1, pp. 36–41, 2017.

[3] F. Firdaus *et al.*, "Meningkatkan Gerak Dasar Sepak Sila Dengan Menggunakan Model Pembelajaran STAD (Student Teams Achievement Division)," *Sportive*, vol. 2, no. 1, pp. 51–60, 2017.

[4] D. Feriyanti, "Discovery Learning As A Method To Teach Descriptive Text In Building Students' Character : A Case Of Seventh Grade Students Of Smp N 3 Ulujami," *ETERNAL (English Teach. Journal)*, vol. 5, no. 2, 2014.

[5] F. Cianda, A. Burhendi, W. D. L, and A. Kusdiwelirawan, "Implementation of Blended Learning to Use Discovery Learning Method," *Int. J. Innov. Creat. Chang.*, vol. 5, no. 6, pp. 153–163, 2019.

[6] F. Durrotul, S. Haryanto, and S. Anitah, "Model Pembelajaran Terpadu Modifikasi Wolfinger di Sekolah Dasar," in *Prosiding Seminar Pendidikan Nasional " Pemanfaatan Smartphone untuk Literasi Produktif Menjadi Guru Hebat dengan Smartphone,"* 2017, pp. 71–79.

[7] I. R. Ermawati, F. Cianda, A. Burhendi, and N. Harahap, "Efektifitas Model Pembelajaran Quantum Learning Di Tinjau Dari Metakognitif Fisika Siswa Di SMAN 48 JAKARTA," *J. Pendidik. Fis. Univ. Muhammadiyah Metro*, vol. 8, no. 1, pp. 24–32, 2020.

[8] A. Asyhari and H. Silvia, "Pengembangan Media Pembelajaran Berupa Buletin Dalam Bentuk Buku Saku Untuk Pembelajaran IPA Terpadu," *J. Ilm. Pendidik. Fis. Al-Biruni*, vol. 05, no. 1, pp. 1–13, 2016.

[9] S. Juariah and Irwandani, "Pengembangan Media Pembelajaran Berupa Komik Fisika Berbantuan Sosial Media Instagram Sebagai Alternatif Pembelajaran," *J. Ilm. Pendidik. Fis. Al-BiRuNi*, vol. 05, no. 1, pp. 33–42, 2016.

[10] E. D. Kusuma, Gunarhadi, and Riyadi, "Keefektifan Model Quantum Learning Berbasis Masalah Terhadap Keterampilan Pemecahan Masalah," *J. Pendidik. Dasar*, pp. 54–64, 2018.

[11] T. A. P, M. Tawil, and B. D. Amin, "Penerapan Model Pembelajaran Quantum Learning Dengan Media Presentasi Terhadap Peningkatan Hasil Belajar Fisika Peserta Didik Kelas VII.5 SMP Negeri 14 Makassar," *J. Pendidik. Fis. Univ. Muhammadiyah Makassar*, vol. 3, no. 1, pp. 64–73, 2015.

ISSN: 2502-2318 (Online)
ISSN: 2443-2911 (Print)
Omega : Jurnal Fisika dan Pendidikan Fisika
Vol **6**, No **1** (2020)

[12] I. L. Putu, S. Widnyani, I. C. Wibawa, N. N. Garminah, and J. Pgsd, "Pengaruh Model Pembelajaran Quantum Terhadap Sikap Ilmiah Dan Hasil Belajar IPA Tahun Pelajaran 2015/2016," *e-journal PGSD Univ. Pendidik. Ganesha*, vol. 4, no. 1, 2016.

[13] P. A. S. Andoko, "Pengembangan Alat Evaluasi Pembelajaran Media Roulette Pada Mata Pelajaran Perencanaan Bisnis Materi Modal Usaha Kelas X Pemasaran 2 SMK Negeri 2 Kediri," *J. Pendidik. Tata Niaga*, vol. 06, no. 4, pp. 175–179, 2018.

[14] W. R. Sakti, "Pengembangan Media Pembelajaran Games Roulette Fisika Untuk Meningkatkan Motivasi Dan Hasil Belajar Peserta Didik SMA N 1 Prambanan Klaten," 2017.

[15] Y. Wulansari, "Pengembangan Media Pembelajaran Permainan Roda Pintar Pada Mata Pelajaran Administrasi Kepegawaian Kelas XI," *J. Adm. Perkantoran*, vol. 5, no. 1, 2017.

[16] F. Cianda, A. Burhendi, and A. Abdurrozak, "The Implementation of Blended Learning Models Based Liveaboard Against Affective Aspects in Modern Physics Course," *Gravity J. Ilm. Penelit. dan Pembelajaran Fis.*, vol. 6, no. 1, pp. 1–6, 2020.