



The Influence of Online Learning on Physics Learning Outcomes During The Covid-19 Pandemic

Suhariyono , Heri Retnawati

Universitas Negeri Yogyakarta

Address: Colombo Street 1st, KarangMalang, Yogyakarta, 55281, Indonesia

| suhariyono.2021@student.uny.ac.id  | DOI: <https://doi.org/10.37729/radiasi.v15i1.1812> |

Abstract

Throughout the COVID-19 pandemic, it is hoped that all elements of education can still facilitate learning so that children remain active even though they are online. The Indonesian policy of the government in dealing with the spread of the COVID-19 outbreak is to prevent it by imposing social distancing. This policy impacts all lives, Education is one of them., especially in the online learning process. Physics is one of the specialization subjects given to high school students. The purpose of this research is to determine impact of online learning Physics on student learning outcomes and the things that affect this impact. This type of research is a mixed-method—qualitative data obtained by observation, documentation, and interview techniques. Quantitative data comes from evaluating student achievement before the application of online learning (before the pandemic) and after the implementation of online learning (during the pandemic). Participants in this quantitative study were 116 students, and qualitative participants were 5 students' parents. The result of this study is that there is a significant impact or difference between the effects of learning Physics before and after the pandemic. This can be seen from the effects of Pillai's trace, Wilks lambda, Hotelling's trace, and Roy's most enormous root test results stating that the significance value at 0.000 is smaller than 0.05. It can also be seen from the average before the pandemic, 80,04 and after the pandemic, 82.11 This is caused by that there is excessive parental participation in completing each student's task at home.

Keywords: Learning achievement, Learning Physics, Online learning

Article Info:

Received:
08/02/2022

Revised:
18/04/2022

Accepted:
25/04/2022



1. Introduction

At the beginning of 2020, WHO (World Health Organization) or world health organization announced that Coronavirus Disease (Covid-19) was declared a pandemic [1]. Indonesia is one of the countries that has been exposed to the Covid-19 outbreak, so the government has implemented social distancing aimed at breaking the chain of transmission of the Covid-19 epidemic [2]. During the COVID-19 pandemic, it is hoped that all elements of education can still facilitate learning so that children remain active even online [3]. The Indonesian the government's response to the Covid-19 outbreak is to prevent it from spreading again by imposing social distancing [4]. The Covid-19 incident has pushed distance education testing to unprecedented levels, for all components of education, including students, teachers, and parents [5].

This policy has an impact on all lives, Education is one of them, especially in the learning process [6]. Considering time, location, and distance are now significant issues during the pandemic [7]. There was an online learning component during the Covid-19 pandemic. tsunami almost everywhere in the

world [8]. Changes in learning in formal schools during the pandemic concerning the implementation of educational policies during a disaster can be seen from the letter number 4 for the year 2020, issued by the Minister of Education and Culture. So far, in the educational world, we have never used an online system that is carried out in a meaningful way to carry out learning activities [6].

Physics is among the specialization subjects given to students in high school [6]. Learning Physics from home is defined as online learning Physics [9]. Some students said that studying Physics in class/school under the guidance of a teacher is very difficult to understand, especially without a teacher, only studying alone at home [10]. Such student statements must be corrected by the teacher [11]. Physics by distance learning presents unique challenges for teachers and students [12]. Teachers are expected to be innovative in delivering online physics material so that students not only complete academic assignments but also do fun activities so that students' learning desires remain high [13][12]. However, of course, the impact of online learning on learning outcomes in Physics is not yet known. In his research [14] states that in Spain, online learning has a significant effect on the final learning outcomes. Meanwhile, according to his research [15] in South Wales, Australia, online learning does not have a significant impact on the outcomes of student learning. Then research from [16] in Saudi Arabia showed that online learning has a significant effect in terms of learning outcomes. In Indonesia, research from [17] shows that online learning has a significant influence on student learning outcomes. Departing based on the outcomes of the research above, the researcher wants to know the impact of online learning Physics on student learning outcomes and the things that affect this impact.

2. Method

The mixed-method is used in this study to find and describe information and data that can explain social phenomena [18][19]. Qualitative data were obtained by using observation, documentation, and interview techniques [20]. Quantitative data comes from the results of evaluating student achievement before the application on-line education (before the pandemic) and following the introduction of online education (during the pandemic). Interviews with parent's of students are also primary data. Interview instruments were sent online to participating students, then forwarded to their respective parent's.

The results of the interviews were then recorded by students and sent back online by students to researchers. This is done to comply with social restrictions from the government in order to comply with health protocols. Interviews with parents of students aimed to obtain information from the responses to the use of online learning that was put in place. Participants in this study participants in this quantitative study were 116 students, and qualitative data participants were 5 parent's of students and 5 students. Data reduction was used in the analysis of the data to find the main points. The process of selecting, simplifying, abstracting, and transforming rough data from field notes was defined as data reduction. Activities to reduce data are still underway, particularly when working on a qualitative project or when gathering data. There was a stage of data reduction during data collection that included summarization, coding, theme tracking, clustering, partitioning, and authoring memos [21].

The process of drawing conclusions is an important part of research activities because it is the conclusion of the research. This process of drawing conclusions intends to analyze and seek meaning from the existing data so that it can be found in the research that has been done. Conclusions that were initially unclear will increase to become more detailed [22]. "Final" Depending on the number of field notes collected, conclusions will arise, the methods employed for coding, storage, and retrieval, the researcher's skill, and the funder's demands, but these conclusions are frequently erroneous formulated in advance [23].

3. Result and Discussion

In this study, the SPSS 26 application was used to analyze the data obtained [24]. Before displaying the results, it is necessary to hold a multivariate assumption test because the resulting data is multivariate data. The first assumption is the normality test [25]. The Figure 1 illustrates the normality test.

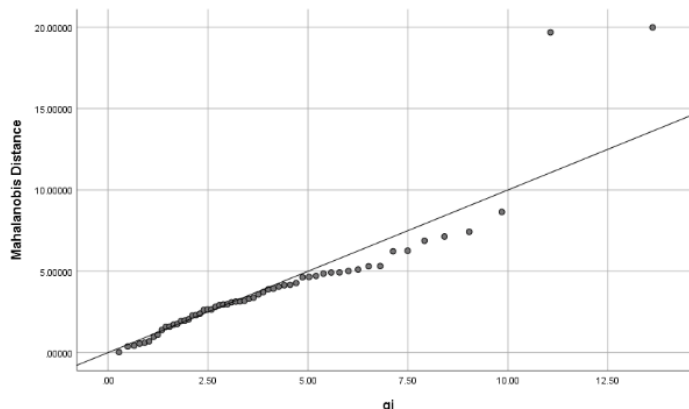


Figure 1. The distance of Mahalanobis

From the scatter plot Figure 1, it can be seen that the relationship is linear because the points collect along a straight line, so it can be said that the expected data is multivariate [26]. Besides that, it can also be seen from the correlation between the distance of Mahalanobis and qi, as shown by Table 1.

Table 1. Correlation between Mahalanobis distance and qi

Correlations		Mahalanobis Distance	qi
Mahalanobis Distance	Pearson Correlation	1	.850**
	Sig. (2-tailed)		.000
	N	58	58
qi	Pearson Correlation	.850**	1
	Sig. (2-tailed)	.000	
	N	58	58

** . Correlation is significant at the 0.01 level (2-tailed).

From Table 1, the correlation coefficient value of 0.850 shows a very high correlation, and the sig value is less than 0.05, so the data is usually distributed multivariate [26]. And then, the homogeneity test of the variance and covariance matrices as shown in the Table 2.

Table 2. Test box'M

Box's Test of Equality of Covariance Matrices ^a	
Box's M	15.052
F	1.389
df1	10
df2	14992.829
Sig.	.178

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.
a. Design: Intercept + Waktu

From Table 2, the outcomes of the sig value of 0.178 can be concluded that there is homogeneity because the value exceeds the value of 5% or 0.05 [26]. Then only the Manova test was carried out. In this test, what will be seen are the Pillai's Trace, Wilks' Lambda, Hotteling's Trace, and Roy's Largest Root tests. The analysis's findings are shown in the Table 3.

Table 3. Multivariate Test

Multivariate Tests							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	1.000	31510.047 ^b	4.000	53.000	.000	1.000
	Wilks' Lambda	.000	31510.047 ^b	4.000	53.000	.000	1.000
	Hotelling's Trace	2378.117	31510.047 ^b	4.000	53.000	.000	1.000
	Roy's Largest Root	2378.117	31510.047 ^b	4.000	53.000	.000	1.000
Waktu	Pillai's Trace	.347	7.034 ^b	4.000	53.000	.000	.347
	Wilks' Lambda	.653	7.034 ^b	4.000	53.000	.000	.347
	Hotelling's Trace	.531	7.034 ^b	4.000	53.000	.000	.347
	Roy's Largest Root	.531	7.034 ^b	4.000	53.000	.000	.347
a. Design: Intercept + Waktu							
b. Exact statistic							

From Table 3, it can be seen, the sig value of Pillai's Trace, Wilks' Lambda, Hotteling's Trace, and Roy's Largest Root is 0.000 this means it is smaller than 0.05 [26], so it can be concluded that the value of Physics before the pandemic and after the pandemic there is a significant difference or impact. And judging by the average value after the pandemic or during online mode, it is higher than the value face-to-face. The mean result before pandemic is 80,04 and after pandemic 82,11. To find out the impact in-depth, interviews were conducted with 5 parents and 5 students.

The interview stage carried out by the author is to ask the same questions to different sources, then confirm the answers with the sons/daughters of the informants. The following are questions asked by the author to sources:

What is the opinion of the parents about the online learning that has been done?

Were there any difficulties during online learning, and what efforts were made by the parents to solve these difficulties?

Based on these two questions, the writer got various kinds of responses. The first response whose daughter had the initials MA said,

"During this online learning, sir. I had a lot of difficulties accompanying my child because the time to accompany him was limited. I have to go to work immediately, while his father is out of town for work and the time for returning home cannot be determined. So... when my child MA does his homework for too long, I immediately tell him the answer or part of the task I just do it, so that it can be finished quickly".

From the explanation of the parents of the MA students, the authors received information that the parents of the MA students had difficulty in time for mentoring because they had to work immediately while their father was out of town. This resulted of the student with the initial MA taking the initiative to directly help his daughter instantly, namely by telling the answer or doing the student's task, which should be the responsibility of his daughter. Then, when further confirmation was made to MA students, MA students explained,

"Yes, I'm sorry, sir, MA, if you don't want to work, you like to be lazy to finish. So, Mother often helps. She said to get it over with quickly. Besides, Mother is also often in a hurry when teaching me."

From the explanations of MA students, the author can understand that MA students have moods that often change. The state of the heart that likes to change makes MA students have low enthusiasm for learning. This is supported by the environmental conditions that forced him to finish his task quickly.

Based on the interview results from the MA parent's, it was added with a second interview from the MNP Parent's, in which the author found out in class that the MNP students had an attitude that paid less attention to the discipline of collecting assignments. However, when the online learning took place, the MNP parent said,

"MNP really likes online learning because it is easier and more comfortable. MNP said that there would be a lot of help from his mother or sister when he couldn't or was lazy to do the work."

When the author communicated directly with MNP students who were known to have high self-confidence and ego in class, at first, he did not want to justify his mother's explanation when the author asked whether the assignments he collected were his own results or help from his parents or others. However, after a reasonably relaxed discussion with the student, the student finally told him that what his mother had reported was true.

Slightly different from the results of the third interview with MU's Parent's, who said that their daughters were only assisted in doing practical assignments or projects related to skills. This is done because when doing practical tasks or projects, MU's son takes longer if he has to do it himself, while practical assignments or projects are usually given towards the weekend. Contrary to that, his family had to visit his parents' house outside the city. So, according to MU's Parent's, the completion of practical assignments and projects must be completed immediately. When MU students were asked through communication, MU students immediately told the truth from their mother's story.

Furthermore, the fourth interview came from NK's guardian, who told me that his daughter was very reluctant when doing online learning because it was boring not being able to meet her friends and teachers at school in person. As a result, when NK students sometimes feel bored, their parents or siblings often help themselves by completing every task that must be completed at that time. The explanation from NK's guardian was immediately confirmed by NK's own students when communicating what's up with the author. Based on the last interview, there was a parent from RGA who said that the tasks that were difficult for his son to do were often done directly by the father or himself. This is due to the rotating use of cell phones between RGA students and their younger siblings who also attend the same school. This condition is also influenced by fathers who work outside the city and mothers who have to immediately trade using cellphones used by students so that RGA students and their younger siblings must complete their assignments faster. The RGA students did not dodge the explanation from their mother when they communicated directly with the author.

Based on interviews with the parents and students as well as the authors' own findings when conducting evaluations, in general, it was found that the cause of student learning outcomes that experienced an increase during online learning when compared to face-to-face instruction, that there was excessive parental participation in completing each student's task at home. This is influenced by a variety of factors, including parental involvement, student participation, and limited facilities and infrastructure. Factors from parents, for example, parents are less patient and painstaking in helping students go through every step of the process that must be passed by students, parents also have a busy schedule outside the home so that when accompanying their son/daughter at home is also limited. This causes parents to rush when attending to their son/daughter to study at home, so parents think that if

they help directly by giving the answer, it will make it easier for themselves and their son/daughter at that time.

Then another factor is the students themselves. It can be in the form of changes in interest that quickly change from those who are interested, suddenly lazy to do or indeed the student feels lazy to complete every task given by the teacher. The guardian of the student who is not patient with the attitude of his son/daughter will immediately take over his duties so that his son/daughter is recorded as having completed the task and getting the best results. Then, the last factor is the availability of facilities and infrastructure for the parents and students concerned at home, such as cellphones, laptops, and quotas, as well as a smooth internet network. Facilities and infrastructure during online learning will also determine student success, including the emotions of the parents when accompanying their son/daughter to study at home.

4. Conclusion

According to the findings of this study, there is a significant impact or difference between the results of learning Physics before and after the pandemic. This can be seen from the effects of Pillai's trace, Wilks lambda, Hotelling's trace, and Roy's most enormous root test results stating that the significance value at 0.000 is smaller than 0.05. It can also be seen from the average before the pandemic, 80.04 and after the pandemic, 82.11. This is caused by several factors, ranging from the duration of time required for students to complete assignments, facilities, and infrastructure such as cellphones that must be used alternately to the enthusiasm of students who go up and down when doing online learning, the needs, and conditions of each student is different. This encourages parents to keep trying for their children so that they can continue to follow the tasks assigned by the school. Parents' efforts that are too easy or provide assistance to students in completing assignments have a negative impact on student development in the future. As for the negative consequences found by the author, students will be more dependent on other people or their parents in every completion of their assignments, students will ignore their assignments if there is no assistance, and students will be less confident in each completion of their tasks.

Acknowledgement

This research is fully supported by SMA Negeri 4 Purworejo and Yogyakarta State University

References

- [1] Y. C. Wu, C. S. Chen, and Y. J. Chan, "An summary of the COVID-19 epidemic," *Journal of the Chinese Medical Association*, vol. 83, no. 3. pp. 217–220, 2020, doi: 10.1097/JCMA.0000000000000270.
- [2] Z. Miftah and I. P. Sari, "analysis of online learning systems using the sus method," *Res. Dev. J. Educ.*, vol. 1, no. 1, p. 40, 2020, doi: 10.30998/rdje.v1i1.7076.
- [3] E. Chung, G. Subramaniam, and L. C. Dass, "In the midst of Covid-19, university students in Malaysia are prepared to engage in online learning.," *Asian J. Univ. Educ.*, vol. 16, no. 2, pp. 45–58, 2020, doi: 10.24191/AJUE.V16I2.10294.
- [4] M. Lutfi, P. C. D. Buntuang, Y. Kornelius, Erdiyansyah, and B. Hasanuddin, "The influence of Indonesian small and medium-sized firms on social distancing policy (SMEs).," *Probl. Perspect. Manag.*, vol. 18, no. 3, pp. 492–503, 2020, doi: 10.21511/ppm.18(3).2020.40.

- [5] D. Aldila *et al.*, "A mathematical analysis of the transmission of COVID-19 in Jakarta, Indonesia, taking social distance and fast assessment into consideration.," *Chaos, Solitons and Fractals*, vol. 139, 2020, doi: 10.1016/j.chaos.2020.110042.
- [6] L. D. Herliandry, N. Nurhasanah, M. E. Suban, and H. Kuswanto, "Lessons Learned During the Covid-19 Pandemic," *JTP - J. Teknol. Pendidik.*, vol. 22, no. 1, pp. 65–70, 2020, doi: 10.21009/jtp.v22i1.15286.
- [7] J. W. Kusuma and H. Hamidah, "comparison of mathematics learning outcomes with the use of the whatsapp group and webinar zoom platforms in distance learning during the covid 19 pandemic," *JIPMat*, vol. 5, no. 1, 2020, doi: 10.26877/jipmat.v5i1.5942.
- [8] S. Hadi, D. Andrian, and B. Kartowagiran, "In Indonesia, a methodology for assessing vocational skills programs based on local content curriculum has been established.," *Eurasian J. Educ. Res.*, vol. 2019, no. 82, pp. 45–62, 2019, doi: 10.14689/ejer.2019.82.3.
- [9] F. Gunawan, Ni Made Yeni Suranti, "During the COVID-19 Pandemic, Different Models and Learning Platforms Were Used for Prospective Teachers," vol. 1, no. 2, pp. 75–94, 2020.
- [10] Nurhayati, L. Yuliati, and N. Mufti, "Physics Synthesis Problem Solving," *Jurnal Pendidik. Teor. Penelitian, dan Pengemb.*, vol. 1 Nomor 8, pp. 1594–1597, 2016.
- [11] S. Hamdi, B. Kartowagiran, and Haryanto, "Creating a testlet model for elementary school mathematics," *Int. J. Instr.*, vol. 11, no. 3, pp. 375–390, 2018, doi: 10.12973/iji.2018.11326a.
- [12] J. Siswanto, "The Effectiveness of STEM-Based Physics Education in Increasing Student Creativity," *J. Penelit. Pembelajaran Fis.*, vol. 9, no. 2, pp. 133–137, 2018, doi: 10.26877/jp2f.v9i2.3183.
- [13] M. Sa'diah, E. Mujahidin, and R. Hartono, "In the middle of the Covid-19 epidemic, the role of government in utilizing information technology to create innovation in student learning at Ibn Khaldun University," *Asian ESP J.*, vol. 16, no. 51, pp. 74–92, 2020.
- [14] J. L. Martín Ayala, S. Castaño Castaño, A. Hernández Santana, M. Martí González, and J. Brito Ballester, "The effect of learning in the twenty-first century on the academic outcomes of undergraduate psychology students," *Sustain.*, vol. 13, no. 16, pp. 1–17, 2021, doi: 10.3390/su13168735.
- [15] J. Gore, L. Fray, A. Miller, J. Harris, and W. Taggart, *The effect of COVID-19 on student learning in primary schools in New South Wales: an empirical study*, vol. 48, no. 4. 2021.
- [16] R. Khalil *et al.*, "A qualitative study of medical students' opinions on the rapid change to synchronized online learning in Saudi Arabia during the COVID-19 epidemic," *BMC Med. Educ.*, vol. 20, no. 1, pp. 1–10, 2020, doi: 10.1186/s12909-020-02208-z.
- [17] Y. Khurriyati, F. Setiawan, and L. Binti Mirnawati, "The impact of online learning on student learning outcomes," *Pendidik. Dasar*, vol. VIII, no. 1, pp. 91–104, 2021.
- [18] J. . Creswell, "Qualitative, quantitative, and mixed methods approaches," in *Research design*, London: Sage Publication Inc, 2013, pp. 1–26.
- [19] A. Onwuegbuzie and N. Leech, "Using Mixed Methods to Answer Research Questions Procedures for Data Analysis 1," *Qual. Rep.*, 2015, doi: 10.46743/2160-3715/2006.1663.
- [20] J. DiPasquale and W. Hunter, "Critical Thinking in Asynchronous Online Discussions: A Systematic Examination" *Can. J. Learn. Technol. / La Rev. Can. l'apprentissage la Technol.*, vol. 44, no. 2, 2018, doi: 10.21432/cjlt27782.
- [21] M. B. Miles and A. M. Huberman, *Qualitative Data Analysis Source Book About New Methods (Translation)*. 2007.

- [22] D. Elliott, S. Husbands, F. C. Hamdy, L. Holmberg, and J. L. Donovan, "Qualitative Research Methods for Understanding and Improving Recruitment to Randomized Controlled Trials," *European Urology*, vol. 72, no. 5. pp. 789–798, 2017, doi: 10.1016/j.eururo.2017.04.036.
- [23] C. Willig and M. Borcsa, "Conclusion: Reflections on Research Questions, Methods, and Knowledge in Mental Health Qualitative Research," in *Qualitative Research Methods in Mental Health*, 2021, pp. 251–261.
- [24] K. Dewi and I. Anisykurlillah, "The Effect of Fraud Pentagon Factors on Fraudulent Financial Statements, with the Audit Committee as a Moderating Variable," *Account. Anal. J.*, vol. 10, no. 1, pp. 39–46, 2021, doi: 10.15294/aa.v10i1.44520.
- [25] A. A. P. Antara and B. Bastari, "Vertical Equalization With Classical Approach And Item Response Theory For Elementary School Students," *J. Penelit. dan Eval. Pendidik.*, vol. 19, no. 1, pp. 13–24, 2015, doi: 10.21831/pep.v19i1.4551.
- [26] J. F. Hair Jr, R. E. Anderson, B. J. Babin, and W. C. Black, *multivariate-data-analysis-7th-edition.pdf*, 7th ed. Pearson Prentice Hall, 2015.