The Effectiveness of STEM Education Applied with a Distance Education Approach

https://doi.org/10.3991/ijet.v16i19.26061

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Abstract—In this research, information about Science, Technology, Engineering and Mathematics (STEM) and Distance education was given to prospective science teachers and the integration of STEM into courses was emphasized. On the other hand, an experimental study was conducted to support the research on STEM Education and distance education. The study group of this research consisted of 328 science teacher candidates studying in the 4th grade of university. Some of these students were randomly selected as the experimental group and the others as the control group. In the study carried out in the science laboratory course, while the course was taught according to STEM Education and Distance Education in the experimental group; In the control group, the lessons continued as normal. The application in question was carried out based on a quasi-experimental study. The study was implemented during the 2020-2021 fall semester. Before the application, the learning level test, which was valid and reliable, was applied regarding the subjects. As a result of the application, a significant difference was found between the students in the experimental group and the students in the control group in favor of the experimental group in which STEM Education and Distance Education were applied. In line with these results, STEM Education and Distance Education were found to be effective in improving the success of university teacher candidates, and it was added to the research results.

Keywords—STEM, Distance Education Integration, Success, Science Teacher Candidate

1 Introduction

1.1 Applying the styles to an existing paper

With the time of globalization in the world, economic, social, political and so on. It is seen that there are various changes and developments in the fields. These movements, which took place in the 21st century, naturally change the qualities expected from individuals; It is seen that the need for university students who think, produce, question and contribute to economic and social developments is increasing day by day [8].

The impact of informatics, technology, engineering, science and mathematics (STEM) on the economy and social life has drawn the attention of business and policy leaders and has given priority to increasing the skilled workforce in the fields of science and engineering [14].For this reason, European Union (EU) member countries such as England and the United States (USA) are making some changes in their education systems, and these changes are seen to show themselves in the understanding of education in other countries [7].

Science has an important place in the social, cultural and economic development and development of countries. In this sense, countries have aimed to raise individuals who are intertwined with information and technology in order not to stay out of current events, to follow scientific and technological events, and to ensure the continuity of their developments in many fields [2].In recent years, it has been seen that the Vision II approach, which moves away from the Vision I approach, which advocates teaching only the concepts of physics, chemistry and biology, in science education, and emphasizes that factors such as society and environment should be taken into account in addition to physical chemistry and biology, has gained importance. He defines science literacy, which is the primary goal of the Vision II approach, as knowing the subject areas of science, mathematics and technology and using this scientific information in daily life [16].

This concept, the importance of which is frequently emphasized in the literature in European countries and Kazakhstan, aims to take science out of the laboratory boundaries and include it in daily life, to give individuals the ability to understand the science concepts spoken in daily life, and to interpret the effects of developments on social life in a multidimensional way. In this respect, it is seen that Science is important for the education of the individuals in question, and science education aims to educate science literate individuals who know nature, create scientific and creative intelligences and criticize them, can look at problems from different angles, in short, have 21st century skills and scientific process skills. [10].

21st century skills; solving problems rationally, researching, questioning, collaborating, criticizing, analyzing and synthesizing, accessing information, adapting to changes, making decisions, producing, being responsible, curious, being in social and cultural interaction, having leadership qualities, entrepreneurship is expressed as. Looking at the curricula, it is seen that while science and mathematics are taught as separate disciplines at the primary level, although technology is sometimes used, the engineering field is mostly not taught or is rarely taught [9].

It is seen that the STEM movement started to become popular with the thought that engineering would provide an environment for application to the theoretical knowledge acquired after mathematics, science and technology education, science teachers, education became a favorite term by different countries and discussed, and other fields, engineering, was taught in schools [4]. Looking at the developments in recent years, the abbreviation STEM has taken a large place in the education and policy studies of many countries, especially the USA. According to the US Department of Education, 75% of the fastest growing occupations require significant science or mathematics education. In this sense, it is necessary for students to have solid STEM knowledge to be ready for university and to be employed [12].

It is seen that STEM education is defined as an integrated approach that aims at 21st century skills rather than learning and applying different disciplines by separating them from each other, providing the development of scientific process skills, and adopting up-to-date learning and teaching activities [3]. An integrated curriculum brings together practices and processes from different disciplines, the term STEM encompasses four basic disciplines (science, science-technology, engineering and mathematics). When the studies are taken into consideration, it is seen that STEM is not only addressed to science, technology, engineering and mathematics disciplines, but also is in an educational approach that includes many different disciplines [11].

In addition to the aforementioned fields (science, technology, engineering and mathematics), the STEM approach is seen to have a broad qualification in fields that can form the basis for other disciplines such as environment, economy and medicine [1]. STEM education, together with distance education, allows students to find solutions to problems by applying the theoretical knowledge they receive. students seem to be preparing for the global economy of the 21st century [17].

In this context, it is seen that while STEM education has a different meaning for teacher candidates in their own fields, it also prepares them for their future environments.

1.2 Related Studies

Bozkurt et al. (2019) aimed to determine the current trends in STEM education and to discover and determine the research trends and patterns in the articles published on STEM education between 2014-2016 with a systematic review study. The results show that interest in STEM education in academic settings has witnessed a marked increase since 2014, with a preference for mixed and practice-based research methods. In this context, it can be said that stem education is important for the research from 2014 to this time period. [6].

In the study of Acar et al. (2018), they aimed to use a systematic review and meta-analysis as a method to investigate whether STEM practice in Asia effectively improves students' learning outcomes. [1]. As a result, they found that the effectiveness of STEM animation starts from students' high-level thinking skills and passes to students' academic learning success and ends with motivation.

It is seen that the studies in the related research section are included in the literature so that students can benefit throughout their education life. In this context, this study is expected to benefit 328 science teacher candidates.

1.2 Problem Statement of the Research

In this study, information about STEM and distance education was given to prospective science teachers and the integration of STEM into lessons was emphasized.
The sub-objectives determined to achieve the general purpose are as follows:

1. What is the internet usage status of the experimental and control group students during the day?
2. Is there a difference in the opinions of the students in the experimental and control groups about the distance education used?
3. Is there a difference in the opinions of the experimental and control group students about the Stem application used?
4. Is there a significant difference between the post-test achievement scores of the pre-service teachers in the Experimental and Control groups?

2 Method

2.1 Research Model

This research aims to develop the knowledge of prospective science teachers about STEM and distance education, to form the concepts of stem and distance education, for what purpose stem and distance education should be used, to improve the environment and to teach prospective teachers about stem and distance education and technology values. . The research is an experimental study and was designed according to a two-group pre-test and post-test research model. In addition, the research is a quantitative study and information about STEM and distance education was given to pre-service science teachers and it was designed according to the analysis of their views on the integration of STEM into lessons.

2.2 Participant

The research was conducted in the fall academic year of 2020-2021. The data of the research randomly consists of 4th grade science teachers who continue their education at universities in Kazakhstan. In addition, 328 science teacher candidates participated in the research.

Gender. As seen in Table 1, it is seen that 51.89% (170 people) of the study group science teacher candidates are male and 48.11% (158 people) are female, science teacher candidates. In the gender section, the findings reflect the actual gender distribution.

Table 1. Distribution of Science Teacher Candidates by Gender

Gender	**F**	**%**
Male	170	51.89
Female	158	48.11
Total	**328**	**100**

Working Group. The study group of the research consists of 4th grade science teacher candidates who continue their education at universities in Kazakhstan. 165 people constitute the experimental group and 163 people constitute the control group.

2.3 Data collection tool

A draft questionnaire was created by creating an item pool in order to create an opinion questionnaire about the stem and distance education system for prospective science teachers. The data collection tool was designed by taking half from experts in the field. For the scope and reliability of the data collection tool, it was arranged with the help of 9 professors who are experts in the fields of stem and distance education at universities. The data collection tools used in the research are listed below:

1. Personal Information Form (Demographic Data): In the personal information form; Information such as age, gender, group information, internet use status, how many hours a day they use the internet are included.
2. Stem and Distance Education Data Collection Tool:

A 5-point Likert-type questionnaire was prepared in order to receive stem and distance education opinions. The questionnaire consists of 20 positive statements about Stem and Distance Education. In positive statements, 1-point expresses “Strongly Disagree” and 5 points “Strongly Agree”. The validity and reliability scope of the questionnaire was arranged by taking expert opinions.

2.4 Application

Sectional live trainings were arranged for 328 science teacher candidates continuing their education in Kazakhstan, and only the experimental group students were given stem and distance education training. The students in the other control group continue their education with online education. It includes topics on online education, methods used in stem and distance education to prospective science teachers in the experimental group within the 5-week training. After the 4-week training, the measurement tool was applied to the pre-service science teachers and the data were given in tables in the findings section. The training is arranged in a way that each section is limited to 40 people through the google meet program, which is preferred by most universities, and each training is covered in 50 minutes, 40 minutes of the time frame consists of training and 10 minutes of question and answer. In the case of distance education, pre-service science teachers were expected to attend the lesson with an image and microphone from

their phones, tablets and computers. In addition, the measurement tool applied to the teacher candidates was taken by means of the Google form.

2.5 Analysis of Data

The data obtained in the research were analyzed using appropriate statistical techniques in line with the opinions of statistics experts, then tables were created and explained and interpreted. All analyzes were performed using the SPSS 23 package program. The data obtained as a result of the research were analyzed using the SPSS 16 program. Data are given as percentage (%), mean (*M*), frequency (F), standard deviation (SD). Statistical data were explained and interpreted by creating charts. In the analysis of the collected data, t-test for unrelated samples (One-sample t-test) was used.

2.6 Limits Used in Data Analysis

The values generated in the analysis of the data are given in Table 2.

Table 2. Limitations

Weight	Limits	Option
1	1.00 - 1.80	Strongly Disagree
2	1.81 - 2.60	Disagree
3	2.61 - 3.40	I'm undecided
4	3.41 - 4.20	Agree
5	4.21 - 5.00	Strongly Agree

Among the values above, the values in the findings section were interpreted and shared in the findings section in tables.

3 Results

3.1 Internet Usage Status of Experimental and Control Group Students During the Day

You may mention here granted financial support or acknowledge the help you got from others during your research work. Simply delete this section if it doesn't apply. As seen in Table 3, 0.60% (2 people) of the study group teacher candidates use the internet for 2-4 hours during the day, 3.36% (11 people) 4-6 hours, 25.92% (85 people) 6-8 Hours and 70.12% (230 people) are pre-service teachers who use the internet for 8 or more hours a day. From this table, it can be said that the internet usage of the students is high, and the internet is necessary for education, addressing the pandemic conditions. The findings in the Internet Usage Periods during the Day section reflect the actual usage distribution.

Table 3. Distribution of Teacher Candidates Participating in the Study during the Day

Internet Usage During the Day	***f***	**%**
2-4 time	2	0.60
4-6 time	11	3.36
6-8 time	85	25.92
8 and Above	230	70.12
Total	**328**	**100.0**

3.2 Results of Experimental and Control Group Students' Opinions on Distance Education Used

When Table 4 is examined, it is seen that the test results of the pre-service teachers included in the experimental group after the study were higher than the students in the control group and there was a significant difference ($p<0.005$).

Table 4. Results of Experimental and Control Group Students' Opinions on Distance Education Used

No	**Opinions on Distance Education**	**Experiment Group**		**Control Group**				
		M	***SS***	***M***	***SS***	***df***	***t***	***p***
1	It is easy to open an account via Distance Education	4.60	0,68	3,58	0,99	328	-3.888	.000
2	It is easy to access classes via Distance Education	4.41	0,66	3,20	0,88	328	-3.962	.000
3	It is easy to access course materials through distance education.	4.44	0,68	3,50	0,86	328	-4.730	.000
4	Courses on distance education are easy to use on mobile devices.	4.45	0,58	3,53	0,91	328	-4.721	.000
5	Lessons taught using distance education become more effective in cooperative learning	4.48	0,66	3,60	0,82	328	-3.988	.000
6	Events can be created easily via distance education	4.59	0,59	3,50	0,72	328	-6.784	.000
7	It is very easy to share what I have learned through distance education.	4.47	0,63	3,67	0,82	328	-3.384	.001
8	The online exam environment made through distance education is very easy.	4,65	0,49	3,62	0,92	328	5.998	.000
9	I had no difficulty in following the course through distance education.	4,52	0,59	3,59	0,90	328	-5.703	.000
10	Distance education design is simple and convenient	4,51	0,50	3,50	0,92	328	-6.540	.000
	Overall Average	4,51	0,61	3,53	0,87	328	-6383	.000

Although there is a significant difference in all statements, according to the final evaluation results, one of the most prominent expressions of the pre-service teachers in the experimental group is "The online exam environment made through distance education is very easy", while the average score of M=4.65 is M=3.62 in the control group. In addition, one of the most prominent expressions of the students in the experimental group, "It is easy to open an account through Distance Education" M = 4.60, while the final test result in the control group was M = 3.58. According to the findings of Table

4, it can be said that the experimental group teacher candidates did not experience any difficulties in the training they received with distance education and that the teacher candidates adopted this environment.

3.3 Results of Experimental and Control Group Students' Opinions on the Stem Application Used

When Table 5 is examined, it is seen that the post-test results of the pre-service teachers included in the experimental group after the study were higher than the pre-service teachers found in the control group, and there was a significant difference. ($p<0.005$)

Table 5. Results of Experimental and Control Group Students' Opinions on the Stem Application Used

No	Student Opinions about Stem Application	Experiment Group		Control Group				
		M	***S***	***M***	***S***	***df***	***T***	***p***
1	Online courses run with Stem are more effective	4.48	0.58	3.62	0.89	328	-4.843	.000
2	Taking lessons with Stem provides the opportunity to devote more time to my social life.	4.42	0.65	3.52	0.79	328	-5.482	.000
3	Instant correspondence and asking questions with the teacher who teaches the lesson with Stem is a very effective method.	4.60	0.60	3.72	0.80	328	-3.885	.000
4	Accessing the recording of the lesson taught with Stem is more effective in reinforcing the lesson.	4.52	0.64	3.69	0.79	328	-4.393	.000
5	It is an advantage for me to be able to learn information whenever and wherever I want with the Stem application.	4.42	0.58	3.59	0.99	328	-4.007	.000
6	In the Stem environment, the information is simpler and more understandable while the course is being taught.	4.42	0.63	3.52	0.88	328	-5.670	.000
7	I have the opportunity to learn how information technologies are used by taking courses in the Stem environment.	4.20	0.65	3.69	0.86	328	-4.285	.000
8	Discussion with my friends gives me pleasure while taking lessons in Stem environment.	4.38	0.70	3.62	0.90	328	-3.823	.000
9	I can watch the course video recordings in the Stem environment when they are uploaded.	4.38	0.63	3.84	0.70	328	-3.714	.000
10	I can download the contents of the course taught in the Stem environment whenever I want from the system.	4.42	0.77	3.74	0.82	328	-3.650	.000
	Overall Average	4.42	0.64	3.66	0.84	328	-6.090	.000

Although there was a significant difference in all statements, according to the post-test results, one of the most prominent statements of the students in the experimental group was “Instant correspondence with the teacher who teaches the lesson with Stem and asking questions is a very effective method”, while the mean score of M=4.60, the post-test result in the control group was M=3.72. is seen. In addition, one of the most prominent expressions of the students in the experimental group, "Reaching the record

of the lesson taught with Stem is more effective in reinforcing the lesson" was M=4.52, while the final evaluation result in the control group was M=3.69. With the findings obtained, it can be said that the environment created by integrating the education that the experimental group students received with the stem application environment into distance education is effective and the communication established with the stem application and providing feedback to other teacher candidates are quite effective.

3.4 Comparison Results of Success Scores of Experimental and Control Group Teacher Candidates

When Table 6 is examined, a significant difference was found in the laboratory-oriented post-test achievement levels of the experimental group and the control group, in which the current program was applied, for the education applied to prospective science teachers. The post-test achievement scores of the pre-service teachers who participated in the application were determined as (M = (79.12, SD=13.32) for the experimental group and as (M=60.48, SD=3.29) for the control group. These findings were obtained in the post-test scores of the experimental group and control group. The test shows that there is a significant difference between the academic achievement scores in favor of the experimental group (t=38,030, p<0.05).In this context, it has been determined that the courses integrated on stem and distance education are much more effective in terms of academic success.

Table 6. Results of Comparison of Achievement Scores of Experimental and Control Group Teacher Candidates

	Group	N	M	SS	df	t	P	Description
Laboratory Lesson	Experimental group	165	79.12	13.32	328	38.030	.000	P<0.05
	Control Group	163	60.48	3.29				Difference Significant

4 Discussion

Uzunboylu and Tuncay (2009) aimed to reveal the differences in teachers' e-learning competencies in their study, and as a result, experienced teachers and inexperienced ones, those with limited internet access and those with unlimited internet access, those who need less training and those with more They concluded that there is an e-learning distinction among those who need training. When the results of the research are considered, it can be said that the research conducted from 2009 to this time period has improved a lot with the internet, not only the teachers but also the pre-service teachers are in need of it today. It is inevitable that it will become a tool that we have with us everywhere, and it is thought that the importance of internet, distance education and technology is understood once again. [15].

Bakioğlu and Çevik (2020) aimed to understand deeply the experiences of secondary school Science teachers about what happened in distance education during the COVID-19 pandemic process, and as a result, it was revealed that before the COVID-19 pandemic, Science teachers did not know what a pandemic was. The result of this research

is of great importance for the article because both the distance education averages and stem education scores of the students included in the research were high, and in this context, technology education is of serious importance for both teachers and teacher candidates. [5]. Nugent et al. (2015) found that developing and testing a factor model that contributes to science, technology, engineering and mathematics (STEM) learning and career orientation aims to examine the complex pathways and relationships between the social, motivational and instructional factors underlying these results. They concluded that the STEM interest of educators, peers, and family-affected youth predicted their STEM self-efficacy and career outcome expectations. [13].

When the researches made in the discussion environment are discussed, it can be said that the researches on distance education and stem are directly proportional to the results of the research and it will be beneficial for future teachers to know these technologies. In addition, although it is seen in the literature that such methods will always benefit education, it is seen that they are useful in this research. Finally, it is recommended that the research be conducted at another time in another place.

5 Conclusion

When the results of the research are considered, it is seen that firstly gender and the number of teacher candidates take place. In this context, gender and the number of pre-service teachers are important for the problem situation of the research. Among the results of the research, it was concluded that the pre-service science teachers consisted of 170 male and 158 female pre-service teachers, and it was seen that 165 people were in the experimental group and 163 people were in the control group. In the research, it was expected that information about distance education and stem education would be formed in the pre-service teachers, in this context, the use of the internet is among the necessary factors for this problem situation.

Another result of the research is that the experimental group and control group teacher candidates' views on distance education were examined and after the study, it was concluded that the test results of the teacher candidates included in the experimental group for distance education were higher than the students in the control group and there was a significant difference. While it is important for the research that the prospective teachers have positive views on distance education, it has been concluded that they find the online exam environment made through distance education very easy and understandable, and it is easy to open an account through distance education. With the findings, it was concluded that the experimental group teacher candidates did not experience any difficulties in the training they received with distance education and that the experimental group teacher candidates adopted this environment. It has been seen in the literature that the studies on stem are beneficial for teachers and candidates, and it has been understood that people in the field of science have adopted this education. In this context, when another result of the research is considered, it has been investigated whether there is a difference in the opinions of the experimental and control group students about the stem application used. It was concluded that there is a difference. When the application about the stem is discussed, the experimental group teacher

candidates stated that instant correspondence and asking questions with the teacher who teaches the lesson with the stem are a very effective method, and accessing the recording of the lesson taught with the stem is more effective in reinforcing the lesson. With the findings, it was concluded that the environment created by integrating the education that the experimental group students received with the stem application environment into distance education was effective and the communication established with the stem application and providing feedback to other teacher candidates were quite effective.

When the final result of the research is considered, the results of the comparison of the achievement scores of the experimental and control group pre-service teachers were investigated, and it was concluded that there was a significant difference in the laboratory-oriented post-test achievement levels of the experimental group and the control group, in which the current program was applied, for the education applied to the pre-service science teachers. These findings showed that there was a significant difference between the post-test academic achievement scores of the experimental group and the control group in favor of the experimental group, and in this context, the courses integrated on stem and distance education were much more effective in terms of academic success. In this context, when the results of the research are considered, it is important for Kazakhstan. It is also known that, thanks to the data obtained in the research, it contributed to 165 pre-service science teachers. It has been found that STEM Education and Distance Education are effective in improving the success of university teacher candidates.

6 References

[1] Acar, D., Tertemiz, N., & Taşdemir, A. (2018). The effects of STEM training on the academic achievement of 4th graders in science and mathematics and their views on STEM training. *International Electronic Journal of Elementary Education*, *10*(4), 505–513. https://doi.org/10.26822/iejee.2018438141

[2] Adedokun, O., Bessenbacher, A., Parker, L., Kirkham, L., & Burgess, W. (2013). Research skills and STEM undergraduate research students' aspirations for research careers: Mediating effects of research self-efficacy. *Journal of Research in Science Teaching*, *50*, 940–951. https://doi.org/10.1002/tea.21102

[3] Astuti, N. H., Rusilowati, A., & Subali, B. (2021). STEM-based learning analysis to improve students' problem solving abilities in science subject: A literature review. *Journal of Innovative Science Education*, *10*(1), 79-86. https://doi.org/10.15294/jise.v9i2.38505

[4] Ata-Aktürk, A., & Demircan, H. Ö. (2021). Supporting preschool children's STEM learning with parent-involved early engineering education. *Early Childhood Education Journal*, *49*(4), 607-621. https://doi.org/10.1007/s10643-020-01100-1

[5] Bakioğlu, B., & Çevik, M. (2020). COVID-19 Opinions of Science Teachers on Distance Education during the Pandemic Process. *Electronic Turkish Studies*, *15*(4). 109-129. https://dx.doi.org/10.7827/TurkishStudies.43502

[6] Bozkurt, A., Ucar, H., Durak, G., & Idin, S. (2019). The current state of the art in STEM research: A systematic review study. *Cypriot Journal of Educational Sciences*, *14*(3), 374–383. https://doi.org/10.18844/cjes.v14i3.3447

[7] da Costa, M. C. O., & Domingos, A. M. D. (2019). The role of leadership in a STEM teachers professional development programme. *New Trends and Issues Proceedings on Humanities and Social Sciences*, *6*(7), 1–11. https://doi.org/10.18844/prosoc.v6i7.4504

[8] Demir, M., & Demir, S. S. (2015). A comparison the factors affected on academic satisfaction of students between traditional learning and distance learning models. *International Journal of Innovative Research in Education*, *1*(1), 01–09. https://doi.org/10.18844/ijire.v1i1.117

[9] El-Deghaidy, H., & Mansour, N. (2015). Science teachers' perceptions of STEM education: Possibilities and challenges. *International Journal of Learning and Teaching*, *1*(1), 51-54. https://doi.org/10.18178/ijlt.1.1.51-54

[10] Jerki, A., & Han, C. G. K. (2020). Influence of teaching experience in knowledge, motivation and implementation of STEM teaching and learning. *Jurnal Pendidikan Sains Dan Matematik Malaysia*, *10*(2), 45-56. https://doi.org/10.37134/jpsmm.vol9.2.2019

[11] Long, N. T., Yen, N. T. H., & Van Hanh, N. (2020). The Role of Experiential Learning and Engineering Design Process in K-12 STEM Education. *International Journal of Education and Practice*, *8*(4), 720-732. https://doi.org/10.18488/journal.61.2020.84.720.732

[12] Nasri, N., Rahimi, N. M., Nasri, N. M., & Talib, M. A. A. (2021). A Comparison Study between Universal Design for Learning-Multiple Intelligence (UDL-MI) Oriented STEM Program and Traditional STEM Program for Inclusive Education. *Sustainability*, *13*(2), 554. https://doi.org/10.3390/su13020554

[13] Nugent, G., Barker, B., Welch, G., Grandgenett, N., Wu, C., & Nelson, C. (2015). A model of factors contributing to STEM learning and career orientation. *International Journal of Science Education*, *37*(7), 1067-1088. https://doi.org/10.1080/09500693.2015.1017863

[14] Smelova, E., Petrova, A., & Ludikova, L. (2016). Current opinions of Czech teachers about the inclusive form of education. *New Trends and Issues Proceedings on Humanities and Social Sciences*, *2*(5). https://doi.org/10.18844/prosoc.v2i5.1113 (Original work published January 12, 2017)

[15] Uzunboylu, H., & Tuncay, N. (2009). E-learning divides in North Cyprus. *Asia Pacific Education Review*, *10*(2), 281-290. https://doi.org/10.1007/s12564-009-9019-y

[16] Yang, D., & Baldwin, S. J. (2020). Using technology to support student learning in an integrated STEM learning environment. *International Journal of Technology in Education and Science*. https://doi.org/10.46328/ijtes.v4i1.22

[17] Yunzal Jr, A. N., & Casinillo, L. F. (2020). Effect of physics education technology (PhET) simulations: evidence from stem students' performance. *Journal of Education Research and Evaluation*, *4*(3), 221-226. https://doi.org/10.23887/jere.v4i3.27450

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Article submitted 2021-08-12. Resubmitted 2021-09-14. Final acceptance 2021-09-16. Final version published as submitted by the authors.