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# Training on Using PhET Virtual Media on Newton's Law of Gravity for Class X Students at Islamic Senior High School of Syaikh Abdurrahman Kotaraja, East Lombok

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**Abstract:** This training activity aims to improve the ability of class X students at Islamic Senior High School of Syaikh Abdurrahman Kotaraja, East Lombok in understanding physics concepts, especially on Newton's law of gravity. This activity is carried out through three stages, namely preparation, implementation, evaluation. The training activities on the use of PhET virtual media at Islamic Senior High School of Syaikh Abdurrahman Kotaraja have gone well. This is indicated by the enthusiasm of students in participating in the training indicating that there is motivation for better learning. In addition, the training participants wanted the training activities to be sustainable with different materials.

**Keywords:** Newton's Law of Gravity; PhET; Virtual Media

## Introduction

Information technology is currently used worldwide. Its application is not only used by certain groups, but all aspects can be felt by both teaching staff, students and the general public (Asmawi et al., 2019). This use is not limited to cities, but has also been implemented in rural areas (Suarja et al., 2016). The use of information technology to support learning activities in schools with an e-learning system is not implemented with an integrated online learning paradigm (Hartanto, 2018).

In the learning process, science must have competency standards that provide a variety of learning experiences to understand science concepts and processes. These process skills include observing skills, submitting hypotheses, using tools and materials properly and correctly by always considering work safety and security, asking questions, classifying and interpreting data, and communicating findings orally or in writing, as well as digging and sorting out factual information relevant for testing ideas or solving everyday problems (Arti, 2020; Herdianawati et al., 2013; Risnani, 2017).

Physics learning is developed through the ability to think analytically, inductively and deductively to solve problems related to natural events around (Armandita, 2017; Erlina et al., 2016). To obtain all of this, students need space to carry out activities related to the material, for this activity a science laboratory is needed.

The limitations of laboratory practicum tools owned by schools result in less effective learning that takes place in the classroom, because the availability of practicum tools can be used to improve students' understanding of concepts. With advances in technology and information, currently science laboratories can be developed into virtual laboratories or can be referred to as Virtual Labs (Suarja et al., 2016). Virtual Labs can be interpreted as a series of laboratory tools in the form of interactive multimedia-based computer software, which

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is operated by a computer and can simulate activities in the laboratory as if the user were in a real laboratory (Khaeruman et al., 2017; Maryuningsih et al., 2019). Potential virtual laboratory to provide significantly improved and more effective learning experiences (Kusumaningsih et al., 2014). The development of this virtual laboratory is expected to be able to solve learning problems experienced by students and overcome cost problems in procuring tools and materials used to carry out practical activities for underprivileged schools (Muzana et al., 2017).

One of the virtual laboratory media that can be used is PhET (Physics Education Technology (Wieman et al., 2008). PhET is an educational software that contains a simulation of a symptom or physical phenomenon in accordance with the development of learning technology (Perkins et al., 2006). PhET was developed by the University of Colorado in Boulder America (University of Colorado at Boulder) in order to provide a virtual laboratory-based physics teaching and learning simulation that makes it easier for teachers and students to use it for classroom learning (Wieman et al., 2010).

Based on this situation analysis, it is necessary to conduct wave material training using PhET virtual media for class X students at Islamic Senior High School of Syaikh Abdurrahman Kotaraja, making it easier for students to understand wave material that seems abstract.

## Method

This training is carried out through several stages, namely the preparation stage, the implementation stage, and the evaluation stage (Doyan et al., 2019; Susilawati et al., 2019). Several stages that will be passed in solving this problem in detail are shown in Figure 1.

The preparatory stage begins with surveys and interviews with students about the training to be carried out, then determines the time and place for the training. At this stage identification of the problems encountered in the physics learning process is carried out. The problem faced is the lack of effectiveness of learning that takes place in the classroom, due to the limited availability of practicum tools. One effort to solve this problem is to conduct training on the use of Virtual Phet media for class X students at Islamic Senior High School of Syaikh Abdurrahman Kotaraja, making it easier for students to understand physics material. As for this training, students are taught to conduct experiments on Newton's law of gravity material.

The next stage is the implementation process which is a follow-up to solving the problems experienced by students in the physics learning process, namely by carrying out direct training on how to conduct experiments using PhET virtual media. The last stage is the evaluation of training results which is carried out directly by assessing the implementation of the training in order to correct deficiencies so that further training activities are more perfect.

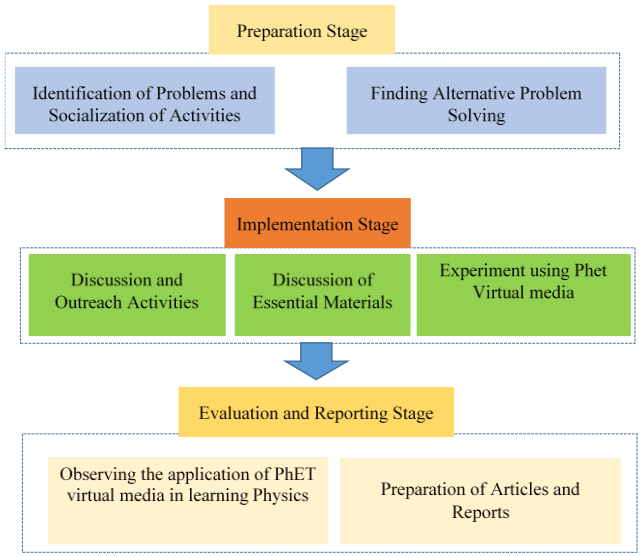


**Figure 1.** Chart of stages in community service

## Result and Discussion

Training activities on using the PhET virtual application were carried out at the Islamic Senior High School of Syaikh Abdurrahman Kotaraja. The training was attended by 16 students of class X. This activity was carried out in two meetings, namely on 8 and 15 February 2023.

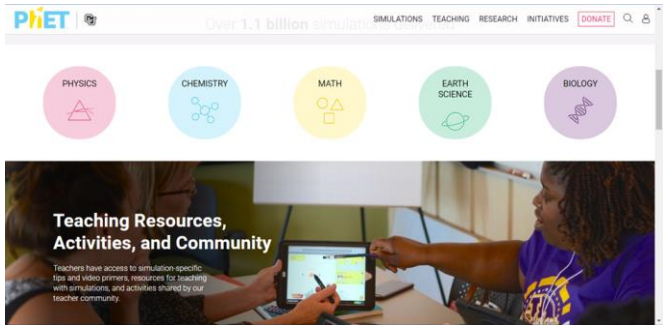


**Figure 2.** Initial display of PhET virtual media

The first meeting was held on February 8 2023. At the meeting students were given information regarding PhET virtual media, namely the functions and how to operate PhET. At this meeting, each student received assistance to operate PhET. Most students find it difficult to operate PhET. This is because students are not used to operating it, but students are very enthusiastic in learning. This is evidenced by the number of questions raised by students.

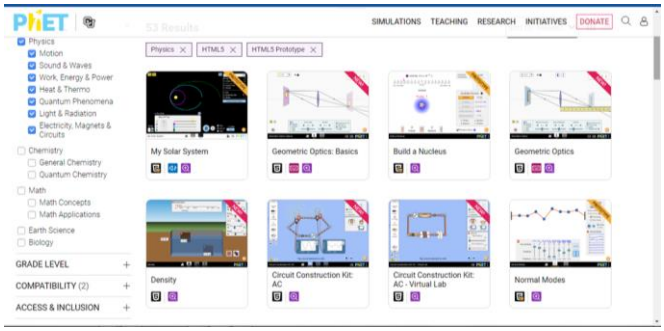


**Figure 3.** Initial appearance of the PhET virtual media for Physics material

The second meeting was held on February 15 2023. At the meeting students were divided into 4 groups to conduct an experiment using PhET virtual media. The material in the experiment is Newton's law of gravity. At the time of conducting the experiment the students looked very active at work. This is indicated by each student interacting with their group mates. The following is an image for an experiment on the law of gravity.

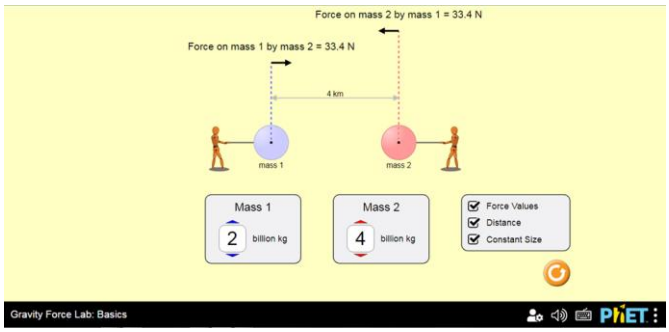


**Figure 4.** Newton's law of gravity experiment using PhET virtual media

**Figure 5.** Experimental activities on Newton's law of gravity using PhET virtual media by students

This assistance received a positive response from students, as evidenced by the enthusiasm of students in following it from start to finish. The enthusiasm of students in participating in the training indicates that there is motivation for better learning. The use of PhET virtual media will of course be able to foster students' motivation and interest in learning physics, especially physics material that has abstract concepts, so that the expected learning outcomes will be achieved. That's why teachers in this era are required to be creative and innovative, so as to produce students who are in accordance with educational goals.

## Conclusion

The training activities on the use of PhET virtual media at Islamic Senior High School of Syaikh Abdurrahman Kotaraja have gone well. This is indicated by the enthusiasm of students in participating in the training indicating that there is motivation for better learning. In addition, the training participants wanted the training activities to be sustainable with different materials.

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## References

Armandita, P. (2017). Analisis kemampuan berfikir kreatif pembelajaran Fisika di kelas XI MIA 3 SMA Negeri 11 Kota Jambi. *Jurnal Penelitian Ilmu Pendidikan*, *10*(2), 129–135. https://doi.org/10.21831/jpipfip.v10i2.17906

Arti, E. S. (2020). Keterampilan Proses Calon Guru Pada Pembelajaran Sains Anak Usia Dini. *Jurnal Wahana Pendidikan*, *7*(2), 135–138. https://doi.org/10.25157/wa.v7i2.3739

Asmawi, A., Syafei, S., & Yamin, M. (2019). Pendidikan Berbasis Teknologi Informasi dan Komunikasi. *Prosiding Seminar Nasional Program Pascasarjana Universitas PGRI Palembang*. Retrievied from https://rb.gy/63lmrt

Doyan, A., Susilawati, S., Bahri, S., Muhlis, M., & Artayasa, I. P. (2019). Pelatihan Pemantapan Konsep Materi Fisika dan Pengukuran Bagi Guru IPA di SMPN 9 Mataram. *Jurnal Pengabdian Magister Pendidikan IPA*, *2*(2), 24–27. https://doi.org/10.29303/jpmpi.v2i1.333

Erlina, N. S., & Wicaksono, I. (2016). Penalaran ilmiah dalam pembelajaran fisika. *Prosiding Seminar Nasional*, *23*, 473–480. Retrievied from https://www.bing.com/ck/a

Hartanto, D. (2018). Pemanfaatan ICT melalui implementasi e-learning berbasis integrasi keislaman dalam proses pembelajaran. *Eklektik: Jurnal Pendidikan Ekonomi Dan Kewirausahaan*, *1*(1),

53–71. https://doi.org/10.24014/ekl.v1i1.4804

Herdianawati, S., Fitrihidajati, H., & Purnomo, T. (2013). Pengembangan lembar kegiatan siswa (LKS) inkuiri berbasis berpikir kritis pada materi daur biogeokimia kelas x. *BioEdu, 2*(1), 99–102. Retrievied from https://www.bing.com/ck/a

Khaeruman, K., Darmatasyah, D., & Hulyadi, H. (2017). The Development Of Chemistry Virtual Laboratory On Colloidal System To Improve Generic Science Skills. *Hydrogen: Jurnal Kependidikan Kimia*, *5*(2), 84–93. Retrievied from https://www.bing.com/ck/a?!&&p=624

Kusumaningsih, Y. R., Iswahyudi, C., & Susanti, E. (2014). Pengembangan model laboratorium virtual sebagai solusi keterbatasan sumber daya pembelajaran. *Prosiding Seminar Nasional Aplikasi Sains & Teknologi (SNAST)*. Retrievied from https://www.bing.com/ck/a?!&&p=0eaf

Maryuningsih, Y., Manfaat, B., & Riandi, R. (2019). Penerapan Laboratorium Virtual Elektroforesis Gel Sebagai Pengganti Praktikum Riil. *Phenomenon : Jurnal Pendidikan MIPA*, *9*(1), 48–64. https://doi.org/10.21580/phen.2019.9.1.3320

Muzana, S. R., & Astuti, D. (2017). Penerapan Pembelajaran Berbasis Simulasi PhET untuk Meningkatkan Pemahaman Konsep Fisika Inti pada Siswa SMA. *Prosiding SEMDI-UNAYA (Seminar Nasional Multi Disiplin Ilmu UNAYA)*, *1*(1), 409–417. Retrievied from http://jurnal.abulyatama.ac.id/index.php/semdiunaya/article/view/224

Perkins, K., Adams, W., Dubson, M., Finkelstein, N., Reid, S., Wieman, C., & LeMaster, R. (2006). PhET: Interactive simulations for teaching and learning physics. *The Physics Teacher*, *44*(1), 18–23. https://doi.org/10.1119/1.2150754

Risnani, L. Y. (2017). Kemamapuan Calon Guru (Pre-Service Teacher) Biologi Merencanakan Pembelajaran Berbasis Keterampilan Proses Sains (Science Process Skills). *BIOEDUKASI (Jurnal Pendidikan Biologi*, *8*(2), 102–116. https://doi.org/10.24127/bioedukasi.v8i2.1067

Suarja, Z. A., & Aswadi, C. (2016). Penggunaan Laboratorium Virtual Biologi Sebagai Sarana Praktikum Yang Efektif dan Efisien Untuk Mencapai Pengalaman Belajar yang Menyenangkan. *Jurnal Bio-Natural*, *3*(2), 80–89. Retrievied from https://rb.gy/eiwqgn

Susilawati, S., Doyan, A., Taufik, M., & Zuhdi, M. (2019). Pengayaan Materi Olimpiade Fisika dan Pelatihan Penyelesaian Soal-Soal Olimpiade Fisika Bagi Guru dan Siswa di SMP Islam Terpadu Putra Mataram. *Jurnal Pengabdian Magister Pendidikan IPA*, *2*(2), 34–36. https://doi.org/10.29303/jpmpi.v2i1.334

Wieman, C. E., Adams, W. K., Loeblein, P., & Perkins, K. K. (2010). Teaching Physics Using PhET Simulations. *The Physics Teacher*, *48*(4), 225–227. https://doi.org/10.1119/1.3361987

Wieman, C. E., Adams, W. K., & Perkins, K. K. (2008). PhET: Simulations that enhance learning. *Science*, *322*(5902), 682–683. Retrievied from https://www.bing.com/ck/a?!&&p=2861