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Increasing Motivation to Study Physics Using PhET Media on Mechanical Energy Material

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Abstract: This service activity is a collaboration carried out with SMAN 5 Mataram. This activity aims to assist teachers in increasing student motivation in the physics learning process. This activity was carried out through three stages, namely preparation, implementation, and reflection. The result of this activity is to create a fun learning process for students, so that students are increasingly motivated to learn to actively explore and build their knowledge. Learning that is carried out is more student-centered.

Keywords: Energy; Learning Motivation; Media; PhET

Introduction

Natural Sciences is a branch of science that studies all aspects of all objects in nature, both inanimate and animate objects. Natural Sciences is built on the basis of scientific products, scientific processes and scientific attitudes. Humans begin to study science when they pay attention to natural phenomena around them, then record them and then study them. The word Natural means something related to nature, while science means knowledge (Rahayu et al., 2015).

Physics which is a part of science is a collection of knowledge, ways of thinking and investigation. The challenge in teaching physics is to create experiences that engage students to be active in the learning process and facilitate students to acquire skills. The skills in question are the ability to observe, ask questions, classify, design experiments, interpret data, communicate, and conclude. Hikmawati (2015) states that in the classroom, teachers should help students to discover concepts, principles or facts for themselves, instead of just giving lectures or controlling the whole class (teacher centered), so that students will be able to construct their own knowledge.

However, most of the schools indicated that the process of learning physics tends to be informative or only in the form of transferring information from teacher to student without involving activities to show why this information is important to learn. Teachers rarely involve students to be active in the learning process through experimental activities or discussions. This causes students not to feel the benefits of learning physics and causes students to be less enthusiastic in learning physics. Riyadi et al (2015) stated that in the learning process what often happens is students only know that physics is only a difficult subject and contains formulas and theories, without knowing how to apply it in everyday life.

The learning process which is a transfer of information is also still happening at SMA Negeri 5

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Mataram. This is based on the results of observations that researchers have conducted at SMA Negeri 5 Mataram. Based on the results of these observations it can be seen that in the learning process the teacher has tried to carry out the learning process which involves the active role of students in the learning process. However, it cannot be denied that the learning process is still not running optimally, or even difficult to implement. The learning process that takes place at SMA Negeri 5 Mataram is still teacher centered and limited to the transfer of information, especially on material in the form of theory and mathematical equations.

Learning will be carried out well when the teacher uses various models, methods, strategies, and learning media in the learning process. The simplest thing for teachers to implement is to use interactive learning media (Kii & Dewa, 2020). The application of interactive learning media really helps students in identifying facts that are very closely related to science whose impact will strengthen students' concepts of a study of learning material (Putria et al., 2019). In addition, interactive learning media can also increase students' interest and motivation in learning physics (Wiyoko et al., 2014).

Motivation is a desire that arises in oneself to do something. Someone who has a strong desire will usually work hard to achieve their goals. Extrinsic motivation is motivation that arises from outside but does not always have a relationship with learning activities. Forms of extrinsic motivation such as learning to fulfill obligations, avoid punishment, get prizes, increase prestige, get praise and learn for the demands of the desired position. Meanwhile, intrinsic motivation is learning motivation that arises purely from oneself to be able to solve a problem or achieve a goal. Motivation is considered important in learning and learning efforts in terms of its function and value or benefits (Primadona, 2018).

Visual aids or virtual media really support the implementation of the learning process (Rizaldi et al., 2020). Herayanti and Habibi (2015) state that with the help of animation media in the learning process students can understand more about the material they are studying, so students can improve their physics learning outcomes and critical thinking skills. One of the appropriate interactive media to overcome the problem of low student learning activity is PhET (Physics Education Technology) (Nurjannah et al., 2021).

PhET media is a visual media in the form of a virtual laboratory which students can access free of charge (Masfaratna, 2022). However, in its application in schools it is still very minimal on the grounds that the media in its application must use the internet network. This is the teacher's opinion, but in fact, one of the advantages of using PhET media is that it can be used offline by downloading it first (Arifin et al., 2022). Simulations in Phet are accurate, and provide good illustrations, which represent the principles of physics. Available simulations connect students' understanding of phenomena in the world with existing physics principles, for example about electric currents and electric fields (Finkelstein et al., 2006).

Based on a study of the problems at SMAN 5 Mataram, the community service team carried out community service in the form of applying PhEt media in learning to increase students' learning motivation.

Method

This activity is a service activity carried out at SMAN 5 Mataram. The target of this service is class X students, totaling 30 people. The purpose of carrying out this activity is to assist teachers in increasing student motivation in the physics learning process.

The stages that were passed in this activity started from the results of observing problems in learning physics at SMAN 5 Mataram. In general, the stages that have been carried out include the preparation stage, the implementation stage, and the reflection stage (Sadikin et al., 2020). The service implementation stage is presented in Figure 1.

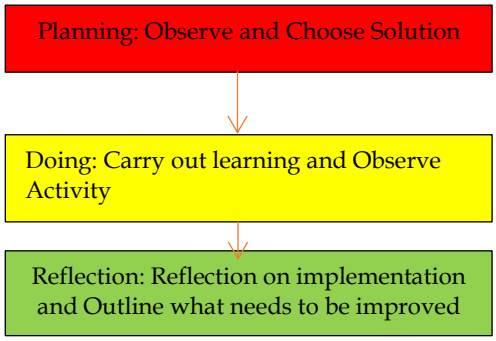

Figure 1. Stages of community service at SMAN 5 Mataram.

Preparation stage

The initial stage carried out in this service is to prepare everything needed to support the implementation of the activity. The step taken is observing the problem to be solved. Then, determine a solution to overcome the problem.

Implementation stage

The implementation of this service is in the form of real actions carried out to overcome the problems faced by teachers and students in learning. The implementation of this activity involves observers who directly observe the community service activities being carried out to assess the level of implementation of each stage in the implementation of community service.

Reflection Stage

Reflection is very important to do as material to find out in detail all the things that need to be improved so that the next activity is better.

Result and Discussion

This community service activity was carried out at SMAN 5 Mataram. The targets of this activity are physics teachers and class X students. The steps taken include the preparation, implementation, and reflection stages.

Preparation stage

The preparations made in the implementation of community service at SMAN 5 Mataram are the first step to assist partners in improving the quality of learning. The thing to do in the preparatory stage is to identify problems in learning physics, then determine the right solution to overcome these problems.

The results of the identification found were that the learning activities of students were low because students were less motivated in learning due to teacher centered learning. Teacher centered is learning that is dominated by the teacher, so that learning is only one way which makes students often feel bored in learning and has an unfavorable impact on learning outcomes (Hikmawati, 2015). Maximum learning outcomes are strongly supported by student activities (Ramli et al., 2019). To overcome this problem, a learning process was carried out using PhET media.

Implementation stage

The implementation of community service at SMAN 5 Mataram is in the form of applying PhET learning media. Utilization of PhET media in learning has a positive impact on the learning process that is carried out. This is in accordance with Ladarna (2021) which states that PhET simulations have a positive influence on student activity in the learning process. Learning activities at each stage can be seen in several pictures taken in the learning process.

Figure 2. Student Activities in Preliminary Activities.

Figure 2 shows the activities of students in the preliminary activities to build apperception and motivation. Students seemed more enthusiastic and focused on paying attention to the demonstrations displayed by the teacher. The demonstration presented is in the form of a video of the difference in the magnitude of the kinetic energy of an object moving in a curved path. This is done to generate student motivation and apperception to recall the subject matter about energy that was studied in junior high school.

Figure 3. Student Activities in Group Discussion Activities.

Figure 3 shows that students are more active in discussing with their group members. The things discussed are related to facts in everyday life which are the application of the Law of the Conservation of Energy. Learning with PhET media helps students to identify the relationship between the material being studied and the phenomena around them that have been experienced by students (Sari, 2020).

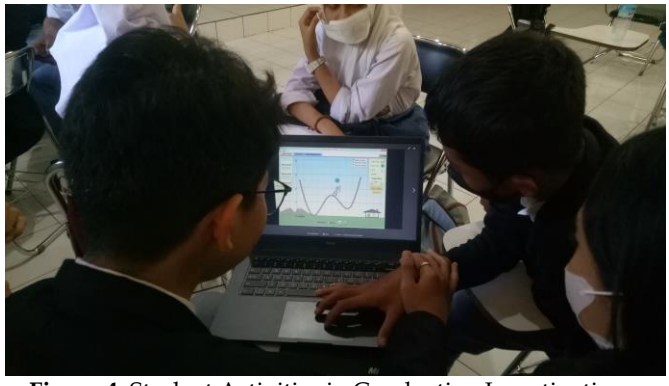

Figure 4. Student Activities in Conducting Investigations.

In Figure 4 it appears that students are given the opportunity and are active to carry out investigations using PhET media. PhET media facilitates students to carry out various experiments (Ula et al., 2021) by varying the shape of the track, the amount of mass, the amount of friction force, and the height.

Closing stage

At the closing stage of learning, students are able to communicate the findings in experiments using PhET. The use of PhET media has a positive impact on mastering concepts and motivating students to be more active in the learning process.

Conclusion

Based on the findings of the researchers that learning using PhET virtual media had a positive impact on the activity, enthusiasm, enthusiasm, and learning motivation of students at each stage. In the preliminary stage students become more motivated to carry out learning, in core activities students are more active in compiling their knowledge, and in closing activities students express their joy after learning is carried out, so that they feel more enthusiastic and motivated to learn physics. The reflection results show that the application of PhET media has a positive impact and increases students' learning activities on mechanical energy material.

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References

Arifin, M. M., Prastowo, S. B., & Harijanto, A. (2022). Efektivitas penggunaan simulasi phet dalam pembelajaran online terhadap hasil belajar siswa. *Jurnal Pembelajaran Fisika*, *11*(1), 16–27. https://doi.org/10.19184/jpf.v11i1.30612

Finkelstein, N., Adams, W., Keller, C., Perkins, K., & Wieman, C. (2006). High-Tech Tools for Teaching Physics: the Physics Education Technology Project. *MERLOT Journal of Online Learning and Teaching, 2*(3), 110-121. Retrievied from https://jolt.merlot.org/vol2no3/finkelstein.pdf

Herayanti, L., & Habibi. (2015). Model Pembelajaran Berbasis Masalah Berbantuan Simulasi Komputer untuk Meningkatkan Keterampilan Berpikir Kritis Calon Guru Fisika. *Jurnal Pendidikan Fisika dan Teknologi, 1*(1), 61-66. https://doi.org/10.29303/jpft.v1i1.236

Hikmawati. (2015). Pembelajaran Fisika dengan Model Siklus Belajar 5–E (Engage, Explore, Explain, Elaborate, Evaluate) sebagai upaya Meningkatkan Kecakapan Hidup Siswa. *Jurnal Pendidikan Fisika dan Teknologi, 1*(1), 24-37. https://doi.org/10.29303/jpft.v1i1.232

Kii, O. A., & Dewa, E. (2020). Simulasi Phet Sebagai Media Pembelajaran Berbasis Komputer Pada Model Pembelajaran Team Games Tournament Untuk Meningkatkan Aktivitas Dan Hasil Belajar Fisika Mahasiswa. *Jurnal Riset Teknologi Dan Inovasi Pendidikan (JARTIKA*, *3*(2), 360–367. Retrieved from http://journal.rekarta.co.id/index.php/jartika/article/view/364

Ladarna, M. (2021). *Pengembangan LKPD Berbasis Laboratorium Virtual Simulasi PhET pada materi Momentum dan Impuls untuk Tingkat SMA/MA*. Retrieved from https://repository.ar-raniry.ac.id/id/eprint/18520/

Masfaratna, M. (2022). Phet Simulation Media Hukum Pergeseran Wien Menggunakan Model Pembelajaran Inkuiri Tingkatkan Hasil Belajar Siswa. *Learning: Jurnal Inovasi Penelitian Pendidikan Dan Pembelajaran*, *2*(4), 362–372. https://doi.org/10.51878/learning.v2i4.1815

Nurjannah, E., Ayub, S., Doyan, A., & Sahidu, H. (2021). Pengembangan Perangkat Pembelajaran Model Inkuiri Terbimbing Berbantu Media PhET untuk Meningkatkan Kemampuan Pemecahan Masalah dan Keterampilan Generik Sains Fisika Peserta Didik. *Journal of Education, Science, Geology, and Geophysics (GeoScienceEdu*, *2*(1). https://doi.org/10.29303/goescienceedu.v2i1.127

Primadona, H. (2018). Perbandingan Motivasi Belajar Siswa Dengan Menggunakan Media Lectora Inspire Dan Powerpoint Pada Materi Momentum Dan Impuls kelas X SMAN 3 Muaro Jambi. *EduFisika: Jurnal Pendidikan Fisika, 3*(1), 43-54. https://doi.org/10.22437/edufisika.v3i01.3956

Putria, A. N., Serevina, V., & Budi, A. S. (2019). Lembar Kerja Elektronik Peserta Didik Dilengkapi Simulasi Phet Berbasis Inkuiri Terbimbing untuk Meningkatkan Penguasaan Konsep Fisika pada Siswa SMA. *Prosiding Seminar Nasional Fisika (E-Journal*, *8*, 2019–. https://doi.org/10.21009/03.SNF2019.01.PE.17

Rahayu, S., Mertha, I. G., & Hadi K. A. (2015). *Pengembangan Model Problem Based Learning (PBL) Berbasis Karakter dalam Pembelajaran IPA*. Yogyakarta: Yayasan Rumah Empu.

Ramli, R., Darvina, Y., & Sari, S. Y. (2019). Pengaruh inkuiri berbasis pictorial riddle berbantuan phet simulation untuk meningkatkan hasil belajar peserta didik kelas X SMAN 13 Padang pada materi momentum, impuls dan getaran harmonis sederhana. *Pillar Of Physics Education*, *12*(3). Retrieved from http://ejournal.unp.ac.id/students/index.php/pfis/article/view/6943

Riyadi, A., Gunawan, G., & Ardhuha, J. (2015). Pengaruh Penerapan Model Pembelajaran Kontekstual

Berbantuan Media flash terhadap Pemahaman Konsep Fisika Siswa. *Jurnal Pendidikan Fisika dan Teknologi, 1*(2), 87-91. https://doi.org/10.29303/jpft.v1i2.240

Rizaldi, D. R., Jufri, A. W., & Jamaluddin, J. (2020). PhET: Simulasi interaktif dalam proses pembelajaran fisika. *Jurnal Ilmiah Profesi Pendidikan*, *5*(1), 10–14. https://doi.org/10.29303/jipp.v5i1.103

Sadikin, I. S., Lestari, S., & Aini, S. (2020). Pembelajaran daring interaktif, bermakna dan menarik sebagai upaya optimalisasi proses pembelajaran masa pandemi covid-19. *Jurnal Pengabdian Pada Masyarakat*, *5*(4), 897–905. https://doi.org/10.30653/002.202054.647

Sari, B. W. G. (2020). *Penerapan Aplikasi PhET untuk Pembelajaran Materi Suhu dan Kalor Pengaruhnya pada Hasil Belajar Siswa di SMP Kelas VII*. Retrieved from https://repository.unej.ac.id/handle/123456789/103403

Ula, J., Ningsih, L. J., Zulkarnaini, Z., Mirdayanti, R., Muzana, S. R., Faisal, M. F. M., & Nurdin, A. (2021). Sosialisasi Penggunaan Phet Simulation Pada Materi Rangkaian Listrik Seri-Paralel di MTsS Pesantren Modern Al-Manar. *BAKTIMAS: Jurnal Pengabdian Pada Masyarakat*, *3*(4), 237–244. Retrievied from https://ojs.serambimekkah.ac.id/BAKTIMAS/article/view/3965

Wiyoko, T., Sarwanto, S., & Rahardjo, D. T. (2014). Pengembangan Media Pembelajaran Fisika Modul Elektronik Animasi Interaktif untuk Kelas XI SMA Ditinjau dari Motivasi Belajar Siswa. *Jurnal Pendidikan Fisika, 2*(2), 16-19. Retrieved from https://jurnal.fkip.uns.ac.id/index.php/pfisika/