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Training on the use of Phet and Pascal Applications to Enhance Critical Thinking Skills and Physics Learning Outcomes for Students of SMAN 1 Gunungsari, West Lombok

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Abstract: The training program is intended to provide SMAN 1 Gunungsari, West Lombok students the abilities they need to use the PhET and Pascal software efficiently. The main goals of the training are to provide students with the skills necessary to use and navigate these programs efficiently to improve physics learning results**.** Participants will learn how to use the PhET and Pascal software to conduct physics experiments, depict difficult ideas, and solve demanding issues through an organized training program and interactive sessions. The training will also emphasize helping students strengthen their critical thinking abilities as they investigate the connections between theoretical concepts and actual experiences. The program will include several practical exercises and demonstrations to ensure that students not only learn the theory but also have the practical skills necessary to use PhET and Pascal successfully. It is expected that these abilities would improve their physics learning process overall. After the training, students will be required to demonstrate improved PhET and Pascal skills, as well as their ability to independently study physics principles, conduct experiments, and use critical thinking to solve problems. As students utilize the potential of these strong tools for learning, this training program signifies an important milestone in empowering them to achieve success in their physics studies as well as afterwards.

Keywords: Critical thinking skills; Pascal applications; PhET Simulation; Physics experiments; Physics learning outcomes.

Introduction

Applying technology for enhanced learning experiences becomes increasingly significant as the educational landscape advances constantly (Nefrita, 2019; Agustina et al., 2017). This training obviously, established specifically for students at SMAN 1 Gunungsari in West Lombok, aims at achieving this necessity by giving participants the skills they need to effectively use Pascal and PhET, two powerful educational applications. The goal is to enable students to utilize these tools effectively, not only introduce them, to improve their grasp of physics principles and foster critical thinking abilities.

The connection of theoretical understanding and real-world application is where physics education encounters (Febrita and Ulfah, 2019). Students should not only comprehend difficult concepts, but also apply them to real-life situations (Roestiyah, 2001; Sinulingga et al., 2016). A special chance for narrowing the gap between theory and experience exists with the combination of Pascal's computational capabilities by PhET's renowned interactive simulations (Usiana et al., 2016; Wieman et al., 2008). Students can start on an explorational excursion via this training program after which they will learn to use these technologies as tools for learning and discovery (Stuckey and Fisher, 2013; Tennent, 1981)

Having faith that application in practice and hands-on experience are required for efficient learning is at the core of this instruction. We wish to improve students' comprehension of physics while also fostering their

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capacity for critical thought by immersing them in a lively and participatory atmosphere. The location for this program, SMAN 1 Gunungsari, West Lombok, was chosen because it exemplifies creativity and dedication to high-quality education.

This introductory material provides the foundation for a comprehensive training course that instills an attitude of inquiry and problem-solving in addition to technical abilities. The goals, approaches, and anticipated results of this training program will be described in the sections that follow, underlining its potential to change how students interact with physics education.

Method

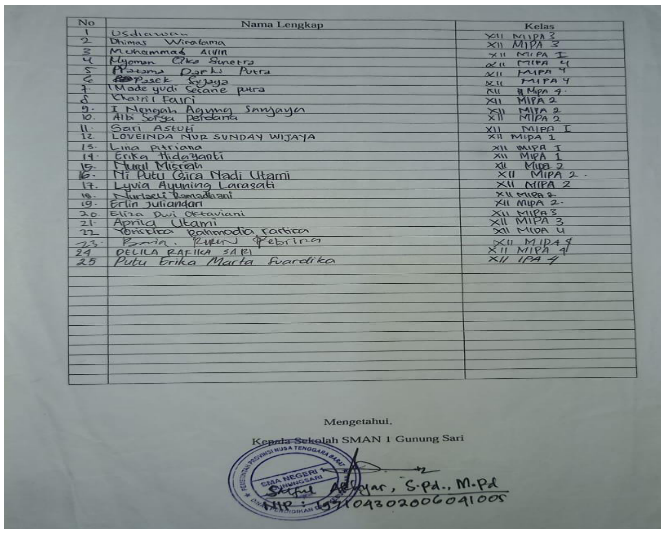
The participants in this training program will be students from SMAN 1 Gunungsari, West Lombok, selected based on their interest in physics and their willingness to engage actively in the training. A diverse group of students from various grade levels will be included to ensure a broad range of perspectives. Training Content consist of 3 stages namely, introduction to PhET and Pascal, hands-on practice, and assessment. In step 1, Introduction to PhET and Pascal, participants will begin with an overview of the PhET and Pascal applications, including their features, functionalities, and relevance to physics education. In step 2, Hands-On Practice, the students conduct practical exercises and interactive demonstrations as the core of the training. Participants will be guided through using PhET simulations to explore various physics concepts and Pascal for solving physics-related problems, and in last steps, is assessment. Regular assessments and quizzes will be conducted to gauge participants' progress and understanding of the training material.

Results and Discussion

At SMAN 1 Gunungsari, West Lombok, the school principal, vice-principal in curriculum, instructors, and students from classes X1, IPA1, IPA2, and IPA4 came together for a service project with a common goal: to enhance students' understanding and learning outcomes through the use of PhET and Pascal applications in physics education. The results of the program were promising, as test outcomes were consistent with previous scores and met the expected level of knowledge for high school students.

A total of 25 students participated in the physics instruction using PhET and Pascal programs, comes from class XII IPA1, XII IPA2, XII IPA 3 and XII IPA 4.

Figure 1. Lecturing Pascal and Phet to students and teachers.



No	Nama Lengkap	Kelas
1	Usdiawan	XII MIPA 3
2	Dhimas Wiratama	XII MIPA 3
3	Muhammad Alvin	XII MIPA I
4	Nyoman Eka Sunetra	XII MIPA 4
5	Pratama Darki Putra	XII MIPA 4
6	Pasek Sujaya	XII MIPA 4
7.	I Made yudi Sesane putra	XII MIPA 4.
8	Khairil Fauri	XII MIPA 2
9.	I Nengah Agung Sanjaya	XII MIPA 2
10.	Albi Surya perdana	XII MIPA 2
11.	Sari Astuti	XII MIPA I
12.	LOVEINDA NUR SUNDAY WIJAYA	XII MIPA 1
13.	Lina pitriana	XII MIPA I
14.	Erika Hidayanti	XII MIPA 1
15.	Nurul Misriah	XII MIPA 2
16.	Ni Putu Gira Nadi Utami	XII MIPA 2.
17.	Lyvia Ayuning Larasati	XII MIPA 2
18.	Nurlaeli Ramadhani	XII MIPA 2
19.	Erlin Juliandari	XII MIPA 2.
20.	Eliza Dwi Oktaviani	XII MIPA 3
21.	Aprila Utami	XII MIPA 3
22.	Yoriskika Rahmadia Kartika	XII MIPA 4
23.	Baiq Rizki Pebrina	XII MIPA 4
24	DELILA RAFIKA SARI	XII MIPA 4
25	Putu Erika Marta Suardika	XII IPA 4

Mengetahui,
Kepala Sekolah SMAN 1 Gunung Sari
S.Pd., M.Pd

Figure 2. The attendance list of SMAN 1 Gunugsari students for the Pascal and PHET training

The evaluation was based on their results, four students scored below 70, indicating that they may need additional assistance to better understand the material. Seven students fell within the 70-79 range, showing progress but room for improvement in other areas. Nine students scored between 80-89, demonstrating a strong understanding of the Pascal and PhET programs for physics teaching. Lastly, five students scored between 90-99, showcasing exceptional mastery of the material and proficiency in utilizing the applications.

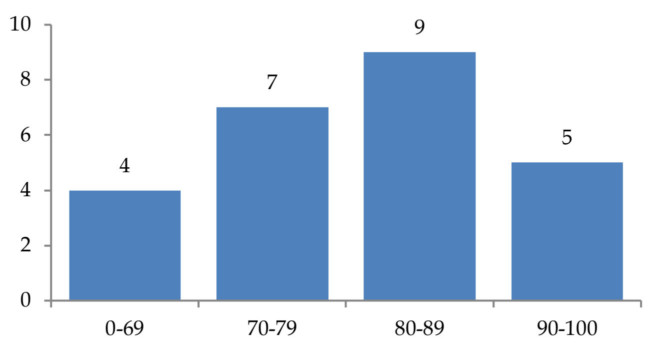


Figure 3. Distibution assesmernt score over 25 students

Overall, most students demonstrate a satisfactory to excellent grasp of how to effectively utilize PhET and Pascal programs for physics learning. However, some may benefit from additional support to further enhance their understanding. It's important to make sure that every student has a solid comprehension of this material, and that requires additional efforts. The training has resulted in improved outcomes in students' physics education.

Conclusion

Our training program at SMAN 1 Gunungsari in West Lombok, which focused on applications for Pascal and PhET, produced impressive results. Despite having minimal exposure to these tools initially, students have now developed advanced skills. Depending on the level of satisfaction, students are classified as either enough, satisfaction, or very satisfied. With the help of Pascal's programming, students can now perform electrical calculations with ease, while PhET's simulations have improved their understanding of modern physical concepts. As a result, they can confidently analyze circuits, solve complex problems, and enhance their critical thinking skills.

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