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Efforts to increase enthusiasm for learning through a simple lava lamp-based experiment learning

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ABSTRACT

Education is one of the most essential requirements for national development, as quality education produces quality human beings. The purpose of this study is to create a pleasant learning environment that facilitates students' understanding of the material and encourages active class participation, while also examining the relationship to the Sustainable Development Goals (SDGs). Through research and development (RnD) method in the Thematic KKN service method of the Universitas Pendidikan Indonesia 2022/2023 with the theme "Building Village Existence based on SDG's" and following the 4th SDGs program, namely Quality Education, simple experimental-based learning entitled "Lava Lamp" was held to provide a new color in the learning process in the classroom, especially in science learning. This simple experiment was conducted with all 28 students in Class VII at SMPN Satu Atap Ciawi. The results obtained through this learning experiment showed that students found it easy to focus and understand the material and felt happy during the learning process. In addition, critical thinking skills, creativity, and the ability to solve problems and draw conclusions in students also increased.

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ABSTRAK

Pendidikan adalah salah satu syarat penting dalam pembangunan negara, karena dengan pendidikan yang berkualitas akan menciptakan manusia yang berkualitas. Tujuan penelitian ini adalah untuk menciptakan suasana pembelajaran yang menyenangkan sehingga memudahkan peserta didik dalam memahami materi dan melibatkan peserta didik secara aktif di kelas dan menganalisis kaitannya dengan SDGs. Melalui metode research and development (RnD) pada pengabdian KKN Tematik Universitas Pendidikan Indonesia 2022/2023 yang bertemakan "Membangun Eksistensi Desa berbasis SDG's" dan sesuai dengan program SDGs ke-4 yakni Pendidikan yang Berkualitas, pembelajaran berbasis percobaan sederhana berjudul “Lampu Lava” diadakan untuk memberikan warna baru dalam proses pembelajaran di kelas khususnya pada pembelajaran IPA. Percobaan sederhana ini dilakukan pada seluruh kelas VII di SMPN Satu Atap Ciawi yang berjumlah 28 orang. Hasil yang didapat melalui percobaan pembelajaran ini adalah peserta didik menjadi mudah fokus dan memahami materi serta merasa senang selama pembelajaran. Selain itu keterampilan berpikir kritis, kreatif, dan kemampuan dalam memecahkan masalah serta kemampuan dalam menarik kesimpulan pada diri peserta didik juga menjadi meningkat.

Kata Kunci: KKN tematik; pembelajaran; percobaan sederhana; SDGs

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INTRODUCTION

The level of quality of a country must be able to be adjusted to the conditions and social situations that exist in society. Education is one of the important requirements in the development of the country, because quality education will create quality human beings. The current state of education in Indonesia is concerning, given that the education system is not functioning evenly and a shortage of educators persists (Ratnasari & Nugraheni, 2024). The quality of education in Indonesia has been a topic of heated discussion lately. The quality of education is said to have a great influence on the quality of a graduate (Alifah, 2021). Quality education is expected to impact a country's progress, meaning that education is not only a means of "agent of change" for the current young generation but must also become an "agent of production" in order to yield real results. According to the UNESCO report, Indonesia's quality of education is ranked 64th out of 120 countries worldwide.

The quality of education in Indonesia at the ASEAN level is quite underdeveloped, ranking 11th (Panani et al., 2024). To overcome this, the Sustainable Development Goals (SDGs) program (Humaida et al., 2020) was implemented. The SDGs are a commitment of the international community that serves as a milestone in the country's development, continuing the development goals of the MDGs. The Sustainable Development Goals in Indonesia are valid for thirty years, starting from 2015-2030. The implementation of the SDGs in Indonesia involves several activity programs that aim to achieve SDG indicators and promote sustainable development. One of the goals of the SDGs in Indonesia is to develop villages and improve the quality of education (Wulansari et al., 2022).

Education is the process of changing the attitudes and behaviors of students in an effort to mature them through teaching and training. Education can develop students' potential, enabling them to exhibit critical thinking, creative thinking, and problem-solving abilities (Pratomo et al., 2021). An educator plays a very important role in the world of education. Educators will be responsible for all the needs of students in the School (Khaira et al., 2023). So, an educator must have qualified competence and abilities (Risdiany, 2021). Learning is a conscious effort carried out by educators that involves students as recipients and keepers of materials and educators as facilitators (Manullang, 2017). The application of scientific principles in the science learning process in schools can involve students in actively solving problems, making decisions, asking questions, and drawing conclusions from the material. The involvement of students in the learning process has a significant impact on the success of learning, thereby improving the quality of education (Yunita & Wijayanti, 2017). Simple experiments are one of the learning media that can be a means of delivering material to students. Thus, it can encourage students to be more creative and enthusiastic during learning (Dewi et al., 2019).

Natural Sciences (IPA) is a subject that studies the environment that can be observed directly with the eyes or with the aid of tools. Natural science learning encompasses the universe and its contents, as well as events that can be discovered through scientific research (Redhana, 2019). The primary goal in learning science is for students to acquire the mastery necessary to understand the broad context of science, particularly as it applies to daily life (Shofiyah, 2018). In the science learning process, educators must be able to convey material in a varied and engaging manner, not only through lecture methods (Devi & Bayu, 2020). Currently, the curriculum that is being implemented in Indonesia is the Independent Curriculum. The Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) issued a policy on the development of the Independent Curriculum, which is provided to educational units as an additional option to support learning during 2022-2024 and enhance the quality of education. The development of the independent curriculum is more flexible when compared to the 2013 Curriculum. The focus of the independent curriculum is on essential materials, character development, and competencies that students must achieve (Ledia & Bustam, 2024).

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The most effective learning method for junior high school students in science lessons, as outlined in the curriculum, is the fun science education method. This method combines games and experiments, exemplified by the "Lava Lamp" experiment. The Lava Lamp experiment was conducted by mixing oil, baking soda, vinegar, and dye (Lestari et al., 2020). Based on the results of the research, it is said that this fun learning is in accordance with the SDGs Implementation Strategy to improve the quality of education in Indonesia which has several targets such as: 1) guaranteed access to care for children to continue their education at various levels; 2) gender equality; 3) improve facilities for safe education; 4) Have qualified educators; 5) quality and accessibility of education; 6) facilities that support the learning process; 7) improve special services for education; 8) practicing character education in learning (Muslim, 2021). Simple experiment-based learning increases students' physical, mental, and social activity in the learning process (Madani & Kardinah, 2021). Learning carried out through a scientific approach, combined with fun science, also enhances students' motivation and understanding of science (Gultom et al., 2024). Fun science has successfully helped students understand the material well and also increase continuity and interest in learning (Kurniawan et al., 2021).

This service is based on various research results that have been conducted and published. This service is a form of direct practice of implementing fun learning for high school students and its relation to the SDGs. Simple experiment-based learning is the choice of UPI KKN 2023 students to enhance the learning experience in the classroom.

Literature Review

Improving the Quality of Education

Improving the quality of education is one of the goals of the Sustainable Development Goals (SDGs). The government's readiness to improve the quality of education is evident in the quality of learning, adequate facilities, the quality of educators, and the implementation of an appropriate curriculum. Currently, the curriculum used is the Independent Curriculum. The development of the Independent Curriculum is more flexible when compared to the 2013 Curriculum. The focus of the Independent Curriculum is on essential materials, character development, and competencies that students must achieve. Therefore, the existence of the SDGs program is expected to enhance the quality of education, particularly in rural areas. This is also in line with the government's curriculum, which is complemented by the independent curriculum of the learning system in schools, adding a new dimension (Ledia & Bustam, 2024).

The three main goals of the SDGs are to alleviate poverty, build equality, and combat climate change (Handrian, 2020). The application of the SDGs concept involves many parties, including the community, as the scope of this program is very universal. The SDGs have a balanced role for all developed, developing, and underdeveloped countries. This balance of roles is expected to support the country's development. The 4th point of the SDGs program, namely improving the quality of education, can be done in various ways by all groups (Hadiapurwa et al., 2024).

Fun Science Learning

In the learning process, an educator must be able to prepare for all the needs that are their obligation. Often, educators rely solely on lecture methods in the learning process. Thus, the teaching and learning process produces less effective conditions, making it challenging to achieve learning objectives. The learning environment will be faced with students who, of course, have different characteristics, which will cause the "mood" of students to learn to vary. Educators assume that all students have the same learning characteristics. This process will be repeated daily and can cause students to feel bored about participating in learning (Sugito, 2021).

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The tedious learning process can be overcome through fun learning, especially in subjects that require practice. Fun learning is a learning approach and strategy that combines elements of meaningful, contextual, constructivist, active, and attention to psychological aspects. In this process, students will feel enthusiastic and happy because they understand the meaning and benefits of what they have learned. Students learn according to their interests and talents, while relating the subject matter to real-life experiences and actual issues that occur in society. Through this fun approach, it is hoped that the learning process will be more relaxed and less stressful. Students also become more interested and able to maximize their potential (Sufiani & Marzuki, 2021; Azifah et al., 2023). In the context of science learning, engaging science activities can help address these challenging learning experiences. Fun science is a learning method that combines games and experiments. Fun science can enhance children's creativity and cognitive development (Susanti & Purwasih, 2023).

Student Participation and Enthusiasm for Learning

In Indonesia, there are also many problems in the education system. The low education system in Indonesia is evident in the weak education management sector, the imbalance of educational facilities and infrastructure in both urban and rural areas, inadequate government support, and a low standard of learning evaluation. Herlambang in the book "Pedagogic Critical Study of Education in Multiperspective" states that in Indonesia the national education system is being faced with various problems so that finally education in Indonesia cannot provide solutions to problems regarding the development of education, the formation of life skills, educational institutions in Indonesia are also still very dependent on developed countries and are not necessarily appropriate or relevant with a cultural background in Indonesia.

METHODS

This service employs a direct practice method that draws on the results of research and development (R&D). The R&D research stage comprises ten stages, namely: information collection, planning, initial product development, initial product testing, main product revision, main product testing, operational product revision, operational product testing, final product revision, and deployment and implementation. However, the stage carried out in this service only reaches the third stage because it is part of the service activity.

This service activity was conducted at SMP Negeri Satu Atap Ciawi, involving 28 students from class VII, comprising 15 males and 13 females, for a total of 28 people. The following are details of the stages involved in implementing the service.

1. Information collection stage
   At this stage of information collection, an analysis of school facilities and environment is conducted to identify the necessary needs to facilitate this fun learning. SMPN 1 Atap Ciawi has facilities and a school environment that supports community service activities. Educators and students are also enthusiastic and very supportive of the smooth running of this activity.
2. Planning stage
   At this planning stage, activities were carried out by preparing the tools and materials used for the fun learning experience, "Lava Lights". The tools and materials used are oil, baking soda, vinegar, dyes, scissors, and glasses.
3. Product development
   After the tools and materials are ready, the next step is to create a learning flow that begins with greetings, introductions of students, and singing as a warm-up. After that, the learning of "Lava Lights"

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began with the presentation of materials, followed by student experiments. Ultimately, the submission of observations, questions, answers, and conclusions was drawn.

RESULTS AND DISCUSSION

Results

The result of implementing simple experiment-based learning at SMPN Satu Atap Ciawi is that students are more likely to be satisfied with this approach. Students are very enthusiastic about conducting experiments and giving opinions.

Preparation Stage

This program was held on August 9, 2023, and is one of the individual work programs by UPI 2023 KKN students. This activity was conducted from 07:30 WIB to 09:30 WIB, with the experiment title being "Lava Lights". The target of this program's implementation is all grade VII children, totaling 28 individuals. The school is very enthusiastic about welcoming the program that will be implemented.

Figure 1. Source Group Division
Author Documentation 2023

The first stage involves dividing students into several groups, as shown in **Figure 1**. Group division in learning has numerous benefits and purposes, including fostering a sense of cooperation, training students to communicate with one another, and developing social skills. Group division also allows students to learn from one another, creating a learning atmosphere that respects each other. As a result, students develop a sense of togetherness (Hasanah & Himami, 2021).

Implementation Stage

At the implementation stage, students are first given examples or demonstrations of how to conduct experiments, as shown in **Figure 2**. This session aims to train students' grasp and understanding of

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learning. The demonstration method will illustrate the process of an event, allowing students to understand it more clearly. This method offers students the opportunity to collaborate in analyzing social situations, particularly those related to learning (Endayani et al., 2020).

Figure 2. Conducting Experiment
Source: Author Documentation 2023

Furthermore, during the implementation stage, as shown in Figure 2, students are given the freedom to work independently under the supervision of KKN students. This independent experiment aims to train students' motor skills, allowing them to be directly involved in the process. Furthermore, these self-paced experiments will provide students with hands-on experience and stimulate their senses, enabling them to easily understand the abstract concepts of ongoing learning (Azhari et al., 2024). Students were taught about waste treatment as a result of experiments. Students understand that waste from experiments (in this case, oil, baking soda, vinegar, and dyes) should not be directly discharged into rivers or the sea, as it will endanger aquatic creatures (Sompotan & Sinaga, 2022).

Evaluation Stage

At this stage, students are given time to express their opinions about the results of the observations during the experiment and their impressions of the learning process. The students managed to deduce the reaction that occurred, the reaction that was produced, the changes that occurred (including changes in smell, color, and temperature), the process of the lava lamp reacting, and how long the reaction lasted. The impression of each student during the learning process is pleasant. Many students expect a learning system that involves them directly, rather than just relying on handbooks. The learning process that directly involves students results in increased retention and a deeper focus and understanding of the material. Through this fun approach, the learning process becomes more relaxed and less stressful. Students also become more interested and able to maximize their potential (Azifah et al., 2023; Sufiani & Marzuki, 2021). Fun science activities can answer boring learning problems for educators. Fun science can enhance children's creativity and cognitive development (Susanti & Purwasih, 2023).

The Relationship of Learning with the SDGs

Through simple experiment-based learning with lava lamps, it can be seen that students can easily deduce the reactions that occur, the reactions produced, the changes that occur (including changes in smell, color, and temperature), the process by which the lava lamp reacts, and how long the reaction lasts. Many of them are happy that learning is not confined to manuals alone. Simple experiment-based learning of lava

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lamps indirectly results in students at SMPN 1 Atap Ciawi being able to capture and understand the material, leading to an increase.

This aligns with one of the goals of the SDGs, which is to enhance the quality of education. The existence of adequate facilities, the availability of learning resources and materials, as well as the quality of facilities and infrastructure in a school, will improve the quality of learning. If this continues to be developed, learning in the school will become more effective, efficient, lively, varied, and enjoyable (Trihariyanto et al., 2020).

Discussion

Education plays a crucial role in a country's development. One of the primary aspects that must be considered is the quality of education itself, which is often closely tied to the existence of an equitable and accessible education system for the entire community. In Indonesia, although education has made some progress, there are still many challenges to be faced. As revealed in this article, one of the primary problems is the imbalance in education distribution between urban and rural areas. This is exacerbated by the shortage of qualified educators, resulting in a relatively low quality of education in Indonesia compared to other countries in ASEAN and the world. Indonesia's ranking of 64th out of 120 countries, according to the UNESCO report, as well as its lower position within the ASEAN region, highlights the need for significant improvements in the education sector. Therefore, the implementation of sustainable development programs such as the SDGs, which include the goal of improving the quality of education, is expected to make a major contribution to overcoming this inequality.

The implementation of a more flexible, independent curriculum is one of the solutions introduced by the Indonesian government to enhance the quality of education. With this curriculum, it is hoped that the teaching materials will focus more on developing students' character and competencies, not just their academic achievements. The implementation of SDGs programs that focus on village development, especially in terms of improving educational facilities and empowering educators, is also an important step in efforts to improve education in marginalized areas. Fun learning, as explained in this article through the engaging science education method, is one way to increase students' interest and involvement in the learning process. This method combines simple experiments that foster students' creativity and critical thinking skills, making them more active and enthusiastic learners. Therefore, the development and application of innovative learning methods are significant in improving the quality of education, as well as meeting the standards set in the SDGs program.

In addition, the quality of education does not only depend on the curriculum and methods used, but also on the active participation of all relevant parties, including educators, students, and the community. In this article, emphasis is placed on the importance of educators as facilitators who must be able to create a fun learning environment and encourage student engagement. Simple experiment-based learning, such as the "Lava Lamp" experiment, provides learners with hands-on experiences that not only enhance their understanding of the material but also develop social skills and foster cooperation among learners. This aligns with the principles of constructivist learning, which emphasize the importance of hands-on experience in the learning process. When learners feel actively engaged and have a fun experience, they will more easily absorb the subject matter, which ultimately improves the overall quality of education. The application of methods like this also supports the achievement of the SDGs goals in improving the quality of education in Indonesia, especially in providing quality, inclusive, and equitable education for all levels of society.

CONCLUSION

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The condition of education in Indonesia is not evenly distributed across various regions, especially in rural areas. The strategy of the SDGs concept, particularly in the context of quality education, is crucial to be developed and implemented. However, the implementation of the SDGs concept is not yet widely understood by the general public. Through a fun learning system, it will help improve the quality of education, one of which is simple, experiment-based learning, also known as fun science. A simple experiment-based learning activity with lava lamps, conducted at SMPN 1 Atap Ciawi, can enhance critical thinking, creativity, problem-solving skills, and the ability to draw conclusions.

Many students expect a learning system that involves them directly, rather than just relying on handbooks. This learning process, which involves students directly, results in an increased ability to grasp, focus, and understand. This will result in increased education for the Indonesian people and spur the achievement of other goals and objectives in the 17 SDGs, particularly to enhance Indonesia's human development index. Therefore, in today's world, it is essential to encourage every student to receive a high-quality education.

AUTHOR'S NOTE

The author declares that there is no conflict of interest related to the publication of this article. The author emphasizes that the data and content of the article are free from plagiarism.

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