JSSE Journal of Sustainable and Science Education
Volume 1, Issue 1, Mei 2024 page. 1-6
https://journal2.upgris.ac.id/index.php/jsse
DOI: DOI: 10.25134/jsse.v1i1.900.898

THE URGENCY OF IMPLEMENTING STEAM LEARNING ON THE CONCEPT OF MEASUREMENT IN JEPARA REGENCY

Belinda Chintya Rosady Putri*, Muhammad Syaipul Hayat, Nur Khoiri
Magister Pendidikan IPA, Pascasarjana, Universitas PGRI Semarang

Article Information

History:
Received: 05/05/2024
Accepted: 18/05/2024
Published: 30/04/2024

Corresponding Author:
Belinda Chintya Rosady Putri
Email*:
bellindarosady@gmail.com

Abstract

Abstract: *The following research aims to analyze the usage of STEAM approach in learning measurements. This research is qualitative type research. Physics class in senior high school tends to be strictly theoretical with no practical with minimal usage of things that could be found nearby as a learning object. The researcher aims to describe the potential of using the STEAM approach in learning measurements done by senior high school physics teachers in Jepara. The preferred method of data collection of this research are observation, interview and questionnaires about implementing the STEAM approach in learning measurements concept. The results show 95,8% of the teachers are aware of the STEAM approach. 91,7% of teachers have implemented the STEAM approach in learning measurements and 87,5 of the teachers that have implemented STEAM approach state that the approach is effective in tackling learning obstacles in student.*

Keywords: Measurements, STEAM

How to Cite:
Belinda Chintya Rosady Putri, Muhammad Syaipul Hayat, Nur Khoiri. (2024). The Urgency of Implementing STEAM Learning on the Measurement Concept in Jepara Regency. **Journal of Sustainable and Science Education (JSSE),** 1(1), 1-6.

1. INTRODUCTION

The development of science and technology has ushered humanity into the era of globalization. Education plays an important role in the era of globalization because it provides students with understanding and concepts that they can use as the foundation of their future lives (Mu'minah, 2021) In the era of globalization, quality education is needed. This can be achieved through the availability of quality and quantity of human resources as well as supporting facilities and infrastructure (Priantari et al., 2020). In addition, the learning process is inseparable from the two-way interaction carried out by teachers and students. It can be understood that this occurs because of the learning process carried out and the results of behavioral changes experienced by students.

Learning is a continuous process and involves more than just conveying learning concepts (Sahri, 2021). But the most important thing is that students are able to understand the concepts taught by their teachers and apply them in their daily lives (Zubaidah, 2019). Then, learning should be able to equip students with the ability to think logically, analytically, systematically, critically, and creatively in solving problems and students have an attitude of appreciating the usefulness of science and being able to acquire, manage, and utilize information to survive in an ever-changing, uncertain, and competitive situation (Lestari et al., 2020).

In the 21st century, humans are required to have abilities in various fields including the ability to think critically, the ability to think creatively, the ability to communicate and collaborate, and the ability to master information and communication technology (Yuliati & Saputra, 2019). Just like in the world of education, which is faced with the challenge of being able to produce the generation of Indonesia to be able to face the upcoming global competition. Based on this presentation, a pattern is needed in learning that can develop three aspects, including the knowledge aspect, attitude aspect, and skill aspect.

In 2018, PISA conducted a study and found that the Reading, Mathematics, and Science proficiency scores of Indonesia students were 371, 379, and 396 by positioning Indonesia in the 75th position out of 80 countries that participated in the test and survey (Mullis et al., 2019). In addition,

the results of the study conducted by TIMSS showed that the average score in mathematics and science of Indonesia students was 397 with the position for mathematics at the level of 45 out of 50 countries and science at the level of 45 out of 48 countries participating in the assessment and survey (Martin et al., 2016; Michael O. Martin; Ina V.S. Mullis; Pierre Foy; Martin Hooper, 2016; Mullis, I. V. S., Martin, M. O., Foy, P. & Hopper, 2015). The details of the results of the study show that the condition of Indonesia students in the field of mathematics and science is at the bottom of Singapore which occupies the first level in TIMSS, so it needs to receive special attention from all elements related to the field of education in Indonesia.

In addition, based on the results of preliminary studies related to science learning that has been carried out, it still prioritizes the aspects of mastery of concepts/knowledge, aspects of scientific skills and attitudes are still not optimized (Rany *et al*., 2020). Especially in mastering technology, students tend to have an attitude only as users. Science learning, especially in understanding physics concepts, is often carried out using assignment methods and practice questions, so that it has a less attractive impact on students (Nugraheni, 2019).

Based on the problems that occur in science learning, students should not only master concepts or knowledge, but students must also have good scientific skills and attitudes, as well as master technology. This is to be relevant to the purpose of learning science according to the Ministry of Education and Culture of the Republic of Indonesia which not only prioritizes aspects of knowledge, but also attitudes and skills. This goal can be achieved by implementing various efforts, one of which is by applying the learning principles needed in science learning (Kartika *et al*., 2022).

One of the meaningful science learning alternatives so that it can be applied in developing student competencies is science, technology, engineering, arts, and math (STEAM). STEAM (Science, Technology, Engineering, Art, Mathematic) is a learning approach developed from the STEM Learning approach, these two learning approaches come with the concept of integration and exploration of various disciplines, with the hope that learning can provide more relevant experiences and skills in facing the industrial revolution 4.0. (Rahmadana *et al.*, 2022). STEAM learning itself is an indisciplinary approach to learning concepts juxtaposed with the real world by applying the principles of science, art engineering, and mathematics (Aditya, I., & Budiana, 2021; Sari, 2020).

So, with the STEAM learning, it is hoped that science learning can be packaged attractively so that it can foster students' interest in science. With the increase in students' interest in science, it will have an impact on increasing students' learning motivation in studying science. Students who have low motivation tend to have low thinking skills as well. This has an impact on not being interested in problem-solving problems, not liking challenges, not having demands or attention from parents at home about the learning results they have achieved (Nugraha, *et. al,* 2017). Based on this description, this study aims to analyze the Urgency of STEAM Learning Implementation on the Measurement Concept in Jepara Regency. The expected benefits of this research can provide new knowledge about the innovation of the STEAM learning model.

2. METHOD

This study uses a qualitative-descriptive type of research. This research prioritizes the research process based on phenomena and real evidence in the field. The descriptive method aims to see a clear picture or description of a certain state or symptom. The subject of the study was a Physics teacher at a Senior High School (SMA) in Jepara Regency totaling 25 people. The data collection techniques in this study are through observation, questionnaires, interviews and documentation. Data analysis techniques with Triangulation (Miles & Hubermas, 1992 in Gunawan, 2013) include data reduction, data exposure, and conclusion drawing & verification.

3. RESULTS AND DISCUSSION

Based on the results of interviews with physics teachers at Senior High Schools (SMA) in Jepara Regency, it was stated that teachers did not really understand physics learning associated with STEAM but actually teachers had implemented it. It's just that there are some teachers who do not understand the STEAM learning approach. In addition, physics learning on measurement concepts associated with STEAM has not been included in the learning plan. Based on the results of the questionnaire filled out by 25 high school teachers in Jepara district, the data can be seen in the following figure.

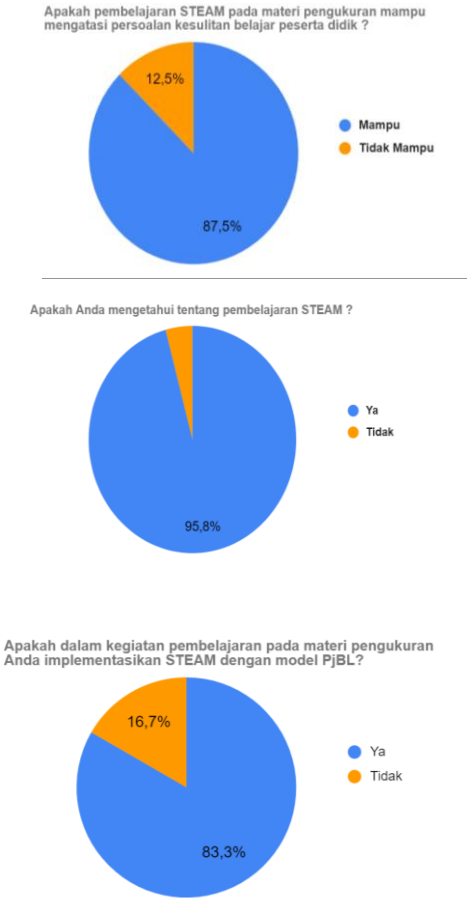

Figure 1. Diagram of the results of the STEAM Implementation teacher questionnaire with the PjBL model of Measurement Concepts.

Based on Figure 1, of the 25 physics teachers who taught the concept of measurement, 83.3% of teachers used the project-based learning learning model. 95.8% of teachers are familiar with the STEAM learning approach. 91.7% of teachers have implemented STEAM in learning measurement concepts, and 87.5% of teachers who have implemented STEAM stated that the implementation of STEAM in learning measurement concepts is able to overcome the problem of learning difficulties for students.

Based on the results of the researcher's observation about the implementation of STEAM oriented in learning measurement concepts, it has been found that physics learning is carried out using a project-based learning (PjBL) learning model. Based on the results of interviews with teachers who teach physics subjects, the reason for using the learning model (PjBL) is because to teach physics that is integrated into other subjects through STEAM the most possible is to make products so that students can learn not only theory but also through practice that produces products.

Based on the results of observations, interviews and questionnaires, it shows that the potential for the implementation of STEAM in learning the concept of measurement has been applied by teachers in Jepara Regency Senior High School, but has not been included in the lesson plan. The learning process is carried out with the PjBL model because this learning model is the most appropriate to use. The learning activities carried out are that in each experiment, students associate science activities with technology, engineering, art and mathematics. This is in line with the results of the study (Ozarslan, M., & Cetin, G., 2018) in his research it was concluded that the STEAM integrated PjBL activity has a great effect on students' attitudes towards STEM and STEAM career interests. PjBL can increase the effectiveness of STEAM education, enable meaningful learning, and influence students' attitudes toward their future careers.

Integration with technology, students can see innovations from the equipment or technology used in learning measurement and how it is used. For engineering, students will learn about utilizing existing items to make design plans then skeletons, and aseembling, students will learn how to assemble the equipment used according to the type of experiment being conducted. Integration with art, carried out with students learning how to make equipment with proportional shapes, if there is coloring, then students learn about how to color well which has artistic value. Integrating with mathematics, students learn about how to give the right size or calculation in making experimental equipment, shapes and angles.

Based on the description above, STEAM is one way to prepare students in various disciplines that will later be practically useful in life in the future. This is proven by the experiments carried out by students so that science is not studied only theoretically or abstractly, but students are equipped with activities as real learning experiences packaged in STEAM.

4. CONCLUSION

The urgency of implementing STEAM learning in learning measurement concepts has been carried out by applying various experiments. The learning process using the PjBL learning model. Equipment used during the learning process by utilizing items or equipment in daily life in these experiments.

5. REFERENCE

Aditya, I., & Budiana, D. (2021). Dampak Terhadap Self-Efficacy dan Motivasi dengan Menggunakan Program Science, Technology, engineering, and Mathematics Melalui Aktivitas Fisik. Jurnal Ilmu Keolahragaan, 20(2), 143–151.

Afifah, A. (2021). Peningkatan Keterampilan Proses Sains Siswa Pada Mata Pelajaran Ipa Konsep Tekanan Zat Cair Melalui Pendekatan Stem (Science Technology Engineerin Mathematic) di Kelas VIII SMPN 4 Kota Bogor. Jurnal Pendidikan Dan Pengajaran Guru Sekolah …, 04, 75–79. https://journal.unpak.ac.id/index.php/JPPGuseda/article/view/3351

Imam Gunawan. (2013). Metode Penelitian Kualitatif Teori dan Praktik. Bumi Aksara.

Kartika, I., Aroyandini, E. N., Maulana, S., & Fatimah, S. (2022). Analisis prinsip konstruktivisme dalam pembelajaran fisika berbasis Science, Technology, Engineering, Art, and Mathematics (STEAM). *Jurnal Pembangunan Pendidikan: Fondasi dan Aplikasi*, *10*(1), 23-33.

Lestari, A. A., Mulyana, E. H., & Muiz, D. A. (2020). Analisis Unsur Engineering Pada Pengembangan Pembelajaran STEAM Untuk Anak Usia Dini. JPG: Jurnal Pendidikan Guru, 1(4), 211. https://doi.org/10.32832/jpg.v1i4.3555.

Michael O. Martin; Ina V.S. Mullis; Pierre Foy; Martin Hooper. (2016). TIMSS 2015 International Results in Science - Eighth Grade Science. 216.

Mullis, I. V. S., Martin, M. O., Kelly, D. L., & Fishbein, B. (2019). INTERNATIONAL RESULTS IN MATHEMATICS AND SCIENCE.

Martin, M. O., Mullis, I. V. S., Foy, P., & Hooper, M. (2016). TIMSS 2015 International Results in Science. 2015. http://timssandpirls.bc.edu/timss2015/international-results/

Mullis, I. V. S., Martin, M. O., Foy, P. & Hopper, M. (2015). Timss 2015 International Results in Science Saved. Distribution of Science Achievement. http://timss2015.org/timss2015/science/student-achievement/distribution-of-science-achievement/

Mu'minah, I. H. (2021). Studi Literatur: Pembelajaran Abad-21 Melalui Pendekatan Steam (Science, Technology, Engineering, Art, and Mathematics) Dalam Menyongsong Era Society 5.0. Prosiding Seminar Nasional Pendidikan, 3, 584–594.

Nugraha, A. J., Suyitno, H., & Susilaningsih, E. (2017). Analisis Kemampuan berpikir kritis ditinjau dari keterampilan proses sains dan motivasi belajar melalui model PBL. *Journal of Primary Education*, 6(1), 35-43".

Nugraheni, A. D. (2019). Penguatan Pendidikan Bagi Generasi Alfa Melalui Pembelajaran Steam Berbasis Loose Parts Pada Paud. In *Seminar Nasional Pendidikan dan Pembelajaran 2019* (pp. 512-518).

Nurfadilah, S., & Siswanto, J. (2020). Analisis Kemampuan Berpikir Kreatif pada Konsep Polimer dengan Pendekatan STEAM Ber-muatan ESD Siswa SMA Negeri 1 Bantar-bolang. Media Penelitian Pendidikan : Jurnal Penelitian dalam Bidang Pendidikan Dan Pengajaran, 14(1), 45–51. https://doi.org/10.26877/mpp.v14i1.5543.

Ozarslan, M., & Cetin, G. (2018). Effects of biology project studies on gifted and talented students motivation toward learning biology. *Gifted Education International*, *34*(3), 205-221.

Priantari, I., Prafitasari, A. N., Kusumawardhani, D. R., & Susanti, S. (2020). Improving Student Critical Thinking trough STEAM-PjBL Learning. Bioeducation Journal, 4(2), 95– 103. https://doi.org/10.24036/bioedu.v4i2.283 .

Rahmadana, A., & Agnesa, O. S. (2022). Deskripsi Implementasi Steam (Science, Technology, Enginering, Art, Mathematic) dan Integrasi Aspek "Art" Steam pada Pembelajaran Biologi SMA. *Journal on Teacher Education*, *4*(1), 190-201.

Rany, T. D., Kuswanto, H., & Abdillah, A. J. (2020). Development of physics-based learning media for android integrated with earthquake disaster education. Journal of Physics: Conference Series, 1440(1), 012029.

Sahri, N. (2021). PELATIHAN METODE PEMBELAJARAN AKTIF DAN MENYENANGKAN BERBASIS STEAM BAGI GURU PAUD SE-KECAMATAN GUNUNG KIJANG PROVINSI KEPULAUAN RIAU. JoURNAL OF CHILDHOOD EDUCATION, 5(2), 441–459.

Sari, N. P. (2020). Implementasi Pembelajaran Matematika Realistik Berbasis Steam Di Sekolah Dasar. Prosiding Seminar Dan Diskusi Pendidikan ….

Sumarno, W. K., Shodikin, A., & Rahmawati, A. A. (2021). Gerakan Literasi Sains melalui Pengenalan STEAM pada Anak di Komunitas " Panggon Moco " Gresik. 6(2).

Zubaidah, S. (2019). STEAM (Science, Technology, Engineering, Arts, and Mathematics): Pembelajaran untuk Memberdayakan Keterampilan Abad ke-21. Seminar Nasional Matematika Dan Sains, September, 1–18.

Yuliati, Y., & Saputra, D. S. (2019). Urgensi Pendidikan STEM Terhadap Literasi Sains Mahasiswa Calon Guru Sekolah Dasar. Proceedings of The ICECRS, 2(1), 321–326. https://doi.org/10.21070/picecrs.v2i1.2420.