

Need Analysis of Learning Tool Development in Developing 21st Century Skills of Elementary School Students

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Abstract: This study aims to describe the analysis of related needs learning tools that can develop 21st century skills through science-based learning, technology art and mathematics (STEAM). The preliminary study in this study was based on a survey conducted on elementary school teachers in Gunungkidul Regency. The research method used is the mix method by integrating qualitative and quantitative descriptive methods. Data collection techniques were carried out using observation, survey and questionnaire methods via google form. Data analysis techniques were carried out through data collection techniques, qualitative data analysis and integrated with quantitative data analysis. The subjects of this study were elementary school teachers in the Gunungkidul district. The sample was chosen randomly with a total of 61 respondents. Based on the results of the study, it is necessary to develop STEAM-based learning tools to develop 21st century skills of elementary school students. Where the development of learning tools is expected to be a benchmark or reference for teachers in developing 21st century skills with STEAM-based learning.

Keywords: Learning Tool, 21st Century Skills, Elementary School Students

1. Introduction

Nowadays, the development of science and technology is very fast, this is triggered by the demands of needs in the 21st-century era which is characterized by the era of the industrial revolution 4.0 and society 5.0 as well as the existence of free market competition around the world. Everything is based on technology and the internet of thought. Education has a very important role in preparing a generation that is able to adapt to the times and compete in the local, national and global arenas.

Changing needs in the 21st century provides opportunities to be utilized as well as possible, but it will be a disaster if we can't anticipate it properly. The

government designed 21st century learning through the 2013 curriculum whose learning process is student-centered. In formal schools, the learning process has been required to apply 4C (Critical Thinking, Communication, Collaboration, Creativity) This can be realized not only by the teacher's performance in changing teaching methods but also by the role and responsibility of non-formal educators in getting students used to applying 4C in their daily activities [1], [2].

The government strives to always improve the quality of education, one of which is through curriculum redesign. The curriculum used in Indonesia nowadays is the 2013 curriculum, emergency curriculum, and independent curriculum. This curriculum tries to improve student skills, especially 21st-century skills that must be learned through integrating the character and profile of Pancasila students as the spirit in every learning process.

The pandemic that hit almost all parts of the world certainly had a great impact on the world of education, students who should be able to study at school switched to learning remotely. Various methods and strategies are used by teachers to carry out distance learning. No matter how good the strategies and methods used by teachers still have an impact on students. One of the impacts experienced by students is learning loss which also affects the academic decline of students, not only in terms of academic or knowledge, 21st-century skills which include Communication, Collaboration, Critical Thinking, and problem-solving also Creative and Innovative suffer or even regress.

However, based on the results of observations that have been carried out at Elementary School in Gunungkidul DIY, data was obtained that the learning process does not optimally improve 21st-century skills. The learning process is still more advanced in terms of knowledge and not based on the process. This is not in line with the learning objectives of the 2013 curriculum and the new paradigm curriculum that emphasizes aspects of attitudes, knowledge, and skills. By integrating these three aspects, it is expected that the

goals of national education can be realized. The observation also shows that technology has not been utilized well in the learning process. One alternative that can be done is to develop learning tools so that the learning process can be directed and designed to be able to improve 21st-century skills.

STEAM learning equips learners with theories of science and humanities and contains other skills needed in the 21st century. Art indicators reveal creativity and non-analytical skills so that students can solve problems creatively by thinking out of the box as well as innovating.

STEAM emerged as a learning approach that integrates skills in the terms of Science, Technology, Engineering, and Mathematics (STEM) and includes Arts indicators in learning. STEAM education provides students with theories of science and humanities and contains other skills needed in the 21st century including communication, critical thinking, leadership, teamwork, creativity, resilience, and other abilities. Arts indicators reveal the creativity and non-analytical skills so that students can solve problems creatively by thinking "out of the box" as well as innovating [3], [4].

With STEAM, students not only strengthen their learning in all disciplines, but through these disciplines students also get the opportunity to explore and make connections between art, music, science, and others. In addition, with STEAM, students feel more motivated and it is more effective in the learning process. STEAM education is needed by Indonesian students as an effort to enlighten their abilities and talents to face 21st-century problems [5], [6].

The application of STEAM-based learning is centered on hands-on activities, group discussions, and reality-based, where STEAM education has been designed with a framework that can be adapted to all levels, types, and teaching styles. The framework consists of three main components, namely present a situation (allowing students to recognize the problem as something connected to their lives and related to the real world), creative design (encouraging students to act creatively in product design), and emotional touch (helping students to develop their point of view in response to something, conveying expression, and sympathy) [7], [8]. Thus STEM-based learning can improve students' 21st-century skills. However, many teachers have not been able to implement STEAM, for that reason researchers aim to conduct a needs analysis of the development of STEAM-based learning devices to develop 21st Century skills in primary schools.

2. Material & Methodology

This research uses a mixed method, which is a combination of quantitative and qualitative methods. Data collection techniques are carried out through observation, interviews, and questionnaires dissemination through google Forms. The questionnaire is used to obtain data in the field regarding teacher experiences and needs in the form of learning tools. Observation activities were carried out from May - July 2022 in several elementary schools in Gunungkidul Regency. The sample used was random

sampling with the research subjects of 61 teachers from several sub-districts in Gunungkidul. The data analysis technique was carried out with descriptive and quantitative data analysis techniques to calculate the results of the questionnaire that had been collected.

3. Results and Discussion

3.1. Result

The results of this study show that the importance of 21st-century skills for students encourages teachers to design a learning process that can improve 4C skills. An alternative solution that can be done is to develop STEAM-based learning devices. Prior to the development of the first needs analysis was conducted through observation, interviews, and questionnaires. The results of field studies conducted with an analysis of teacher need obtained by the fact that teachers have not been developing 21st-century skills well in 21st-century learning. The results of the needs analysis obtained from 61 respondents in Gunungkidul Regency were given questions related to what is meant by 21st-century learning will be demonstrated hereinafter.

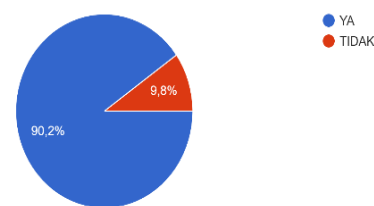


Diagram 1. Visualization of Questionnaire Results related to Teacher knowledge about 21st Century Learning

The results of the questionnaire above show that there are still 9.8% of teachers who do not understand 21st-century learning. If so, it means that knowledge related to the skills needed by students in the 21st century has not been well prepared in the learning process. Regarding the implementation of 21st-century learning, data were obtained as illustrated in the following diagram.

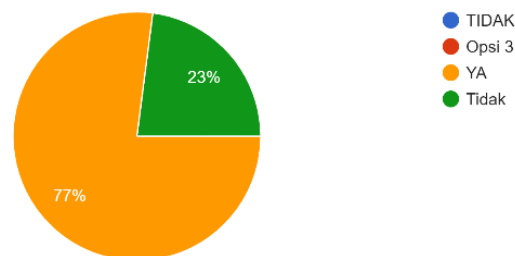


Diagram 2. Data Visualization of the Implementation of 21st Century Learning in the Learning Process

The data above shows that as many as 77% of teachers have implemented 21st Century learning in their classes and 23% of 61 respondents have not. This data is also supported

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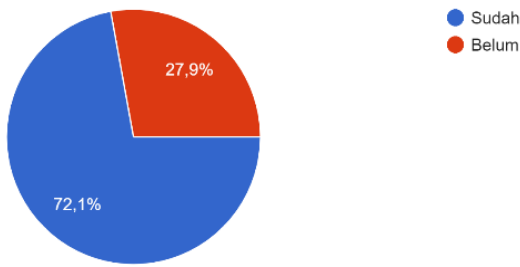


Diagram 3. Percentage of 4C skill development in Learning

The data above shows that there is 27.9% percent of teachers who still have not developed 4c skills in the learning process. Regarding learning tools, the questionnaire data shows that 39.3% of teachers have not integrated 21st-century skills into the learning tools developed. They also have not implemented and developed 21st-century skills in the learning process optimally. It can be seen in the following diagram 4.

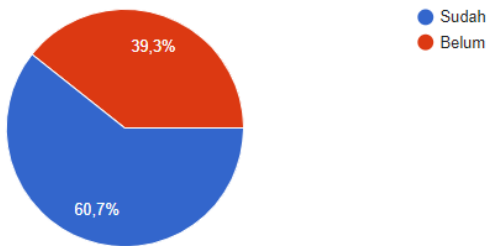


Diagram 4. Implementation Data Integration of 21st-century skills in Learning tools

Meanwhile, once respondents had questions about the obstacles faced in carrying out 21st-century learning, the answers given were various and the researcher summarized in 6 groups of answers as follows.

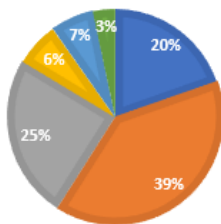


Diagram 5. Data on Obstacles to the Implementation of 21st Century Learning

The data above shows that there are obstacles faced by teachers carrying out learning that integrates 21st-century skills, including as many as 39% asserting the abilities and knowledge possessed by teachers in developing 21st-century skills. 25% said that it is difficult to develop learning tools that integrate 21st-century skills. 20% said that the facilities and infrastructure were not supportive, and 7% said that the obstacles were in the conditions of learning programs that were not considered to be implementing 21st-

he

century learning. Another obstacle is that 6% are on the signal and 3% lack of school support system.

Furthermore, the following is presented as a teacher understanding data related to STEAM. The data below shows that 57.4% of respondents know about the STEAM approach and 42.6% of respondents do not understand the STEAM approach.

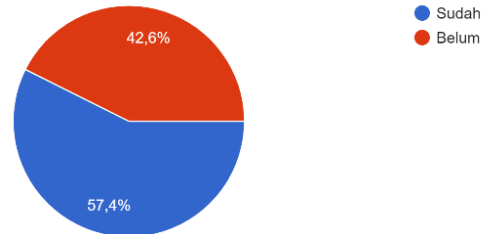


Diagram 6. Data of Teacher Understanding on STEAM

Regarding the implementation of STEAM, the questionnaire shows that about 72.1% of respondents have not implemented STEAM learning. This is illustrated in the following diagram.

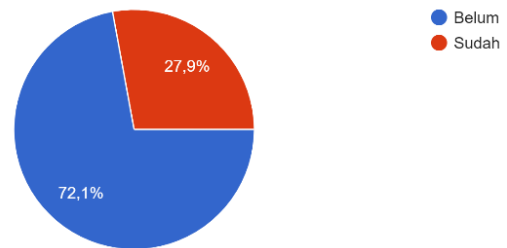


Diagram 7. STEAM implementation in learning

While data related to whether the development of learning devices with the STEAM approach to improving 21st-century skills is needed shows that 61 respondents said that it is necessary to develop STEAM-based learning tools to improve 21st-century skills through the learning process.

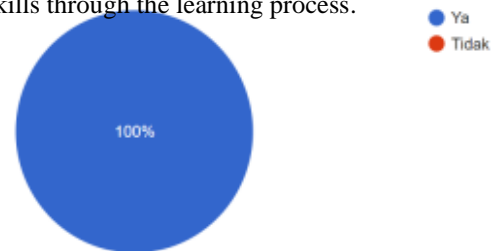


Diagram 8. Percentage of the Learning Tool Development Requirement

3.2. Discussion

Education has a huge contribution to preparing learners in the global world. One that needs to be developed in the educational process is the skills of the 21st century. STEAM is believed to be used as an

alternative solution to improve 21st-century skills through the learning process [9], [10]. STEAM is a response to the urgent need in preparing young people with high-level capabilities to deal with the global era of the 21st century positively and productively. Powerful learning is a teaching set that provides a meta-review of accumulated research on project-based learning, problem-based learning, and design-based learning [11], [12]. Various references said that the three aspects of learning are summarized in STEAM learning. STEAM combines "arts" with STEAM learning to increase learner engagement, creativity, innovation, problem-solving skills, and other cognitive content [13], [12]. Thus STEAM-based learning is very appropriate to be used to improve students' 21st-century skills.

Learning tools have a very large role in the learning process to succeed and are very effective in achieving the learning objectives [14], [15]. Learning tools become a guide for teachers in carrying out teaching and learning processes either in the classroom, laboratory, or outside the classroom. Permendikbud No. 22 the year 2016 on the standards of primary and secondary education process stated that the preparation of learning tools is part of planning [16]. The success of a lesson depends on the planning of the lesson itself. A well-thought-out learning plan will make the learning process run systematically and organized, and learning objectives achieved optimally.

There are some learning tools, including learning implementation plans, teaching materials, student worksheets, media, and assessments. The learning implementation plan contains core competencies, basic competencies, indicators, learning objectives, and activity steps ranging from preliminary activities, core, and closing. Preparing this learning step needs to be adjusted to the model or approach developed [17], [2]. The approaches developed in the lesson plan are steps in the STEAM. While teaching materials serve as a supporting tool in achieving learning objectives. Teaching materials that can be developed include handouts, modules, pocketbooks, and so on. One of the teaching materials, student worksheets, media, and assessments. The learning implementation plan contains core competencies, basic competencies, indicators, learning objectives, and activity steps ranging from preliminary activities, core, and closing. Preparing this learning step needs to be adjusted to the model or approach developed [17], [2]. The approaches developed in the lesson plan are steps in the STEAM. While teaching materials serve as a supporting tool in achieving learning objectives. Teaching materials that can be developed include handouts, modules, pocketbooks, and so on. One of the teaching materials that can be developed to improve student independence and form students' creativity and critical thinking is teaching materials in the form of modules [18].

4. Conclusion

Based on the explanation above, it can be concluded that 100% of respondents stated that it is necessary to develop STEAM-based learning tools in improving 21st-century skills. The innovative solution to improve the skills of 21st-century elementary school students is to develop STEAM-based learning tools. This tool is required to be developed to be a guide or guideline for the implementation of learning as one of the contributions to improving 21st-century skills for students.

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References

- [1] P. Sarwono, & Santoso. Pengaruh Pembelajaran Berbasis Komputer Model Simulasi terhadap Hasil Belajar ditinjau dari Motivasi Siswa pada Materi Tata Surya dikelas X SMAN 10 Pontianak Tahun Ajaran 2016/2017. *Jurnal DeoEco*, 3(2), 2017, 126–132. <https://jurnal.uns.ac.id/GeoEco/article/view/14306/11890>.
- [2] V. D. Wicaksono. Simplification of Lesson Plan: Elementary School Teacher Perspective. *Pedagogia: Jurnal Pendidikan*, 11(2), 2022, pp 77–78. <https://doi.org/10.21070/pedagogia.v11i1.1477>
- [3] M. Zarei., Zeinalipour, H., & Samawi, S. A. W. Identify the components of the STEAM curriculum in elementary school. *Int J Pediatr*, 10(4), 2022, pp 15789–15801. <https://doi.org/10.22038/IJP.2021.57034.4471>
- [4] Y. Kim, & Park, N. The Effect of STEAM Education on Elementary School Student's Creativity Improvement. *Springer-Verlag Berlin Heidelberg*, 339, 2012, pp 115–121. https://link.springer.com/chapter/10.1007/978-3-642-35264-5_16.
- [5] D. Henriksen. Full STEAM Ahead Creativity in Excellent STEM Teaching Practices. *The STEAM Journal*, 1, 2014, <https://doi.org/10.5642/steam.20140102.15>
- [6] A. D. Wijaya., Karmila, N., & Amalia, M. R. Implementasi Pembelajaran Berbasis STEAM (Science, Technology, Engineering, Art, Mathematics) pada Kurikulum Indonesia. Seminar Nasional. *E-Journal.Undikma*. 2015.
- [7] H. Kim., & Chae, D. H. The Development and Application of a STEAM Program Based on Traditional Korean Culture. *Eurasia Journal of Mathematics, Science & Technology Education*, 12(7), 2016, pp. 1925–1936. <https://doi.org/Doi:10.12973/eurasia.2016.1539a>.
- [8] G. Yakman., & Lee, H. Exploring the Exemplary STEAM Education in the U. S. as Practical Educational

- Framework for Korea. *Journal of The Korean Association for Science Education*, 32(6), 2012, pp. 1072–1086.
<https://koreascience.kr/article/JAKO201213459004832.page>
- [9] S. Ristanto, & Mufida. Integration of project-based e-learning with STEAM: An innovative solution to learn ecological concept. *International Journal of Instruction*, 15(3), 2022, pp. 23–40.
<https://doi.org/10.21601/ijese/10962>.
- [10] G. A. Wandari., Wijaya, A. F. C., & Agustin, R. R. The Effect of STEAM-based Learning on Students' Concept Mastery and Creativity in Learning Light and Optics. *Journal of Science Learning*, 2(1), 2018, pp 26–38.
<https://doi.org/https://doi.org/10.17509/jsl.v2i1.12878>.
- [11] P. C. Taylor. Why is a STEAM curriculum perspective crucial to the 21st century?[Paper presentation]. Research Conference 2016 - Improving STEM Learning: What will it take?, 2016.
https://research.acer.edu.au/research_conference/RC2016/9august/6
- [12] B. Falk., & Hammond, L. D. *Documentation and Democratic Education*. 2010.
https://www.researchgate.net/profile/Linda-Darling-Hammond/publication/268503903_Falk_B_Darling-Hammond_L_2010_Documentation_and_democratic_education_Theory_into_Practice_491_72-81/links/5dbefb59a6fdcc2128009845/Falk-B-Darling-Hammond-L-2010-Documentation-and-democratic-education-Theory-into-Practice-491-72-81.pdf?origin=publication_detail.
- [13] S. Nurfadilah., & J. Siswanto. Analisis Kemampuan Berpikir Kreatif Pada Konsep Polimer dengan Pendekatan STEAM Bermuatan ESD Siswa SMA Negeri 1 bantarbolang. *Media Penelitian Pendidikan: Jurnal Penelitian Dalam Bidang Pendidikan Dan Pengajaran*. 2020.
<https://doi.org/10.26877/mpp.v14i1.5543>
- [14] Ratnawati. Developing a Lesson Plan for Teaching English for Specific Purposes to Adult Learners at a Private University. *Journal of Applied Linguistics and Literacy*, 1(2), 2017, pp. 33–42.
<https://jurnal.unigal.ac.id/index.php/jall/article/download/1729/2423>
- [15] V. Cicek., & H. Tok. Effective Use of Lesson Plans to Enchance Education in U.S and Turkish Kindergarten thru 12th Grade Public School System: A Comparative Study. *International Journal If Teaching and Education*, II(2), 2014, pp. 10–20.
https://www.iises.net/download/Soubory/soubory-puvodni/pp10-20ijote_V2N2.pdf
- [16] Masitah. Pengembangan Perangkat Pembelajaran untuk Memfasilitasi Guru Menumbuhkan Rasa Tangung Jawab Siswa SD terhadap Masalah Banjir. *Jurnal.Uns.Ac.Id*, 15, 2018.
<https://jurnal.uns.ac.id/prosbi/article/view/2767>
- [17] B. S. Yuniharto., & A. F. Nisa., Implementasi Pembelajaran Berorientasi HOTS dan Kreativitas pada Muatan Pembelajaran IPA Siswa SD Negeri Sariharjo. *Jurnal Pendidikan Modern*, 3, 2022, pp. 115–122).
<http://ejournal.stkipmodernngawi.ac.id/index.php/jpm/article/view/477/221>.
- [18] A. F. Nisa., S. Rezkiti., B. H. C. Khosiyono., Wijayanti, A., Murniningsih, Utaminingsih, R., Trisniawati., & Sumiyati. Basic Science Module as a Resource for Independent Learning for Elementary Teacher Education Students in the Pandemic Covid-19. *International Journal of Elementary Education*, 6(2), 2022, pp. 213–222.
<https://doi.org/10.23887/ijee.v6i2.44444>