Learning Design with STEM Approach at SDN 002 Kuok Kampar Regency, Riau

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Abstract. Elementary education requires educator competency as well as student inventiveness. This is due to the fact that each primary school employs a traditional learning technique. STEM learning is a learning technique that blends instructor expertise with student innovation. STEM Learning is created by combining 4C skills. The method for analyzing RPP is qualitative, including a focus group discussion process. The advantages of the interviews, observations, and documentation, as well as the FGD process. According to research, STEM learning works synergistically with 4C pupils' abilities and primary school topics. STEM learning design is based on the five phases of learning: learning, envisioning, planning, making, and improving.

Keywords: design · learning · STEM · elementary school

1 Introduction

The technological advancement of the world of education is currently a supporter to improve the ability of educators to face the world of education at this time. Abat 21 technology is a means to socialize education for educators and governments who have policies in education and interests in education. Education in the mass development of learning systems by using technology in the face of a better future. Changes in the human perspective at every age are also very influential on the development of the education system both in schools and families. The development of education has been supported by the preparation of the K13 curriculum used at that time is a means to create a fun learning atmosphere and accredit learners to explore their creativity, so that learners are able to face the progress of digital technology today known as the industrial revolution 4.0.

The industrial revolution 4.0 in the world of education is supported by advances in educational technology that at this time has seen benefits, with the covid-19 pandemic demanding educators be able to use technology for the sustainability of the world of education. Industrial Revolution 4.0 is a system that integrates the online world with industrial products Based on observations in the field of teachers less effort to prepare everything needed to use the medium of learning. The desire of teachers in making

changes makes the learning process there is no interaction between teachers and learners, learners are only hearing and waiting for orders or tasks given by the teacher. As a result of the pattern of learning process carried out by teachers resulted in the results obtained by learners than expected. This is evidenced by the results of research obtained literacy, mathematics, and science skills of Indonesian learners are still below the world average. As reported by Antara, Indonesia has been following this assessment for 18 years, since 2000. However, during that time the value of the ability of its learners is never above average.

Implementation of the National curriculum for the elementary school level, judging from the development of the thinking skills of elementary age learners has not been able to conduct an analysis of certain cases. Learning at the elementary level should encourage learners to do activities to develop their skills. Learners are facilitated to develop their creativity. Educators facilitate learners to bring out the creativity they have to develop the abilities they have. The creativity of learners has different views in response to the same. They also have different ways and opinions in making decisions. Learners have their own way of dealing with a problem, cannot be forced to follow the way adults.

Based on research from the Policy Study Center of the Ministry of Education and Culture, as many as 80% of Indonesian students say they like to read. Students who like to read have not been supported by the creativity of teachers in stimulating effective reading interest to encourage the realization of critical reasoning. Critical reasoning appeals to educators' creativity, to increase interest in reading. Students who claimed to have never listened to a teacher were inferior to those who always listened to the teacher. Students who study in noisy classrooms have lower reading scores than students who study in quiet classrooms using technology facilities.

In the era of the Fourth Industrial Revolution, learners must be prepared with high-level thinking skills (higher order thinking skills). The STEM method is one hots-oriented learning strategy. STEM method is a learning process using learning strategies that provide real-world issues as context for learners to solve problems by optimizing the mind by thinking critically, to gain key knowledge and concepts from the content they learn. The STEM method requires students to be able to tackle real-world challenges (contextual). To address challenges, learners must think critically and analytically, as well as locate and apply relevant learning materials.

The STEM approach facilitates learners to explore their abilities and cultivate skills in Science, Technology, Design and Mathematics, which also supports the formation of 4C skills. 4C skills are skills that can be trained by always inviting learners to collaborate and communicate well in a discussion both in the classroom and outside the classroom. Learners are invited to be able to think critically and develop by including the problem into their lives. Students will feel responsible for the problem. All learners will exert creativity and critical thinking in every problem. Skills to deal with the difficult problems of young people in facing the challenges of digital age life today. These skills can be trained with STEM approaches in learning in various fields of science in enhancing the professional competence of educators.

The current situation with the covid-19 pandemic demands the professional ability of educators in utilizing technological advances for the sustainability of education, many obstacles faced at this time especially in the world of education. The professionalism of

teachers becomes the end of the success of the world of education, educators are required to facilitate learners to continue learning even though learning at home. In fact, educators who are already professionals experience obstacles in doing the learning process at home many obstacles faced both on the part of parents and educators themselves. Professional teacher also has limited ability in technological advancement so that it is difficult in the learning process, the fact that we see on social media and television many educators complain and find it difficult in the learning process, on the part of learners also find it difficult to do learning activities at home, many learners want to learn in school. The problems that arise are caused by lack of mastery of technology from educators and learners. The fact states that the practical application of STEM principles and theories is to strive to create a purposeful learning environment, allowing learners to understand the context they wish to apply. Thus, STEM makes them more literary.

At first, STEM is only engaged in science, technology, engineering and mathematics, but after understanding stem principles more deeply, STEM can also be used for cross-subjects, both general, language and social. This is because stem principles are principles that can improve the analytical skills of learners in dealing with every problem that occurs, even up to social problems in everyday life. The STEM approach is very interestingly researched, to see the ability of educators to improve the ability of the profession with technological developments with the development of STEM approaches in the learning process with various innovation strategies of educators to facilitate the creativity of learners to face the advancement of science and technology in the 21st century. Based on the description above the problem formulation in this study is whether STEM approaches can improve the learning process in elementary school. It aims to find out the improvement of the learning process in elementary school.

Some of the theories considered relevant to this research are constructivism theory, educator professional competence, and STEM approach, creativity, and informatics technology. Constructivism theory refers to one of the first two broad areas is the nature of the discipline or points of human knowledge built into human history epistemology i.e. What the nature of physics or American history the second field is the belief in the practice of education (educational constructivism) Philips in Gredle (2011: 22), further modern and extreme opinions arise in both those areas and the essence of educational practice. For example, Thomas Kuhn in Gredle (2011: 22), embraces constructivism on science but supports anti-constructivist pedagogy as well as proponents of constructivist practice in the classroom may justify his opinions in a variety of ways that some do not constitute constructivism philosophy Philips in The Gradle (2011: 22).

Educating implies continuing to grow life values, teaching means continuing to develop science and technology, and training means educators must be able to improve the abilities that learners already have. Academic qualification is the minimal degree of education that an educator must have, as demonstrated by a diploma or certificate of appropriate knowledge in line with the applicable requirements.

This STEM method to learning may be used to a wide range of scientific subjects outside than science, technology, engineering, and mathematics. According to experts, the basic concepts of STEM may be implemented in numerous sciences to comprehend the execution of knowledge and abilities in the field of science. Analysis of science, technology, engineering, and mathematics is also required in the social and humanities,

including religion and the arts. STEM is an interdisciplinary and practical curriculum that teaches students in four specific disciplines: science, technology, engineering, and mathematics. STEM blends the four disciplines into a holistic learning paradigm focused on real-world applications, rather than teaching them as distinct and independent topics. In 2018, the phrase STEM in education became popular in Indonesia. Many educators have been educated to incorporate STEM curriculum in the classroom. This situation is expected by Indonesia to be able to change the teaching paradigm more in favour of learners, by providing freedom in developing their creativity, instilling noble character (morals), practicing communication skills, social attitudes and cooperation. Thus Indonesia gold in 2045, will be Indonesia's leader in the world in terms of education, character, economy and other sectors.

To meet the demands of such learning, educators must be able to apply various models and methods in learning. With the purpose of the models and methods used will be a bridge for them to understand abstract things into concrete. In its implementation, the freedom of learners must be through the supervision and guidance of educators even though it does not intend to suppress or direct to a style of learning. Learners are given the freedom to express their opinions in a directional discussion with educators. Not only educators can apply the right method in the learning process, students are also intended to have creativity so that the models and methods of the learning process can be applied properly. Suyanto (in Sit Masganti 2016: 9) suggests that behaviors that reflect natural creativity in children can be identified based on the following characteristics:

1) It's nice to explore the environment.
2) Observe and hold all things; Expansionary and excess exploration.
3) His curiosity is great, likes to ask endless questions.
4) Spontaneity expresses his thoughts and feelings.
5) Adventurous; I always want to have new experiences.
6) Likes to experiment; Unpacking and dabbling in various things.
7) Rarely get bored; There's just something to do.
8) Have a high imagination.

There are five (five) techniques to measuring creativity: (1) objective analysis, (2) subjective factors, (3) personality assessment, (4) biographical inventory, and (5) creativity tests.

Knowledge Deepening, in which instructors gain ICT abilities that allow them to offer student-centered, collaborative, and collaborative learning settings. Teachers may also link policy directives to particular classroom actions, create technological plans to sustain school ICT assets, and predict classroom requirements. Furthermore, instructors can learn more by interacting with national and worldwide networks of teachers who have achieved Deep Knowledge level skills:

1. Create, adjust, and put into effect classroom methods that promote institutional and/or national policies, international commitments (e.g., United Nations Conventions), and societal agendas.

2. integrate ICT across topic material, teaching and assessment methods, and grade levels, and establish a conducive ICT learning environment in which students demonstrate mastery of curricular standards with the use of ICT;
3. construct ICT-enabled project-based learning activities and utilize ICT to help students establish, implement, and monitor project plans, as well as solve challenging challenges;
4. use a variety of digital tools and resources to build an integrated digital learning environment to promote students' high-level thinking and problem-solving abilities.
5. Use digital technologies to support collaborative learning, manage students and other learning partners, and manage the learning process in a flexible manner. And make use of technology to interact with professional networks to support PICT CFT intended for teacher training on the use of information and communication technology (ICT)

The literature related to this research is as follows. Rahmiza et al. (2015: 249): "Development of LKS STEM (Science, Technology, Engineering, and Mathematics) in Increasing Motivation and Learning Activities of State High School Students 1 Beutong On Electromagnetic Induction Material". Learning using LKS STEM can increase students' learning motivation on electromagnetic induction subjects compared to the use of conventional LKS and increased motivation also affects student learning activities, with the use of LKS STEM, students become more active in learning on their own, so that teaching and learning activities increase. Next, (1) Learning with a STEM learning approach can significantly improve students' critical thinking skills with a confidence level of 95% and an N-gain score of 0.63 in the moderate category, according to Khoiriyah et al. (2018), with the title "Implementation of STEM Learning Approach to Improve Critical Thinking Skills of High School Students on Sound Wave Material." (2) The enhancement of each sign of critical thinking capacity is distinct. The indicator supplying initial judgments and conclusions has increased, whereas the indicator reaching conclusions or controlling plans and tactics has decreased. (3) STEM learning methods to critical thinking skills produce greater learning results than traditional learning techniques.

2 Method

This research uses a qualitative approach with the focus group discussion (FGD) method (Omar, 2018). Development of STEM learning design in the form of RPP through FGD method procedure (Glynn et al., 2015). This FGD method is done to collect data related to the STEM approach guided by moderator as facilitator (Indrizal, 2014). Data collection techniques are carried out with interviews and questionnaires. This research instrument comes from interview guidelines with questionnaires that contain STEM approaches.

3 Result and Discussion

Based on the results of research to develop learning design in the form of RPP based on STEM attachment for SDN 002 Kampar Regency, Riau. The research is done directly

through interviews to obtain knowledge about RPP designed by educators. The results of the interview were integrated with the 2013 curriculum. Learning design with STEM approach is designed according to the teacher's book as its development in designing RPP. Teacher subjects at SDN 002 Kuok, Kampar Regency, Riau have designed RPP, but this is not necessarily achievable because it needs to be known in advance about the characteristics of students. The results of an interview at SDN 002 Kuok, Kampar Regency, Riau showed that students need skills in understanding student material books. Thus it can provide material output that students understand. The results of relevant studies on RPPs designed by teachers in primary schools can be developed and understood by students. Thus it can provide material output that students understand. The results of relevant studies on RPP designed by teachers in elementary schools can be developed and understood by student. One form of learning development is steam approach to guide student can make material by making a product. This experience can be used as a reference for students in realizing their dreams in the future.

The results of data collection from the application of the FGD method result in a perceptual similarity between product development and STEM engagement and with regard to relevant study results, competency selection developed through the STEM approach. Then, RPP can be designed, furthermore FGD is done to obtain information to design learning with the STEM approach, then the FGD process can be used as the basis for validation of RPP design products using the STEM approach. FGD findings are hindered due to the identification of questions during the FGD depending on participants, time, and location. Separate your text and graphic files until the text has been prepared and styled. Hard tabs should be avoided, and hard returns should be used just once at the conclusion of a paragraph. There should be no pagination anywhere in the paper. Don't bother numbering text heads; the template will do it.

3.1 Identification of Research Participants

The study participants were conducted in accordance with the criteria of FGD implementation followed by 7 to 11 people. This is to get differences of opinion from people who have relatively similar characteristics (Indrizal, 2014). This study used 7 teacher participants in SDN 002 Kuok Kampar Regency, Riau to obtain RPP design development using STEM approach. This participant serves for (1) The development of learning design by using STEM shortening; (2) Development of student worksheets using STEM approaches; (3) Development of learning modules using STEM approaches; (4) The development of written value; (85) Development of performance assessment.

3.2 Timing and Process of FGD

Learning design through RPP using steam approach is done as many as 3 meetings with the required time for 90 min in each meeting (Indrizal, 2014). The place of FGD implementation was conducted at SDN 002 Kuok, Kampar Regency, Riau Then the next meeting was conducted through zoom meeting in line with conditions during the pandemic. This is done to obtain information about students' characteristics knowledge with student LKS books with the use of STEM methods.

3.3   FGD Activity Process

The FGD results were conducted with the team on learning design using a steam approach designed by researchers by integrating students' basic competencies based on the 2013 curriculum. This application relates to other learning tools to create a steam approach learning design in accordance with the understanding and characteristics of students in learning. FGD results were obtained based on the opinions of interconnected participants then analysed based on learning materials at SDN 002 Kuok, Kampar Regency, Riau. The results of the curriculum analysis are determined by the basic complements in the STEM RPP approach based on the results of FGD determination. Then, FGD continued with the STEM learning procedure designed by the researcher.

3.4   Data Analysis Stage

The data analysis stage based on FGD results is valid by STEM experts. Learning design results are designed in the form of learning steps in RPP through 5 steps of learning activities.

3.4.1   Asking (Identify Problems and Identify Boundaries)

a) Students are divided into 4 groups, each of which is given number to provide ease in the assessment of individuals and groups.
b) Each group obtains LKS and makes a identity and understands in LKS
c) Students identify the images provided by the teacher
d) Students are guided in responding to images in LKS
e) Students are guided to read modules and observe videos provided by teachers
f) Students do Q&A about modules and videos written in LKS

3.4.2   Imagining (Creating Ideas and Ideas)

a) Students are guided to conduct Q&A and discuss with a predetermined group
b) The teacher asks for the results of each group's discussion
c) Each group discusses answers based on LKS questions
d) Students understand the results of reading text in LKS
e) Students perform Q&A based on reading text and identify teacher explanations

3.4.3   Planning (Creating Diagram and Collecting Materials)

a) Each group discusses the material in LKS
b) Students are directed to give different responses to other groups.
c) Students are guided to design the learning material planning process

3.4.4   Creating Are Guided to Design the Learning Material Planning Process

a) Each group designed the learning material and conducted a Q&A.
b) Students string together answers in LKS
c) Each Students are guided by teachers to make observations in LKS
d) Group discusses to obtain answers based on learning modules

3.4.5   Improving (Evaluation Discussion and Repeat Stages 1 Through 5)

a) Students are guided to develop learning materials
b) Students are guided to analyse learning materials
c) Students are guided to conclusions of learning outcomes
d) Students are guided to create and present their learning outcomes in LKS
e) Students are guided to evaluate learning outcomes through responses from other groups.
f) Students collect learning outcomes in LKS
g) The teacher provides an explanation of the material and learning outcomes.

These five stages are core learning activities in making RPP conducted and designed research based on STEM approaches.

3.4.6   Making of Report

After the five stages are carried out so that the product output obtained is validated by the FGD team and participants through the STEM approach, then making a report is needed. This is so that the RPP design using the STEM approach is arranged in accordance with the provisions of Permendikbud No. 22 of 20116. As for the important elements contained in the RPP, such as (1) school profiles; (2) subjects/sub-themes; (3) class cluster; (4) timing; (5) the authoring of ki/kd; (6) formulate indicators of competency achievement; (7) formulate learning objectives; (8) formulate learning materials; (9) formulate learning methods; (10) determination of learning devices; (11) to correct the learning procedure; (12) development of learning assessments.

4   Conclusion

Professional teachers in learning design tailored to student books and student characteristics are aided by STEM approaches. This STEM approach uses five steps, such as asking, imagining, planning, creating, and improving. Based on the implementation of these five steps help design RPP using the STEM approach. This is appropriately applied in SDN Elementary School 002 Kuok, Kampar Riau. The STEM approach is in hand with Permendikbud guideline No. 22 of 2016 and FGD results by producing module development in the form of RPP design using STEM Approach.

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