The challenge of implementing STEM for senior high school students in the city border of Jambi

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Abstract The purpose of this study was to describe challenges of implementation of STEM learning for senior high students in the border of the city in Jambi. Case study research design was used for this research. The STEM project which used was a simple telescope. A teacher and 35 students were observed along the learning process and then 5 students who have the problem in learning and the teacher were interviewed after stem learning done. This study finds if to implement STEM learning in this typical area was quite challenging. The main problem was how to manage a class with low motivation for learning. The other challenge was to find ingredients and component for the project. However, implement STEM for teaching and learning in this area was very possible.

1. Introduction
STEM Education is provided to achieve educational goals that prepare people for future lives and labour [1]. STEM learning is one way to discuss the problems of low technology literacy [2]. Technology literacy gains reflect an improved ability to use technology as a mediator of new learning [3]. The low level of technological literacy which results in the slow process of learning. New things will cause the backwardness. This will be able to give birth to well.

One way to overcome this problem is by learning that provides them the ability to live better in the future. Based on this statement, it can be concluded that marginalized people need to learn STEM so they can learn faster and improve their lives. Improving the lives of this people will create a smaller gap among community interactions. this will make the decrease of Social problems.

Marginalized communities are often identified with forest-dwelling communities or those who live in rural areas, but actually, the meaning of marginalized is not only seen from a location far from the city but also from how technology affects their lives, access to quality education and peoples’ income. In Jambi province, there are several groups of people who are said to be left behind. For example, tribal children in the community who lives moving in the forest, villagers around protected forests. But if we look deeper, in fact around the city there are people who are marginalized, for example, people who live in pockets of poverty who are usually people who live in the suburbs.

Urban-suburban communities are actually not so much behind in terms of the economy of many of them who have extensive land and gardens, but not a few are indeed living in the middle to lower
category. On the outskirts of Jambi, there is a phenomenon where children of rich or educated people do not go to school in their area but the school in the city. This causes the average school in the suburbs to be filled by children from the lower middle class. This causes a lot of problems that occur at school. Plus, the government's attention is more focused on favourite schools located in the city or in the district capital.

Based on the above, it is necessary to conduct a study that applies STEM learning to people living in the suburbs. STEM learning is not a common learning moreover for suburban schools. The majority of learning used is direct learning or teacher-focused presentation learning [4]. So, in implementing this learning it will certainly not escape problems and challenges.

Many practitioners and researchers who have studied STEM learning at the high school level. Many also integrate STEM learning with many of the latest technology components that are widely used in learning such as video analysis software, smartphone applications, or some supporting software[5, 6]. But this is not the right step as a beginning of STEM learning in disadvantaged areas. One interesting research is STEM learning using Balloon Powered Car projects. The project was conducted at one of the junior high schools in the city of Bandung. The results of this study indicate that STEM-based learning is able to increase motivation and provide experience in the engineering process [7]. But school context or school level affects STEM learning [8, 9] so researchers try to apply this to learning in high school as the introduction research.

Suwarm, Astuti [7] suggest increasing the readability of worksheets well for students in implementing this learning. All of the learning process using this project can take place well, both from the point of view of the teacher and from the students. Seeing the success of the application of this STEM learning, it is a big question what if this is applied to high schools in disadvantaged areas.

2. Methods
This study aimed to describe the challenges and problem in implementing STEM learning in high school in the border of city Jambi. The method used was a case study. Data in this study were collected from students who experienced or studied in learning and teachers who taught. Along with the implementation, they were 19 students attended which consist of 7 male and 12 females. This study used interview techniques, documentation, and documentation. This third data was matched one by another to get accurate and valid data about this learning.

After making observations during the implementation of this learning, all groups turned out to have the problem. So, 5 people were chosen who had problems with learning and refers to the problem which occur in the class. Of these 5 people, there were 2 samples who were students with low levels or very indifferent in learning. While others were having problem in the implementation of learning.

3. Result and Discussion
Challenges in implementing this learning could be explored. Lessons about this will be very useful in the future. Commonly the challenges of this implementation like the limitation of tool, infrastructure as well as time, and constraints related to the characteristics of students who study.

3.1. Limitations of facilities and infrastructure
Schools that was research sites do not have access to electricity in the classroom, electricity is only for offices. Electrical problems cannot use LCD projection or the like. Besides that, the absence of electricity causes fans not to be provided in class. The consequences of this problem are
3.1.1. *Students cannot focus on what's complicated.* Because the ordinary class uses LCD projection in addition to helping the teacher in explaining the material, this device is also to attract the attention of students to focus.

3.1.2. *Disruption of students due to uncomfortable weather.* The situation is very important to students' attention. Many students cannot take attention to what the teacher describes. What an uncomfortable condition.

3.2. *Time*

STEM learning as implemented was very time-consuming, physics lessons, in this case, were only 2 hours of lessons or about 90 minutes. Imaging time 14 minutes 26 seconds was used the teacher for preliminary activities consisting of preparation of the atmosphere and apperception and motivation. 51 minutes 20 seconds for the project making activities and guiding students to do it. The remaining time was only about 24 minutes, this was done to do activities and the brainstorming to look for the concepts. This time feels very short amid the low logic of students' abilities. and drained to guide students to make projects.

3.3. *Characteristics of students*

A major obstacle in this learning was the discrepancy between the intentions and desires of researchers with various characteristics of students. STEM learning requires students to think and carry out processes that spearhead learning. On the other hand, low student learning makes students' attention and concentration low in learning. This was a disaster that has a domino effect which leads to the exhaustion of the teacher in guiding students to respond to the concepts behind the projects carried out by students. This STEM learning that is implemented adapts STEM learning that is successfully carried out in the city but is lowered. But when implemented in a class located on the border with all the shortcomings it turns out that STEM learning that is taught is not enough to attract interest or create student learning motivation. This is evident from the difficulty of arranging several students to learn. On the other hand [10] states that STEM learning can increase student motivation in learning. [10] underlines that the applied learning only applies to certain activities and characteristics.

From the statement above, a conclusion can be drawn that something is wrong with the activities and characteristics of students. Suitability between the learning process and the characteristics of students makes learning more responsive [11]. Characteristics can include conformity with.

3.3.1. *Cognitive style.* Cognitive style is the first thing to consider after suggesting that there is a mismatch between student characteristics. Cognitive style is the difference in how individuals perceive, organizes, and acts the information [9]. To see this, the researcher carried out a simple test using the Group Embedded Figures Test (GEFT) on students who were having problems. And the result is that 100% of them are field dependent. This shows that learning that is still interfered with by the teacher will not be a problem.

3.3.2. *Initial knowledge.* Students can respond well to what is taught when what is taught is appropriate or connected to what they understand [12] in this case we often call it constructivism theory. The learning provided was very simple learning because it was adapted from learning for the level below it. But the test results of several questions related to the concept being taught cannot be answered properly by students who have problems. This suggests that indeed they do not learn what was taught.
3.3.3. Preferences. The next factor investigated was Learning preferences. To measure this, researchers use Learning preferences inventory [13]. The assessment results show that they prefer to lecture and computer-assisted learning. The learning that was designed was based on the STEM which was a real-world project that does not intersect with learning using ICT and does not contain strong lecture elements. So, it can be concluded that the learning design as applied was not in accordance with learning preferences of some of the students. This is what needs further investigation.

4. Conclusion

Challenges in to implement STEM learning in border city of Jambi was categories by 3 challenges. The biggest challenge was characteristics of students who was haven’t have enough motivation for learning. Another challenge was Limitations of facilities and infrastructure and the last was time. Over all teaching STEM in this school still possible.

5. References

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