STEAM Project Based Learning in Enhancing Japanese Speaking Skill in Online Classrooms

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ABSTRACT
This study aims to analyze the effectiveness of STEAM project-based learning in enhancing students' Japanese speaking skills in online classrooms. This study used true experimental research with pre-test and post-test control group design involving 42 vocational high school student participants majoring in hotel and accommodation. They were divided into two classes, namely the control class, and the experiment class. Data were gathered through pre-and post-interviews and questionnaires for both control and experiment classes and treatment to control class. The result shows STEAM project-based learning is effective in enhancing the students' Japanese speaking skills in online classrooms. The students' speaking skill improvement supports the positive result of STEAM project-based learning effectiveness. The participants were more eager to speak in Japanese after a few treatments compare to the control class. It also shows how the STEAM project-based learning treatments affect the students' motivation in speaking Japanese. The questionnaire results supported the data; the students from the experiment class agreed that STEAM project-based learning could motivate them to speak Japanese in the online classroom. Accordingly, STEAM project-based learning could be used for enhancing Japanese speaking skills in the online classroom.

Keywords: *STEAM, project-based learning, Japanese speaking skill, online classroom*

1. INTRODUCTION

High effectiveness of STEAM in education, the approach became well-known and trending in many countries such as Australia, Korea, America, Cambodia, Ukraine, Malaysia, and China. There is also a country that used STEAM education not only for an approach in education, but also their school curriculum or even a base of the education system (Hlukhaniuk, Solovei, Tsvilyk, & Shymkova, 2020; Kao & Shimizu, 2020; Kenichi, 2020; Kim & Chae, 2016; Kim, 2016; Pugar, 2020; Winarni, Zubaidah, & Handayanto, 2016). Because of high positiveness, STEAM is being used in many countries. Moreover, surprisingly many educators start using STEAM as their learning method in many fields in the classroom.

Those numerous educators who began to use STEAM have increased its popularity. The approach, originally known as STEM, has been in existence since 2007 the growth began in 2010 when Georgette P. Yakman accomplished research and develop STEM into STEAM education (Setiawan & Saputri, 2019). The development of STEM education into STEAM education makes STEAM adopted in many fields that connect with the same components as STEAM or are used by collaborating STEAM with other subjects, especially Japanese language education. Although STEAM education could be applied in the language educational field, it is rarely used in language education. Most educators use STEAM in scientific education such as science, engineering, mathematics, and IT because of the lack of knowledge in STEAM education and its implementation.

However, the Covid-19 pandemic has brought office jobs home following a suggestion from World Health Organization (WHO), which is now widely known as WFH (Work From Home) (Mustakim, 2020). At the same time, this pandemic has also shut down schools thus moving all educational activities home. The teaching and learning process is conducted online making use of various learning platforms. To prevent the spread of Covid, the education minister rules out a policy that teaching and learning must be conducted online (Batubara, 2021). And even though e-learning can be used in many subjects in education, there is a negative side that appears in the language education field. By the time educator uses e-learning, language educator starts to

notice the lack of practice in speaking skill. The results happen because both educators and students only focus on teaching and studying grammar since the learning method has changed into online classes. These facts are opposite from the aims in language education, such as Japanese language education that needs to make students able to speak with Japanese language (El Fauziah et al., 2019; Sudjianto, 2000).

Because of the lack of practice in speaking or communicating in the Japanese language, it is certainly making students feel more pressured, difficult, and hard to speak in the Japanese language. Based on that, educators need to modify and use an active method that could be used in online classes. The use of active learning methods will make students more motivated to study and practice their speaking ability in the Japanese language. STEAM is shown as an effective learning method that could motivate students to develop many skills and raise student motivation in both theoretically and oral skills such as communication. With that, the researchers intend to do experimental research with STEAM project-based learning as a learning method in Japanese online classrooms to know if STEAM project-based learning could be used as an online learning method in Japanese education such as face-to-face classes in the classroom.

2. METHODS

2.1. Research Object

The research was geared to find out the effectiveness of STEAM project-based learning in enhancing students' Japanese speaking skills in online classrooms. The research involved 42 11th grader vocational high school students taking up hotels and accommodation in Cirebon, Indonesia.

2.2. Instruments

Instruments were used to gain all essential data that needs in this research. There are two types of instruments, such as tests and questionnaires that were used in this study. Test interviews were chosen to know and evaluate students' speaking skills. Tests were applied as pre-interview in pre-test and post-interview in post-test. There are 20 questions in both pre-test and post-test with the type of questions being nearly similar. The reasons for using a similar type of question in the instruments are to show the difference in using learning methods. While questionnaire was applied at the end of the treatment section are to know students' impressions in using STEAM project-based learning.

2.3. Data Analysis

True experimental research was chosen by applying pre-test and post-test control group design as part of data processing. To compare students' speaking skills by using different learning methods, two kinds of classes such as experimental classes and control classes were required in experimental research.

Table 1. The Criteria of N-Gain Effectiveness

N-Gain Score	Criteria
$g > 0.7$	High
$0.3 \leq g \leq 0.7$	Intermediate
$g < 0.3$	Low

Experimental research was chosen to test or evaluate learning method effectiveness. Because of that, there are a few types of experimental design normally used in experimental research, this is such as true experimental design, pre-experimental design, quasi-experimental design, and factorial design (Ali, 2010; Sugiyono, 2011; Sutedi, 2009). The test was given to students before and after the treatment was applied. STEAM project-based learning as a learning method was used in experimental class, while conventional learning as a learning method was used in the control class. Both classes were using online classes or known as e-learning in this study.

As collected, all of the data were processed and calculated with the help of a software called SPSS or known as Statistical Product and Service Solution. Formulas are also used in data processing in SPSS. After calculating all the data, the mean score needs to be interpreted by using a category in N-Gain effectiveness. By interpreting the mean score, the N-Gain result in this research will appear more accurately.

Table 1 showed levels of criteria in Normalized Gain effectiveness. The criteria are separated into three levels, such as high, intermediate, and low. The high criteria show the high effectiveness in the learning method that came from the n-gain score with a value of more than 0.7. Intermediate criteria have appeared as the intermediate effectiveness in learning method that came from the n-gain score with value part from 0.3 to 0.7. While low criteria have appeared as the lowest effectiveness in learning method that came from the n-gain score with a value that less than 0.3.

3. FINDINGS AND DISCUSSION

3.1. STEAM in Japanese Language Education

The STEAM definition is known as part of an acronym that connects with all of the components inside of STEAM itself. Like its name, five components filled inside of STEAM and all the components appear with science in "S", technology in "T", engineering in "E", art in "A" and mathematics in "M". Furthermore, language also included as part of the component inside of STEAM because language is connected and contain art component. The aims of STEAM is also known to prepare all of student future workplace with the modern era of creativity, communication skill, and critical mindsets could be shown in many aspects that related to

problem-solving. STEAM is also known to be used with project-based learning methods because of the similarity in their process, such as discussion in making or building a project and how students communicate the result to others in the presentation section (Anisimova, Sabirova, & Shatunova, 2020; Oner, Nite, Capraro, & Capraro, 2016; Park, Byun, Sim, Han, & Baek, 2016; Pugar, 2020; Sanders, 2009; Setiawan & Saputri, 2019).

The similarity of the aims in STEAM education, it is showing the relativeness between speaking aims in education and relates with students speaking or communicating skills in Japanese language education aims (Sutedi, 2009, 2019). Based on the similarity in aims, STEAM is possible to be used in Japanese language education as a learning method. Especially because language is part of the art component in STEAM education, and it is indeed relevant.

STEAM approach and project-based learning method could be combined and usually used as a learning method. STEAM project-based learning could be implemented between each component in STEAM and other subjects such as Japanese language education to enhance students' Japanese speaking skills. As a base of the learning process, Japanese learning components, or known as learning material used in each section could be used as a science component. All of the tools that made from human that able help the user to gain their needs could be used as technology. The example of a technology component in Japanese language education could be implemented with a photo editor for each student as media to make an electronic poster. Making a solution in the process of discussion by using the Japanese language could be used as an engineering component. Producing or building something with creativity could be used an as art component. The implementation of art components in Japanese language education could be a product result such as electronic posters and presentations by using a different language such as the Japanese language. While mathematics components could be used by combining science components that are related to the numeric matter in learning material (Perignat & Katz-Buonincontro, 2019; Pugar, 2020; Winarni, Zubaidah, & Handayanto, 2016).

With that, the use and implementation of STEAM in language education, such as Japanese language education could integrate with the five components that fill in STEAM and make learning education interesting and more active in its learning process. It's also could heighten students' enthusiasm and even motived their learning process. All the components that appear in STEAM such as science, technology, engineering, art, and mathematic have different roles in each of them but are connected and supported with each other. Because of that, STEAM would make the learning process became interesting and develop many skills for each student.

Table 2. Descriptive Analysis

Speaking Skill	Experiment Class		Control Class	
	Mean	Std. Dev	Mean	Std. Dev
Pretest	42.62	25.866	64.29	17.196
Posttest	82.86	14.796	67.86	15.213
Valid N (listwise)	21	-	-	-

3.2. Descriptive analysis

Descriptive analysis is to show and describe the overview data gained from samples. In this research descriptive analysis is to show the different results of Japanese speaking skills between pre-test and post-test from both classes, experiment class, and control class refers to Table 2.

Based on the result in descriptive statistics calculated using SPSS from samples, it shows that 21 students participate as the sample for both experiment class and control class in this research. In both classes, there is an increasing score between pre-test and post-test. For the experiment class, the score of Japanese speaking skills was increased because of the application of STEAM project-based learning as their learning method. Compared to control class, the use of STEAM project-based learning through online classes in experiment class made students speaking skills increase highly. It is shown that the mean of pre-test on experiment class is 42,62 and post-test on experiment class is 82,86. Standard deviation is also shown between classes for pre-test and post-test. Based on the result it is shown that the standard deviation for the experiment class on pre-test is 25.866 and post-test is 14.796. While standard deviation for the control class at pre-test is 17.196 and 15.213.

3.3. N-Gain Analysis

Statistical Product and Service Solution software or known as SPSS was chosen as data processing to gain the perfect result in this research. The data were gained from samples by using the interview as a type of test in both pretest and posttest. Both two classes were contained with 21 students in 11th-grade students as a data collection of hotel accommodation majors in a public vocational school in Cirebon City.

The type of question in test interview as data instruments is different at each question but have similarity from each of pretest and posttest. Test instruments contain 20 questions with the essay as a type of question. Test material is related to learning materials that are given in every learning section. Online classes were done by using WhatsApp and YouTube. Both YouTube and WhatsApp could be used from smartphones or computers. Furthermore, the YouTube platform was used to give students explanations about their learning materials in each section, while WhatsApp was used to interact, give a task, do a discussion, share

all of the learning materials, and do a test both for pretest and posttest.

The test interview used to collect all of the data from the sample is using one of the features that exist in WhatsApp that called voice notes. The voice note features available in WhatsApp surely helps gain all important data from the sample more efficiently and effectively. Pre-test on experiment class was accomplished on 25 July 2020 from 7 am until 6 pm, while pretest on control class was done on 26 July 2020 from 7 am until 6 pm. Post-tests take a place at the end of the class, and it was done after the 5th section of treatment. Post-tests for both experiment class and control class were held on Friday, 18 September 2020. There is a time difference between the classes when the posttest was held. In experiment class, post-test was held from 07.30 am until 08.30 am, while post-test for control class was held from 08.30 am until 09.30 am. The time difference was based on classes' schedules given by the school itself.

N-gain is one of the data processing to show the effectiveness of some learning methods by calculating test scores that gain from samples in research. N-Gain itself was a test that compared gain actual score and gain a maximum score. The N-Gain score could be used as part of data processing if independent sample t-test. Furthermore, there is a significant result inside of it (Hartati, 2020; Nashiroh, Ekarini, & Ristanto, 2020). After collecting all of the data from each sample in both of experiment class and control class, SPSS was used to calculate all of the data. With all of the data that have been calculated using b of formulas and SPSS, it is shows the result in Tables 3.

According to the result in Table 3, it is shown that gains in N-Gain score are shown as a mean score, minimum score, and maximum score on both of experiment class and control class. It is shown after calculating all of the student's data in each of the classes. While for the mean score in experiment class, it is shown that the N-Gain score is 0,5 with a minimal score is -1,4 and the maximal score is 1. While the mean percentage score that the control class gain is 0,1 with a minimal score is -0,6 and the maximal score is 0,5. Based on the result it is showing that the mean score from the experiment class is 0,5 while the mean score for the control class is 0,1.

Based on the results, it is shown that the control class who used conventional learning methods in the online classroom is on low criteria of effectiveness. With that, the conventional learning method in the online classroom is not effective for students in 11th-grade students of hotel accommodation major in a public vocational school in Cirebon. While the criteria of effectiveness in STEAM project-based learning in enhancing Japanese speaking skills in online classrooms is on intermediate criteria. With that, it is shown that the learning method that used

Table 3. Data Result

	N-Gain Score	**N-Gain Score**
Mean	0,5	0,1
Minimal	-1,4	-0,6
Maximal	1	0,5

in experiment class is effective enough to be used in Japanese language education, especially to rise speaking skill ability.

The learning method in experiment class is on intermediate level or known as effective enough, this is happening because students understood each of the learning materials easily and practically use theoretical material in the process of learning section. Moreover, because students always practice the Japanese language in every lesson by using individual presentations through STEAM project-based learning. The practice of speaking skills in every section made students speaking skill ability in the Japanese language improve well. However, there is a negative side that appears when applying STEAM project-based learning in online classes for Japanese language education. The lack of students' readiness in mental aspects when using the method in online classes indeed appears as a negative side of the learning method. The difficulties of mental sides appeared because classes often focus based on theoretically in online classes. This is the opposite facts with how STEAM project-based learning works.

This is happening because STEAM project-based learning is an active learning method that not only listens to educator explanations but also makes students join the assignment through discussion with groups to solve a problem that is given by an educator. With that, students need to stay at every lesson from the start until the class was ended in each section (Hadinugrahaningsih Rahmawati, Ridwan, Budiningsih, Suryani, Nurlitiani, & Fatimah, 2017). More importantly because in the use of STEAM project-based learning, each of students needs to communicate orally by using presentation. Along with making a video of themselves individually while talking about the product that they made with each group. This process makes students feel the difficulty. Students have not been accustomed to doing this kind of active learning method before. Therefore, students can adjust to the active activity in each learning section of the lessons slowly.

Even though STEAM project-based learning is well known as an effective method in terms of face-to-face classes or known that both educator and students were doing a learning process in one room together while facing each other during the lesson's activity. This method shows that it could improve students speaking skill ability well. The positive result also shows when applying STEAM project-based learning in enhancing Japanese speaking skills in an online classroom that show

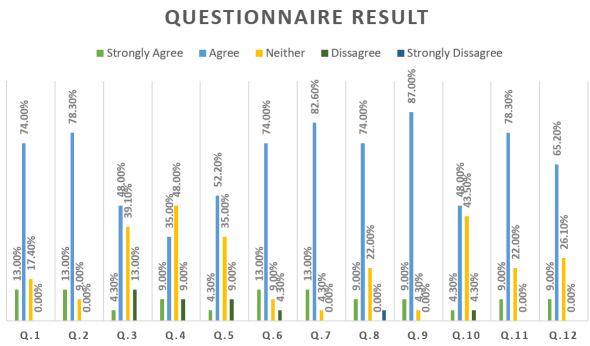

Figure 1 The Questionnaire Result of STEAM Project Based Learning.

the result is on intermediate criteria or known as effective enough. Because of that, it is important to have speaking practice in language education, such as Japanese language education. By practicing speaking skills, students could develop their communication skills by using targeted language (Tarigan, 2013). With that, even though STEAM project-based learning is showing a result as effective enough on the online classroom, STEAM project-based learning show that it could improve students speaking skill in the Japanese language through the online classroom.

3.4. The Impression of STEAM Method

Student impressions collected in this study were using a questionnaire method. Questionnaires were sent to all of 21 samples in the experiment class using google form and the results as shown in Figure 1.

Figure 1 shows very positive feedbacks from students with the use of STEAM project-based learning in enhancing Japanese speaking skills in the online classroom. STEAM project-based learning as their learning method could motivate and improve students speaking skills in the Japanese language impressively. There is plenty of samples that mention STEAM project-based learning as an interesting method that able to be used in an online classroom to raise students' enthusiast and make students more active in every learning process. The hardly use of STEAM project-based learning indeed shows at the beginning of the learning process. This is happening because of the lack of readiness in samples mentally. A lot of samples need to gain familiarity with the use and how STEAM project-based learning performance or task as a learning method in each of the learning sections. But it was solved when samples gain familiarity with how STEAM project-based learning was applied in every section as a learning process.

4. CONCLUSION

With all the data collected from both classes in experiment class and control class, it reveals that the use of STEAM project-based learning in enhancing students' Japanese speaking skills in online classrooms is effective enough and could motivate students' enthusiasm in learning or speaking the Japanese language. That occurred because there are a lot of students that showed positive feedback and were eager to speak the Japanese language actively. Furthermore, the effectiveness result in this research is part of the intermediate effectiveness criteria. While control class that used conventional learning methods in online classes is not effective because the result was shown on low criteria. The positive effect was appeared because students could easily understand learning material and even used learning material practically that made students practice their Japanese speaking skills with more of enthusiast feeling. Although the negative result occurs in this research, it's all settled when students are familiar with the use of STEAM project-based learning. However, STEAM project-based learning is effective enough to be used as an online learning method for 11th-grade students of hotel accommodation major in a public vocational school at Cirebon City. It is shown that students speaking skill in the Japanese language is improving and could actively raise student's enthusiast in the learning process. With that, STEAM project-based learning in enhancing Japanese speaking skills can be used in the online classroom.

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