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Collaborative Project Usage Analysis Steam Integration Towards Characters and Student Creativity

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Abstract

This study aims to analyze the significant influence between the use of STEAM integrated collaborative projects on the character and creativity of students of RK Delidunia Delitua Private Middle School on the KPK and FPB materials. This study uses a mixed method research design that combines quantitative and qualitative methods. This study uses an explanatory sequential design model. The stages in this study are the researcher conducting quantitative data analysis by analyzing data for test instruments in the form of essays, questionnaire instruments and interview guidelines. The population in this study were all students of class VII of RK Deliwarni Delitua Private Middle School consisting of 3 classes with a total of 93 students. The sample in this study used one class using a purposive sampling technique, namely data collection based on certain considerations. The sample to be analyzed was 6 students, each of whom was seen based on the level of ability of 2 high students, 2 medium students, 2 low students based on considerations of MID results, interviews, and observations. This study used a character questionnaire and creativity test that had gone through an expert assessment process and instrument trials, and were declared valid and reliable. Based on these findings, it shows that there is a significant influence between the use of STEAM integrated collaborative projects on student creativity in KPK and FPB materials. The results of this study are also expected so that schools can provide special training for teachers in teaching using projects in order to help students achieve the desired learning.

Keywords: *STEAM, Character, Creativity Integrated Collaborative Project*

1. INTRODUCTION

Education is one of the important aspects in shaping the character and creativity of students (Kasingku & Gosal, 2024) . Deviant characters in mathematics learning in general are cheating and a low level of independence (Mansur et al., 2022) . Students tend to be passive when given problems, as seen from the lack of a sense of responsibility of students when the teacher gives them assignments, and the lack of discipline when participating in class learning. The Indonesian Ministry of Health (2017) emphasizes the need to instill character values in students when learning mathematics in order to improve their attitudes and characters. There are several character indicators needed in mathematics learning (Maryati & Priatna, 2018) , including: discipline, honesty, hard work, creativity, curiosity, independence, communication and responsibility, obedience, respect, and tolerance .

But the reality is that currently, the character of students has declined significantly compared to the character that existed in the era before the Pandemic where students were often dishonest and irresponsible when working on practice questions because they always used Google facilities to solve problems given by teachers. Students only prioritize grades compared to the learning process (Inovasi et al., 2024) . This is what makes character education difficult to realize in online learning, which has an impact on the current era where students no longer have a sense of responsibility and honesty. (Nadila & Alam, 2024) .

Based on the results of the interview with Mr. Jupriandri as a mathematics teacher for class VII of SMP Swasta RK Delimurni Delitua, it was stated that the character of students in the class was still not good. This is evidenced by the low curiosity of students when learning because some of them often fall asleep when the learning process is taking place so that when given practice questions they will have difficulty understanding which has an impact on their assumption that learning mathematics is not fun.

With good character, especially in creative attitudes, it can improve their creativity (Lotulung & Kasingku, 2024) . Students who are diligent, curious, open to new ideas and

want to learn from their mistakes can improve their creativity (Novitasari et al., 2024) . This is based on the fact that students have the opportunity to try new ideas by thinking more creatively and innovatively in solving problems mathematically. Creativity that plays an important role in the learning process can develop their abilities and potential (Irayana & Assyauqi, 2024) .

In addition, in mathematics learning, students still have several obstacles that are often found, such as learning that is still monotonous and only centered on the teacher (*teacher-centered approach),* and the use of learning models that are not yet appropriate and varied. (Kusuma et al., 2024) . So far, technically, teachers have only assessed students' achievements in mathematics learning which only emphasizes the results, not the process, so that they cannot think flexibly. (Kusuma et al., 2024) . Students are unable to solve one problem in another way because they are used to working with a pattern of memorizing the formula given by the teacher. Students are also not fluent in conveying ideas in solving a mathematical problem because they do not understand the concept. (Dewi, 2013) . This is because students rarely discuss or repeat the lessons they have learned.

Therefore, an innovative approach is needed to create relevant and effective learning. One approach that is currently developing is the integration of collaborative project-based learning models with the STEAM (Science, Technology, Engineering, Arts, and Mathematics) approach. The STEAM integrated collaborative project-based learning model aims to encourage students to work together to complete real projects that require creativity, critical thinking, and problem-solving skills. (Mansur et al., 2022) . This approach not only focuses on knowledge transfer, but also character development such as cooperation, responsibility, and communication.

This study aims to analyze the significant influence between the use of STEAM integrated collaborative projects on the character and creativity of students at RK Delimurni Delitua Private Middle School on the KPK and FPB materials.

2. METHODS

This study uses a mixed method research design that combines quantitative and qualitative methods. This method and design were chosen because they consider the depth of coverage and complexity of the implementation of quality management in realizing quality schools, so that it requires a sequential combination of quantitative methods to produce measurable data, and qualitative methods to deepen and develop quantitative data obtained previously. This study uses an explanatory sequential design model. The stages in this study are that researchers conduct quantitative data analysis by analyzing data for test instruments in the form of essays, questionnaire instruments and interview guidelines that will be validated by experts and then tested in research and qualitative data is done by analyzing data based on the results of tests and questionnaires that have been tested (Waruwu 2023).

This research was conducted at SMP Swasta RK Delimurni Delitua located on Jalan Lorong Nogio No.117, Delitua District, Medan City, North Sumatra Province. The population in this study were all students of class VII of SMP Swasta RK Delimurni Delitua consisting of 3 classes with a total of 93 students. The sample in this study used one class using a purposive sampling technique, namely data collection based on certain considerations. The sample to be analyzed was 6 students, each seen based on the level of ability of 2 high students, 2 medium students, 2 low students based on considerations of MID results, interviews, and observations. The research instruments used in this study were questionnaires and tests.

This study uses a character questionnaire and creativity test that has gone through the process of expert judgment and instrument trials, and is declared valid and reliable. This questionnaire is given before and after learning is completed. The research data consists of two types, namely quantitative and qualitative data. Quantitative data to measure the

level of creativity and character of students using a simple linear regression test. While quantitative data as supporting data from quantitative which is inductive.

3. RESULTS

To find out what is the influence between the use of STEAM integrated collaborative projects on the character and creativity of students in the KPK and FPB materials, it is seen through hypothesis testing (simple linear regression test and F test) . A simple linear regression test is carried out to determine how significant the influence is between the use of STEAM integrated collaborative projects on the character and creativity of students in the KPK and FPB materials. The simple linear regression test is as follows:

Table 1. Results of Simple Linear Regression Test on Characters .

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.161	1	16.161	4.245	.049 [b]
	Residual	102,804	27	3,808		
	Total	118,966	28			

a. Dependent Variable: Character, b. Predictors: (Constant), Project Collaborative

Based on the results of the simple linear regression test, there is a calculated F value of 4.245 with a significant level of 0.049 <0.050, so the linear regression model has a significant influence on the two variables. To create a simple linear regression equation, see table 2.

Table 2. Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	32.0	1,922	.369	16.69	.000
	Character	7	.018		2,060	.049
		.038				

In general, the simple linear regression equation formula is Y = a + bX is a constant number and can be seen in the table above in column B with a value of 32.077. Furthermore, b is the regression coefficient number and can be seen in column B with a value of 0.038. The regression coefficient value in the table is positive, thus it can be said that disposition has a positive effect on student character. The regression equation is Y = 32.077 + 0.038. Based on the table above, it is also known that the significance value is <0.05 so it can be concluded that there is a significant influence between the use of STEAM integrated collaborative projects on student character in the KPK and FPB materials.

After conducting a simple linear regression analysis test, an F test was conducted to determine whether the use of STEAM integrated collaborative projects had an effect on student character. The results obtained from the F test are as follows:

Table 3. F test of characters

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.161	1	16.161	4.245	.049 [b]
	Residual	102,804	27	3,808		
	Total	118,966	28			

a. Dependent Variable: Collaborative project

b. Predictors: (Constant), Character

The table above shows that there is a significant influence between the use of STEAM integrated collaborative projects on student character in the KPK and FPB materials. This is because the data above meets the significance requirements ≤ 0.05. The following are the results of a simple linear regression test on the creativity variable. This can be seen in table 4 below:

Table 4. Results of Simple Linear Regression Test on Creativity

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.000	1	.000	.994	.000
	Residual	150,138	27	5,561		
	Total	150,138	28			

Based on the results of the simple linear regression test, there is a calculated F value of 0.994 with a significant level of 0.000 <0.050, so the linear regression model has a significant influence on the two variables. To create a simple linear regression equation, see table 5:

Table 5. Coefficients

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	Std. Error	Beta		
1	(Constant)	102,409	5,872		17,440	.000
	Creativity	-.021	.055	-.074	-.384	.704

a. Dependent Variable: Project

In general, the simple linear regression equation formula is Y = a + bX is a constant number and can be seen in the table above in column B with a value of 102.409. Furthermore, b is the regression coefficient number and can be seen in column B with a value of -0.021. The regression coefficient value in the table is positive, thus it can be said that the STEAM integrated collaborative project has a positive effect on student creativity. The regression equation is Y = 102.409 + -0.021. Based on table 5 above, it is also known that the value, namely the significance value <0.05, so it can be concluded that there is a significant influence between the use of STEAM integrated collaborative projects on student creativity in the KPK and FPB materials. After conducting a simple linear regression analysis test, an F test was carried out which aims to determine whether the use of STEAM integrated collaborative projects has an effect on and student creativity. The results obtained from the F test are as follows:

Table 6. F test of creativity

Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	43,453	1	43,453	.147	.704 [b]
	Residual	7969.788	27	295,177		
	Total	8013.241	28			

a. Dependent Variable: Project
b. Predictors: (Constant), Creativity

The table above shows that there is a significant influence between the use of STEAM integrated collaborative projects on student creativity in the KPK and FPB materials. This is because the data above meets the requirements listed in chapter lll, namely significance ≤ 0.05. Thus, it can be concluded that there is a significant influence in the use of STEAM integrated projects on student character and creativity. This shows that this approach can improve critical thinking, collaboration and innovation skills. The learning approach that is being developed to complement the learning model with the STEAM approach.

4. DISCUSSION

The STEAM approach is an approach that is very suitable to be applied to learning at the secondary education level because the STEAM approach helps students to deeply understand learning that emphasizes five different disciplines that students need to face various global challenges today. Through learning with the STEAM approach, each student will have and develop a broad way of thinking so that they can develop critical thinking, form logical thinking that can apply it. In addition, students will be accustomed to solving problems well. The learning process with the STEAM approach will shape the character of students who are able to reason, think creatively, logically and systematically (Supriyatin et al., 2023). The STEAM approach can be implemented with project learning given to students. Project-based learning is systematic learning that involves students in learning activities, knowledge and skills. Project-based learning is a learning that is centered on students while a teacher acts as an inspirator and motivator as well as a facilitator in learning activities so that students can play an active role, create, collaborate and innovate with all other students in STEAM-integrated learning (Nugraha et al., 2023). STEAM learning contains elements of art that influence students' creativity and independence to build a stronger creative character of students so that learning using STEAM can be realized (Hasanah & Haerudin, 2021).

This is in line with research conducted at SMP Swasta RK Delimurni Delitua where students made a project in the form of congkak which increased their creativity in solving problems. When the teacher gave the opportunity to solve problems with KPK and FPB materials without using congkak, students were often more passive in doing it, some were just silent and waiting for answers from their deskmates, some told stories, some found it difficult to do it, some were caught looking for answers via Google and some did it well but found it difficult to complete.

However, with the creation of STEAM integrated collaborative projects, students become creative and have character where in completing the questions given by their teachers they are more enthusiastic in completing them with the help of congkak so that it is easier to determine the results. This can be seen in completing it, the teacher divides groups consisting of 5 to 6 people in one group. Students are more active and no one is passive or asleep when working on making congkak, they are busy with their respective tasks that have been given to each group leader. The tasks given by the group leader include cutting aqua, cutting origami paper, dividing the cardboard parts to be used and attaching the formed aqua to the measured cardboard so that by helping students complete the questions given by the teacher more easily. Thus, there is a significant influence between the use of STEAM integrated collaborative projects on the character and creativity of students in the KPK and FPB materials.

5. CONCLUSION

Based on the results of research findings and discussions regarding the use of STEAM integrated collaborative projects on student creativity at SMP Swasta RK Delimurni

Delitua, which shows that there is a significant influence between the use of STEAM integrated collaborative projects on student creativity in KPK and FPB materials. The results of this study are expected so that schools can provide special training for teachers in teaching using projects in order to help students in achieving the desired learning.

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