



Effect of IBSC Learning Model with Qreatif Educative App on Students' Collaboration Skills

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Abstrak: Kompetensi abad 21 yang harus dimiliki siswa yaitu keterampilan kolaborasi. Keterampilan berkolaborasi siswa di kelas IV khususnya pada mata pelajaran IPA masih cenderung rendah dan juga masih menggunakan pembelajaran konvensional yaitu ceramah yang dimana dalam hal tersebut guru lebih aktif dalam proses pembelajaran. Oleh karena itu diperlukan adanya model atau media pembelajaran yang menarik, untuk mengatasi permasalahan tersebut, peneliti menggunakan model *Investigation Based Science Collaborative (IBSC)* berbantuan media pembelajaran games *Qreatif Educative* yang dirancang dengan mengintegrasikan pendekatan investigasi dan kolaboratif dengan tujuan untuk memfasilitasi siswa dalam berkolaborasi dan berkomunikasi. Penelitian ini bertujuan untuk (1) mengetahui pengaruh model pembelajaran *Investigation Based Science Collaborative (IBSC)* berbantuan media pembelajaran games *Qreatif Educative* terhadap keterampilan berkolaborasi siswa di kelas IV MIN 1 Cirebon (2) mengetahui perbedaan keterampilan berkolaborasi di kelas IV MIN 1 Cirebon. Penelitian ini menggunakan metode quasi eksperimen dengan desain *non-equivalent control group design*. Subjek yang digunakan dalam penelitian ini yaitu kelas IV A berjumlah 28 siswa dan V B berjumlah 29 siswa. Teknik pengumpulan data yang digunakan dalam penelitian ini adalah angket keterampilan berkolaborasi, observasi dan dokumentasi. Hasil dari penelitian ini adalah terdapat perbedaan yang signifikan antara keterampilan berkolaborasi pada kelas eksperimen dan kelas kontrol yaitu sebesar $0,014 < 0,05$. Hal ini membuktikan bahwa model *IBSC* berbantuan media pembelajaran games *Qreatif Educative* memiliki pengaruh yang positif terhadap keterampilan berkolaborasi siswa.

Kata Kunci: Keterampilan berkolaborasi, Model pembelajaran *investigation based science collaborative (IBSC)*, *Qreatif educative*

Abstract: The 21st century competency that students must have is collaboration skills. Students' collaboration skills in grade IV, especially in science subjects, are still low and also still use conventional learning, namely lectures, in which the teacher is more active in the learning process. Therefore, an interesting learning model or media is needed, to overcome this problem, researchers used the *Investigation Based Science Collaborative (IBSC)* model assisted by *Qreatif Educative* game learning media which was designed by integrating investigative and collaborative approaches with the aim of facilitating students in collaborating and communicating. This study aims to (1) determine the effect of the *Investigation Based Science Collaborative (IBSC)* learning model assisted by *Qreatif Educative* game learning media on students' collaboration skills in grade IV MIN 1 Cirebon (2) determine the differences in

collaboration skills in grade IV MIN 1 Cirebon. This study used a quasi-experimental method with a non-equivalent control group design. The subjects used in this study were class IV A with 28 students and VB with 29 students. Data collection techniques used in this study were collaboration skills questionnaires, observation and documentation. The results of this study showed a significant difference between collaboration skills in the experimental class and the control class, namely $0.014 < 0.05$. This proves that the IBSC model assisted by Qreatif Educative games learning media has a positive influence on students' collaboration skills.

Keywords: Collaboration skills, Investigation based science collaborative (IBSC) learning model, Qreatif educative

INTRODUCTION

In the 21st century, education is required to be competent in critical thinking, problem-solving, innovation, creativity, communication, and collaboration, as well as the ability to understand, apply, and utilize technology effectively. However, achieving these competencies is certainly not as easy as turning over one's hand (Halim, 2022). A teacher needs to equip his students with 21st century skills, this is because schools do not only provide students with an academic foundation, but also various skills such as critical thinking, creativity, problem solving, communication and also collaboration or cooperation (Altay & Mirici, 2024).

One of the skills needed in the 21st century is collaboration. The word "collaboration" generally means cooperation. (Liebech-lien & Sjølie, 2021) According (Le et al., 2018), Collaborative skills are the ability students must possess to communicate by talking to each other to share ideas, opinions, perspectives, and concepts. Collaborative skills are also crucial for achieving effective learning outcomes. Through collaboration, students can interact and work together with other students to achieve common goals (PSMA, 2017). Collaborative skills teach students to interact with their peers in the learning process, by collaborating it will be easy for students to develop cognition and also gain knowledge (Ilma et al., 2022).

However, in reality, collaboration skills are rarely specifically taught during classroom learning. Teachers tend to simply group students without providing guidance and teaching the true meaning of collaboration, thus underutilizing students' social skills (Liebech-lien & Sjølie, 2021). Cakrabuwana et al., (2025) added that classroom learning tends to be teacher-centered and competitive, not giving students much space to work together and exchange ideas, so that students are accustomed to individual learning and are less able to develop social skills that can support collaboration. Collaborative skills are not yet fully developed by students. This is based on initial observations during the School Field Introduction (PLP) activity conducted at MIN 1 Cirebon, specifically in grade IV. Students are not yet able to build cooperation with their peers. When grouped together,

some students are not actively involved during the learning process. Some assignments that should be completed in groups are only completed by a few students. Students who have a fast grasp and high understanding work on their group assignments alone or are reluctant to discuss with their group members. Conversely, students who have a slow grasp and low understanding are only busy with their own activities, such as playing around and so on. This lack of sensitivity to group assignments and projects is one sign of a lack of collaboration skills among students (Sari & Mawardi, 2023).

Based on these findings, it is concluded that efforts are needed to improve students' collaboration skills. One way to improve students' collaboration skills is by implementing engaging learning models or even learning media to motivate students to learn and achieve their learning goals.

Learning models play an important role in the learning process because they can help students to broaden and deepen the material, and make it easier for teachers to convey the material to be studied. (Lokat et al., 2022). The cooperative learning model is a model that involves students working together to achieve a common goal. The term "cooperative learning" comes from the English word "Cooperative Learning," which means learning in groups (Harefa et al., 2022). One of the cooperative learning models that can improve academic results and student cooperation is the investigation learning model (Damanik et al., 2022).

In addition to learning models, game-based learning media can also be used as evaluation materials to measure students' understanding of the material taught by teachers. Game-based learning media can also train cooperation, communication, and interaction between students. Furthermore, training students in collaborative skills using digital tools is also beneficial, this is due to the increasing development of technology and the need for teamwork in the future (Cherbonnier et al., 2025). Games or play itself is a context that creates interaction between players by following all the rules that have been made in order to achieve a goal (Citra & Rosy, 2020). Teachers can utilize a wide variety of media, including a game-based learning platform called "Qreatif Educative." This platform offers a wide variety of learning materials packaged in an interactive, high-quality application that's easily accessible from a variety of digital devices (Inafazri et al., 2024). In this case, with the existence of fun and entertaining media, a supportive environment, and meaningful learning, it will strengthen students' individual skills, such as their ability to collaborate (Fonseca et al., 2023).

The Investigation Based Science Collaborative (IBSC) learning model was created by combining scientific investigation methods with collaborative activities, enabling students to learn through discovery and collaboration with their peers. This approach not only

enhances conceptual understanding but also fosters collaboration, a skill essential in the modern workplace (Nurdin et al., 2024). The Investigation Based Science Collaborative (IBSC) learning model facilitates students' communication and collaboration skills. With the IBSC model, students can positively depend on each other (Suharti et al., t.t.).

Thus, it can be concluded that the Investigation Based Science Collaborative (IBSC) learning model is a model developed to facilitate students in practicing their collaboration skills. This is in line with research conducted by (Nurdin et al., 2024), in class XII of SMAN 10 Makassar. The study proved that the Investigation Based Science Collaborative (IBSC) learning model was effective in improving students' collaboration skills. Although the IBSC model has the potential to improve students' collaboration skills, its application at the elementary school level is still rare, and its integration with interactive game-based learning media has not been optimally explored. Therefore, this study aims to fill this gap.

Based on the background of the problem above, the researcher raised a research theme entitled "The Influence of the Investigation Based Science Collaborative (IBSC) Learning Model Assisted by Creative Educative Games Learning Media on Collaborative Skills in Class IV MIN 1 CIREBON" especially in the subject of Science on the material of Changes in the State of Objects. The aim of the research is to determine the influence of the Investigation Based Science Collaborative (IBSC) learning model assisted by Qreatif Educative games learning media on students' collaboration skills in class IV of MIN 1 Cirebon and to determine the differences in collaboration skills in class IV of MIN 1 Cirebon.

METHOD

This study uses a quantitative approach with a quasi-experimental method with a non-equivalent control group design to determine the effect of the implementation of the Investigation Based Science Collaborative (IBSC) model assisted by Qreatif Educative game-based learning media on students' collaboration skills, especially in the science subject of Changes in the State of Objects. The subjects used in this study were students of MIN 1 Cirebon, specifically in class IV A as the experimental class, totaling 28 students and IV B as the control class, totaling 29 students.

The data collection techniques used in this study were questionnaires, observation, and documentation. The data collection instruments were pretest and posttest questionnaires for collaboration skills, a collaborative skills observation rubric, and an IBSC model implementation observation sheet. Prior to the study, the researcher distributed a trial questionnaire to class V C, whose characteristics were similar to class IV, to conduct validity

and reliability tests. The validity test was conducted by expert lecturers and, with the help of SPSS version 25, the results obtained were 0.361, or ≥ 0.05 .

The data analysis techniques used were normality tests, homogeneity tests, and hypothesis tests. Normality tests are conducted to determine whether the data is normally distributed. If the data is not normally distributed, non-parametric hypothesis tests can be performed. In this study, the data the researcher had was not normally distributed. Therefore, the researcher conducted non-parametric tests using SPSS version 25.

RESULTS AND DISCUSSION

Results

The researcher conducted the research for three meetings, the first meeting was held to distribute the collaboration pretest questionnaire and explanation of the learning objectives for the second meeting. In the second meeting, the researcher carried out the learning process by conducting treatment in the form of the Investigation Based Science Collaborative (IBSC) model assisted by the Qreatif Educative games learning media in the experimental class, then applied conventional learning in the form of lectures, questions and answers, dividing simple groups, and not forgetting to use media in the form of printed images of changes in the state of objects, then filling out the observation rubric sheet for students' collaborative skills. After that, in the third meeting, the researcher distributed the collaboration posttest questionnaire, the learning model implementation questionnaire in both the experimental and control classes. After all the data was obtained, the researcher then analyzed the collection using SPSS version 25, the following are the results of the analysis that the researcher had done:

Normality Test

Researchers conducted a normality test using the Shapiro-Wilk test with a significance level >0.05 . The test criteria are as follows:

1. If the significance value is > 0.05 , the data can be considered normally distributed.
2. If the significance value is < 0.05 , the data can be considered non-normally distributed.

Table 1. Results Normality Test

	Kelas	Shapiro-Wilk		
		Statistic	Df	Sig.
Hasil	Pretest B (Kontrol)	.943	29	.117
	Posttest B (Kontrol)	.966	29	.454
	Pretest A (Eksperimen)	.939	28	.102
	Posttest A (Eksperimen)	.922	28	.040

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The table 1 above shows that one piece of data is not normally distributed, namely the experimental class posttest data of 0.040. The significance value of the experimental class posttest data is <0.05 . Therefore, it can be stated that the data is not normally distributed.

Homogeneity Test

In this case, to test the homogeneity of data variance, the researcher used a homogeneity test using the Levene statistic. The criteria for homogeneity testing are:

1. If the significance value is > 0.05 , the data has homogeneous variance.
2. If the significance value is < 0.05 , the data has non-homogeneous variance.

The following is a table of homogeneity test results using SPSS version 25:

Table 2 Results of Homogeneity Test

	Levene Statistic	df1	df2	Sig.
Nilai Based on Mean	2.999	1	55	.089
Based on Median	1.916	1	55	.172
Based on Median and with adjusted df	1.916	1	50.784	.172
Based on trimmed mean	2.699	1	55	.106

From the table 2, the homogeneity test results for significance (sig) were >0.05 , with values of 0.089, 0.172, and 0.106. These results indicate that the data have homogeneous variance. However, because the normality test results indicate that the data are not normally distributed, the researcher decided to use non-parametric tests in the subsequent analysis phases of the hypothesis test.

Hypothesis Test

The hypothesis test used by the researchers was a non-parametric one, as the results of the normality test indicated that the data were not normally distributed. Therefore, the researchers used two types of hypothesis tests to analyze the data:

1) Wilcoxon Signed Rank Test Hypothesis Test

A Wilcoxon Signed Rank Test was conducted to determine whether there were significant differences between the pretest and posttest results for collaboration in the experimental and control classes.

Researchers conducted a Wilcoxon Signed Rank Test to determine whether the IBSC learning model, supported by the Qreatif Educative game, had an effect on students' collaboration skills.

The criteria for this hypothesis testing are as follows:

- a) If the Asymp. Sig. (2-tailed) value is < 0.05 , then H_0 is rejected and H_a is accepted.

b) If the Asymp. Sig. (2-tailed) value is > 0.05 , then H_0 is accepted and H_a is rejected.

The following is a table of the results of the Wilcoxon Signed Rank Test.

Table 3. Wilcoxon Test Results

	Post-Test Eksperimen - Pre-Test Eksperimen	Post-Test Kontrol - Pre-Test Kontrol
Z	-2.843 ^b	-1.833 ^b
Asymp. Sig. (2-tailed)	.004	.067

From the table 3 above, it can be seen that the Asymp. Sig. (2-Tailed) for the pretest and posttest results of the experimental class is 0.004, which is < 0.05 . Therefore, it can be concluded that in the experimental class, H_0 is rejected and H_a is accepted, meaning there is a significant difference in the collaborative skills of students in the experimental class before and after implementing the IBSC learning model. In the control class, the Asymp. Sig. (2-Tailed) is 0.067, which is > 0.05 . Therefore, it can be concluded that in the control class, H_0 is accepted and H_a is rejected.

From the explanation above, it can be concluded that there is an effect of the Investigation Based Science Collaborative (IBSC) learning model assisted by the Qreatif Educative game learning media on the collaboration skills in science subjects of class 4A students or the experimental class.

2) Mann-Whitney U Test Hypothesis Test

Researchers conducted a Mann-Whitney test to determine whether there were differences in post-test results on collaboration skills between students in the control and experimental classes. Because the data came from different groups, the researchers used the non-parametric Mann-Whitney test. The criteria used were:

- If the Asymp. Sig. (2-tailed) value is < 0.05 , then H_0 is rejected and H_a is accepted.
- If the Asymp. Sig. (2-tailed) value is > 0.05 , then H_0 is accepted and H_a is rejected.

The following is a table of the results of the Mann-Whitney hypothesis test ranks:

Table 4. Results of the Mann-Whitney hypothesis test ranks

	Kelas	N	Mean Rank	Sum of Ranks
Hasil Angket Kolaborasi	Kelas Eksperimen IBSC	28	34.46	965.00
	Kelas Kontrol Konvensional	29	23.72	688.00
	Total	57		

Based on the results of the Mann-Whitney test as shown at table 4, specifically in the ranks table, it can be seen that the average score for the experimental class was 34.46 and the control class was 23.72. This indicates that the collaborative skills of students in the experimental class were higher.

The following are the results of the statistical hypothesis test using the Mann Whitney test:

Table 5. Results of the Mann-Whitney hypothesis test

Test Statistics ^a	
	Hasil Angket Kolaborasi
Mann-Whitney U	253.000
Wilcoxon W	688.000
Z	-2.453
Asymp. Sig. (2-tailed)	.014

Based on the criteria listed above, data on table 5 shows a significance value or Asymp. Sig (2-Tailed) of 0.014, which is < 0.05 . From these results, it can be concluded that H_0 is rejected and H_a is accepted. This means there is a significant difference between the collaboration skills of the experimental class and the control class.

Instrument Analysis Results

Analysis of Observation Results of Students' Collaboration Skills

In this study, researchers observed students to determine the extent of their collaborative skills during the learning process using the Investigation Based Science Collaborative (IBSC) model, supported by the Qreatif Educative game. The observations were conducted by the teacher, the researcher, throughout the learning process.

This assessment is carried out using a collaborative skills rubric with a scale:

2 = Sangat Baik 1 = Baik 0 = Kurang

The following is a graph of the results of the recapitulation of observation scores for collaborative skills of students in the experimental and control classes.

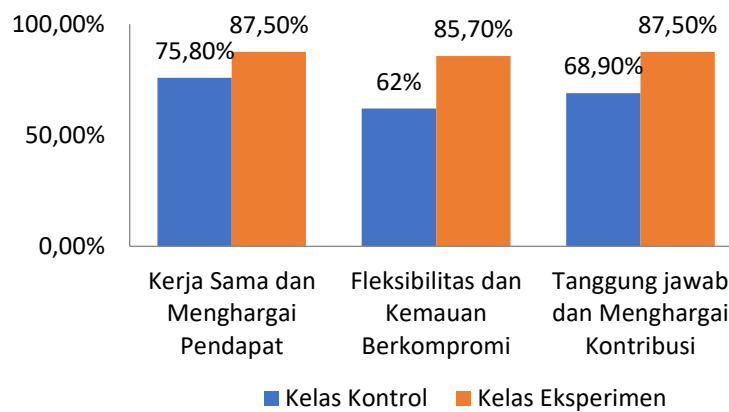


Figure 1. Graph of Observation Results of Students' Collaboration Skills

Before proceeding to the analysis, the percentage score for students' collaboration skills was obtained by comparing the scores for each aspect to the maximum score. As with the first aspect in the experimental class, the score was 49, while the maximum score for each aspect was 56. This was then converted into a percentage. Therefore, comparing the scores of 49 and 56 yields 0.875, which, when converted into a percentage, yields a score of

87.5%.

From the graph above, it can be concluded that the control class achieved an average score of 75.80% for the first aspect, while the experimental class achieved an average score of 87.5%. These percentages indicate that the students' ability to collaborate and respect opinions in the control class was categorized as good, while the experimental class received a very good score.

The second aspect, regarding flexibility and willingness to compromise, the control class achieved an average score of 62%, while the experimental class received an average score of 85.7%. This means that the control class achieved a good score for this second aspect, while the experimental class achieved a very good score.

The third aspect concerns responsibility and respect for the contributions of group members. The control class achieved an average score of 68.9%, while the experimental class achieved an average score of 87.50%. This also indicates that students' collaborative skills in the control class were categorized as good, while those in the experimental class were categorized as very good.

From these observations of collaborative skills, it can be concluded that during the learning process, collaborative skills in the experimental class, which received the IBSC learning model, were superior compared to the control class, which only used conventional learning methods.

Results of Observation Analysis of the Implementation of the IBSC Model

Observations of the implementation of the Investigation Based Science Collaborative (IBSC) model were conducted by observers, namely homeroom teachers, to observe the implementation of the IBSC model carried out by researchers. This observation sheet consists of 5 syntaxes, where each syntax consists of 3 statements, so the total number of statements is 15 items. This observation uses the Guttman scale. The following graph shows the results of the IBSC model observations carried out by the observers.

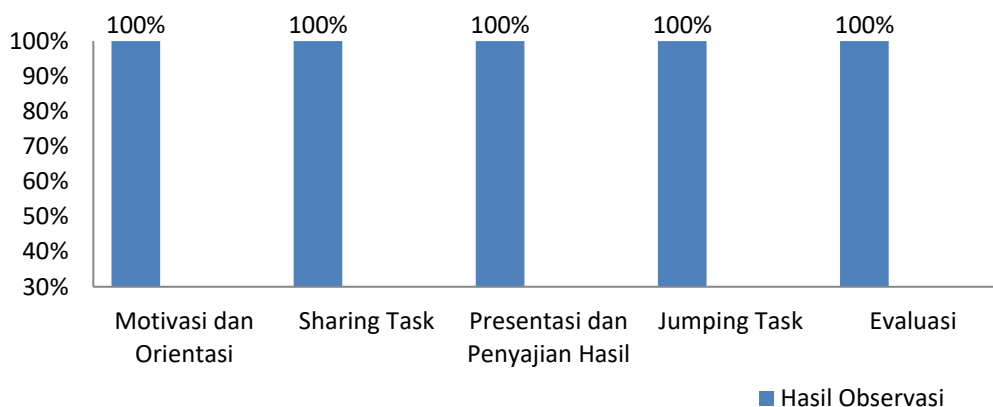


Figure 2. Graph of IBSC Model Observation Results

Based on the results of observations carried out by the homeroom teacher, from the graph it can be seen that each syntax is at 100% level, this can be interpreted that the implementation of each syntax in the IBSC learning model in the experimental class has been carried out in accordance with the statements and teaching modules that have been prepared.

Discussion

Based on the research findings described above, the following is a discussion of the research problem formulation:

1. The IBSC Learning Model Assisted by Creative Educative Games Learning Media on Students' Collaborative Skills in Class IV of MIN 1 Cirebon

According (Nurdin et al., 2024)), The Investigation Based Science Collaborative (IBSC) learning model is a cooperative learning model based on a problem. The Investigation Based Science Collaborative (IBSC) learning model was developed with the aim of training students' communication and collaboration skills (Suharti et al., 2020)). This is because in the IBSC model there are student activities to solve a problem in groups according to the wishes and expertise of each group member. (Fakhrudin & Suharti, 2021).

In addition to the learning model, researchers also added the aid of Qreatif Educative games as learning media to train students' collaboration skills. This unique media will motivate students to learn. This is in line with the opinion of (Wulandari, 2020), that learning media functions to provide more meaningful learning and increase students' learning motivation.

From the results of the hypothesis test analysis, it can be seen that the Investigation Based Science Collaborative (IBSC) learning model has a positive influence on students' collaboration skills. This is evidenced by the results of the Wilcoxon Signed Rank Test, namely the pretest and posttest scores of the collaboration skills of experimental class students obtained an Asymp. Sig. (2-Tailed) value of 0.004, which is smaller than the significance value of 0.05. In addition, when viewed from the pretest and posttest results, the experimental class experienced an increase of 7.07%. Namely, from the pretest results obtained a percentage of 78.53% then the posttest results were 85.42%.

The results of this study support the findings of Nurdin et al. (2024), who stated that the Investigation Based Science Collaborative (IBSC) learning model can improve students' collaboration skills. This is evidenced by the average score obtained after implementing the IBSC model, which was 80.94, which is categorized as high or good.

Thus, it can be concluded that the use of the Investigation Based Science Collaborative (IBSC) learning model assisted by Qreatif Educative games in science, specifically the material on changes in the state of matter, has an impact on students'

collaboration skills in grade IV of MIN 1 Cirebon.

2. Collaborative Skills of Students in Grade IV of MIN 1 Cirebon

The Mann-Whitney test was used to determine whether there was a significant difference in student collaboration skills between the experimental and control classes after the learning process was completed. The Mann-Whitney test results, specifically in the ranks table, show that the average posttest score for the experimental class was 34.46 and the control class was 23.72. This indicates that students' collaboration skills in the experimental class were higher than those in the control class.

Furthermore, the Asymp. Sig. value was 0.014, which is less than the 0.05 significance level. It can be concluded that there is a significant difference between collaboration skills in the experimental and control classes. This difference occurred due to the different treatments given to each class. The experimental class was given a learning treatment in the form of the Investigation Based Science Collaborative (IBSC) model assisted by the Qreatif Educative game learning media, where this model emphasizes students to be active and positively interdependent with their groups, especially in collaborative investigation activities.

Unlike the experimental class, which requires students to be active, learning in the control class only uses conventional methods, namely lectures and questions and answers, so that students play a passive role in the learning process. This is supported by the opinion of (Asmedy, 2021), Conventional learning models emphasize a delivery method where the teacher is more active in the classroom, while students simply pay attention and tend to be passive during the learning process. The control class also used printed images of objects as media; therefore, students' collaboration skills did not improve as rapidly as in the experimental class.

Therefore, the differences in treatment and learning models between the experimental and control classes indicate that the Investigation Based Science Collaborative (IBSC) model, supported by Qreatif Educative games, is more effective in improving collaboration skills than traditional learning.

CONCLUSIONS

Based on the results of the prerequisite test and the non-parametric hypothesis test, namely the Wilcoxon test, it shows that there is a significant difference between the pretest and posttest scores in the experimental class. Therefore, it can be concluded that there is an influence of the Investigation Based Science Collaborative (IBSC) learning model assisted by Qreatif Educative games learning media on science collaboration skills in the material

of Changes in the State of Objects in class 4 MIN 1 Cirebon. This can be seen from the results of the Mann-Whitney test obtained a result of 0.014 where the result is below the significance value <0.05 . The posttest results of collaboration skills in the experimental class are also much higher compared to the control class. So the application of the Investigation Based Science Collaborative (IBSC) model assisted by Qreatif Educative games learning media is more effective in improving students' collaboration skills compared to the application of conventional learning. The learning process with the Investigation Based Science Collaborative (IBSC) model can be an alternative for teachers when they want to improve students' collaboration skills in science learning. Furthermore, school facilities should be utilized effectively, such as as a medium for learning, to prevent students from becoming bored with only media like books and whiteboards. Therefore, teachers should be more creative in employing a variety of methods, approaches, strategies, and models that can foster students' collaborative skills.

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