

The Impact of Discovery Learning Model on Students' Collaboration Ability

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ABSTRACT

This research aims to see whether there's an impact of the disclosure learning show on the collaboration abilities of understudies at SMAN 2 Padang. The research method used was quasi-experimental with a posttest control design. Sampling in this ponder used purposive sampling and class XI phase F (physics 5) was obtained as the exploratory lesson and lesson XI phase F (physics 2) was the control class. Data on students' collaboration abilities was taken using an observation sheet evaluating students' collaboration abilities which was analyzed descriptively. To see the greatness of the impact of the disclosure learning show on students' collaboration abilities, effect size calculations are used. The results of the inquire about appeared that the normal esteem of collaboration ability of students in the exploratory lesson was (68.19 ± 2.49) with great criteria, though the average value of collaboration ability of students within the control lesson was (63.43 ± 2.45) with great criteria. The greatness of the impact of the find learning show on students' collaboration abilities is gotten from an impact estimate list of 1.9 and includes a tall category in making strides students' collaboration abilities. The application of the disclosure learning show in the learning process can be concluded to have a critical positive impact in improving students' collaboration abilities.



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INTRODUCTION

The fast advancement of innovation and data has brought changes within the arrange of social life, counting within the field of instruction. One exertion to expect and react to changes that are happening and will happen within the future is to move forward the quality of instruction (Muiz et al., 2016). The quality of instruction can be moved forward by planning a more imaginative learning framework and expanding the competency of graduates who have 21st century abilities (Zubaidah, 2018). The abilities emphasized within the 21st century are understudies being able to think fundamentally and illuminate issues, communicate and collaborate, make and upgrade relevant learning, and media education aptitudes (Ramadhani & Ratnawulan, 2022). 21st century abilities can be given to understudies through the learning prepare. The learning handle must emphasize students' capacity to think fundamentally,

interface information with genuine life, ace innovation and be able to communicate and collaborate well (Erriska & Suyanta, 2019). One of the abilities that understudies ought to have within the learning handle is the capacity to collaborate (Amran et al., 2019).

Collaboration abilities are abilities that can offer assistance in working along with other individuals. Understudies who have collaboration abilities will be able to work together in several bunches to unravel issues and accomplish common objectives (Pramudiyanti et al., 2020). (Arsanti et al., 2021), contend that in working on a extend, a individual does not continuously work exclusively but frequently together so that the capacity to collaborate is imperative for understudies in planning themselves to enter the world of work. Understudies who have collaboration abilities will discover it simple to trade thoughts, reevaluate points of view, and consider, dismiss, and acknowledge their claim conclusions and the conclusions of others.

Collaboration abilities are exceptionally critical within the learning handle. Collaboration capacities can make strides students' issue tackling aptitudes (Anngelita et al., 2020). Understudies who have collaboration abilities can effortlessly grow their information through interaction and sharing data with each other, peers, and instructors and progress their learning abilities at a better level (Priyambudi et al., 2019). (Ode et al., 2017), expressed that collaborative learning impacts understudy learning results. Subsequently, on the off chance that collaboration skills proceed to be prepared and utilized ideally within the learning prepare, students' problem-solving capacities will increment and impact way better learning results.

When conducting observations at school, it was discovered that students' collaboration abilities were still low. This can be seen from the results of observations of students' collaboration abilities in one of the state schools in Padang City. Students' collaboration abilities are shown in Table 1.

Table 1. Students' Collaboration Ability

Class	Number of Students	Average Score Collaboration Ability	Category
Physics 2	37 students	34,64	not enough
Physics 3	37 students	33,95	not enough
Physics 4	40 students	35,05	not enough
Physics 5	35 students	34,40	not enough

(Source. Observation results of students' collaboration abilities).

Table 1 appears that the average score of students' collaboration abilities in one of the state schools in Padang City is low. The contribution of students in the learning process is also still low. This can be seen from the absence of understudies providing ideas and active students being the same person. Students also do not compromise with other people when solving problems.

One way to move forward students' collaboration abilities is to utilize a learning demonstrate that creates understudies exceptionally dynamic, collaborative and communicate well through a prepare of disclosure and experimentation. One learning demonstrate that centers on students' learning exercises is the Disclosure Learning demonstrate (Haryadi & Pujiastuti, 2019). The discovery learning show could be a learning handle where understudies are given the opportunity to be more dynamic in overseeing their claim learning strategies when finding concepts, and the educator guides and coordinates students' learning activities

in accordance with learning goals (Wigati, 2019). The revelation learning demonstrate may be a learning show that includes dynamic understudies (Walo et al., 2021). Revelation Learning can energize understudies to be more dynamic in learning (Maulida et al., 2018). Learning through the disclosure learning show leads to intuitive that back the smooth learning process and understudies appear tall excitement amid the learning handle (Prasetyo & Abduh, 2021). The revelation learning demonstrate could be a learning show that suits the characteristics of material science learning (Masril et al., 2019).

The use of discovery learning models in learning can increase students' learning activeness. Fajri (2019), presented three primary characteristics of the discovery learning demonstrate. One of the most characteristics of the revelation learning show is the action of exploring and tackling issues to form, combine and generalize information. This revelation learning too centers on understudy exercises. Separated from that, this learning demonstrate moreover combines modern and existing information in learning exercises. Revelation learning makes a difference understudies create and increment preparation and secure information autonomously (Subramaniam & Sapri, 2022).

Using the discovery learning model can also improve students' abilities. (Pramudiyanti et al., 2020)), expressed that the Disclosure Learning demonstrate impacts students' collaboration abilities. This can be demonstrated by discoveries appearing that the normal assessment of students' collaboration aptitudes is higher within the test lesson than within the control lesson. The utilize of disclosure learning models in classroom learning moreover moves forward students' communication and collaboration skills (Priyambudi et al., 2019). (Balqist et al., 2019), utilizing the Disclosure Learning demonstrate within the learning handle can make strides students' collaboration aptitudes. Separated from that, this show can moreover be utilized to make strides students' high-level considering capacities.

What separates the research conducted by researchers from previous research is the material used and the indicators of collaboration ability watched. In this research, researchers used physics material specifically dynamic fluid material, temperature, heat and exchange. Moreover, the indicators of collaboration ability watched are contribution, research techniques, problem solving, working with other people, and time management in accordance with the indicators contained in the international reading association standard rubric (Read Write Think, 2005).

The hope is that by implementing this discovery learning demonstrate, collaboration abilities can increase. By increasing this ability, it is hoped that students' high-level abilities will moreover increment, which is able eventually have an impact on learning results. Subsequently, analysts are curious about conducting test inquire about at SMAN 2 Padang. The title of this inquire about is "The Impact of Discovery Learning Model on Students' Collaboration Ability".

METHODS

This research uses a quasi-experimental method consisting of an experimental class using the discovery learning model and a control class using conventional learning. The form of this research design is a posttest-only control design which is shown in table 2.

Table 2. Form of Posttest-Only Control Design

Group	Treatment	Results
Experiment	X	O
control	-	O

In this plan there are two groups, namely the experimental and control groups. The experimental group was treated using the discovery learning model (X) and the control group was treated using the conventional learning model (-). The impact of treatment is students' collaboration abilities (O) (Sugiyono, 2019).

This research was carried out at SMAN 2 Padang in five meetings from October to November in the odd semester of the 2023/2024 academic year. The population of this study was all students in class XI phase F (physics). This research sample was taken using a purposive sampling technique obtained by Physics 5 class as an exploratory course with a add up to of 35 students and Physics 2 class as a control course with a add up to of 37 students. The information collection strategy is carried out by watching the collaboration capacities illustrated by each understudy amid the learning handle utilizing an instrument within the frame of an perception sheet. This perception sheet comprises of a scoring rubric and an appraisal sheet. This perception sheet has been approved by three validators and is substantial agreeing to the calculation comes about which gotten an normal legitimacy file of 0.9. Concurring to Retnawati (2016), in the event that the legitimacy record is more prominent than 0.8, it can be said to be exceptionally substantial.

Information examination was carried out by giving a score to each explanation with respect to the collaborative abilities of each student. Another, include up the focuses gotten by each student for each collaboration ability articulation. To decide the rate of scores gotten for each collaboration ability articulation, it is calculated by including up the scores of all understudies at that point separating by the most extreme score and increasing by one hundred percent. At that point, utilizing the normal rate of the evaluation for each articulation gotten, at that point calculate the normal rate of the appraisal of collaboration ability by including up the rate score for each explanation isolated by the number of articulations at that point duplicated by one hundred percent.

The appraisals gotten are at that point partitioned into interims utilizing criteria agreeing to Arikunto (2010), which are changed over into a few categories. To begin with, a score within the extend of 81 to 100 is categorized as very good. secondly, a score within the extend of 61 to 80 is categorized as great. third, a score in the run of 41 to 60 is categorized as sufficient. The four scores ranging from 21 to 40 are categorized as destitute. Fifth, a score extending from to 20 is categorized as very destitute.

To see the magnitude of the influence of the discovery learning model on students' collaboration abilities, the effect size was calculated. To calculate the effect size, Cohen's formula is used which is referred to from (Becker, 2000):

$$Effect\ size = \frac{\mu_1 - \mu_2}{\sqrt{\frac{Sd_E^2 + Sd_K^2}{2}}}$$

μ_1 is the normal esteem of the exploratory lesson. μ_2 is the normal esteem of the control lesson. Sd_E is the exploratory lesson deviation standard and Sd_K is the control lesson deviation standard.

RESULTS AND DISCUSSION

Results

The data obtained in this research is data from the observation sheet on students' collaboration abilities. The data that has been obtained in the research is then analyzed for each indicator. This collaboration ability indicator consists of five indicators. Each indicator consists of one to four statements. The percentage of average scores for indicators of students' collaboration abilities is as follows.

The first indicator of collaboration ability is contribution. This indicator consists of three statements. The percentage of average scores for contribution indicators in the experimental class and control class can be seen in Figure 1.

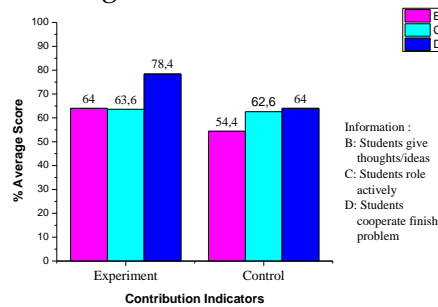


Figure 1. Percentage of Average Contribution Indicator Scores in the Experimental and Control Classes

Based on Figure 1, it can be seen that the average score of contribution indicators in the experimental class is higher than in the control class. In the first statement, students provide ideas. It can be seen that the average score percentage for this statement in the experimental class was 64% in the good category, whereas in the control class it was 54.4% in the sufficient category. In the second statement, students play an active role. The percentage of the average score for this statement in the experimental class is higher than the control class. The average score percentage on this statement was 63.6% for the experimental class in the good category and 62.6% for the control class in the good category. In the third statement, students work together to solve problems. The percentage of the average score for this statement in the experimental class is higher than the control class. The average score percentage on this statement was 78.4% for the experimental class and 64% for the control class. The average score category for both classes is good.

The second indicator of collaboration ability is inquiry techniques. This indicator consists of two statements. The percentage of average scores for investigative technique indicators is presented in Figure 2.

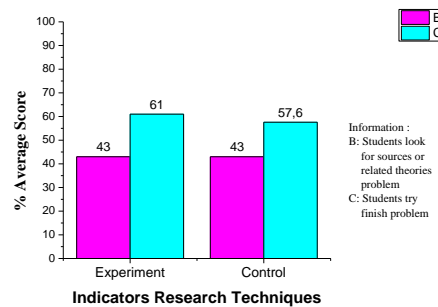


Figure 2. Percentage of Average Scores for Research Technique Indicators in the Experimental and Control classes

Based on Figure 2, it can be seen that the average score of the investigation technique indicators in the first statement is the same and in the second statement the average score for the experimental class is higher than the control class. The first statement is that students look for sources or theories related to the problem being discussed. It can be seen that the average percentage score for this statement in the experimental and control classes is 43% in the sufficient category. In the second statement, students record the information obtained. The average percentage score on this statement was 61% for the experimental class in the good category and 57.6% for the control class in the sufficient category.

The third indicator of collaboration ability is problem solving. This indicator consists of two statements. The percentage of average scores for problem solving indicators is presented in Figure 3.

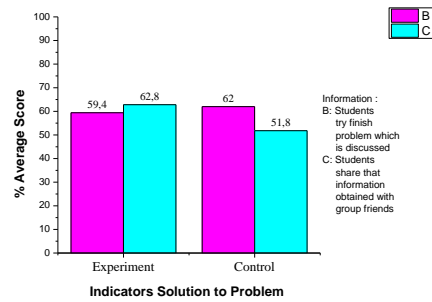


Figure 3. Percentage of Average Scores for Problem Solving Indicators in the Experimental and Control Classes

Based on Figure 3, it can be seen that the average score of the problem solving indicators in the first statement for the experimental class is lower than in the control class and in the second statement the average score for the experimental class is higher than the control class. In the first statement, students try to solve the problems discussed. It can be seen that the average percentage score for this statement in the experimental class was 59.4% in the sufficient category and in the control class was 61% in the good category. In the second statement, students share the information obtained with their group friends. The average score percentage for this statement was 62.8% for the experimental class in the good category and 51.8% for the control class in the sufficient category.

The fourth indicator of collaboration ability is working with other people. This indicator consists of four statements. The percentage of average scores for indicators of working with other people is presented in Figure 4.

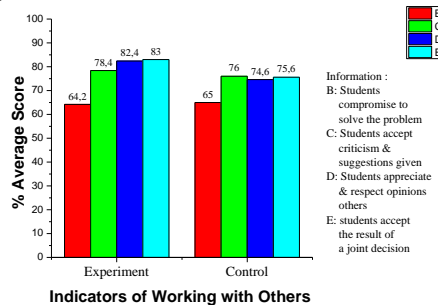


Figure 4. Percentage of Average Scores for Working with Others Indicators in the Experimental and Control classes

Based on Figure 4, it can be seen that the average score of contribution indicators in the first statement of the experimental class is lower than that of the control class, whereas in the second, third and fourth statements the average score of the experimental class is higher than the control class. In the first statement, students compromise to solve problems. It can be seen that the average percentage score for this statement in the experimental class was 64.2% and the control class was 65%. The average score category for both classes is good. In the second statement, students accept the criticism and suggestions given. The average score percentage on this statement was 78.4% for the experimental class and 76% for the control class. The average score category for both classes is good. In the third statement, students value and respect other people's opinions. The average score percentage for this statement was 82.4% in the very good category and 74.6% for the control class in the good category. In the fourth statement, students accept the results of joint decisions. The average score percentage for this statement was 83% in the very good category and 75.6% for the control class in the good category.

The fifth indicator of collaboration ability is time management. This indicator consists of one statement. The percentage of average scores for time management indicators is presented in Figure 5.

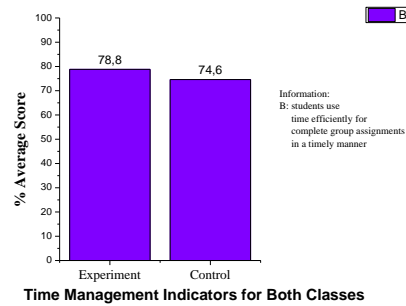


Figure 5. Percentage of Average Score of Time Management Indicators in Experimental and Control Classes

Based on Figure 5, it can be seen that the average score of time management indicators in the experimental class is higher than in the control class. This statement is about students using time efficiently to complete group assignments on time. It can be seen that the average percentage score for this statement in the experimental class was 78.8% and the control class was 74.6%. The average score category for both classes is good.

The average score of indicators of students' overall collaboration abilities in the experimental class and control class is presented in Figure 6.

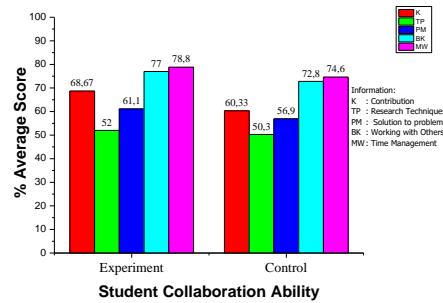


Figure 6. Percentage of the Average Score of Students' Collaboration Ability in the Experimental and Control Classes

Based on Figure 6, it can be seen that the average score for each indicator of students' collaboration abilities in the experimental class is higher than in the control class. In terms of contribution indicators, the average score of the experimental class was 68.67% in the good category, while the average score of the control class was 60.33% in the good category. In terms of investigative technique indicators, the average score of the experimental class was 52% in the sufficient category, while the average score of the control class was 50.3% in the sufficient category. In the problem solving indicator, the average score of the experimental class was 61.1% in the good category, while the average score of the control class was 56.9% in the sufficient category. On the indicator of working with other people, the average score of the experimental class was 77% in the good category, while the average score of the control class was 72.8% in the good category. In terms of time management indicators, the average score of the experimental class was 78.8% in the good category, while the average score of the control class was 74.6% in the sufficient category.

The magnitude of the influence of the discovery learning model on students' collaboration abilities is calculated using the effect size. The data obtained is presented in the following table.

Table 3. Data Analysis of the Influence of the Discovery Learning Model on Collaboration Ability

$\bar{x} \pm SD$ Class <i>Experiment</i>	$\bar{x} \pm SD$ Class <i>Control</i>	Index Effect Size	Category
68,19 ± 2,49	63,43 ± 2,45	1,9	High

Based on Table 3, it can be seen that the normal collaboration ability of students in the experimental class is 68.19 and the standard deviation is 2.49. The normal collaboration ability of students in the control class was 63.43 and the standard deviation was 2.45. From the results of calculations using Cohen's formula, an effect size of 1.9 was obtained, which according to (Becker, 2000), an effect size of 1.9 contains an expansive interpretation, meaning that the use of the discovery model has an impact on students' collaboration abilities.

Discussion

Based on the overall observation results, the collaboration ability of the experimental class was higher than that of the control class. This is in line with research by Priyambudi et al (2019), Pramudiyanti et al (2020), and Syafii (2022), which states that the discovery learning model can improve students' collaboration abilities. This can be seen from all indicators of collaboration ability observed in the experimental class which were higher than the control class (Figure 6). The contribution indicator of students' collaboration abilities in the experimental class is higher than in the control class. This is observed from the students' ability to provide ideas, play an active role during group discussions, and work together to complete LKPD as a group.

In the investigation technique indicator, collaboration abilities in the experimental class were higher than in the control class. This is observed from students' ability to search for sources or theories and record the information obtained. In terms of problem solving indicators, the collaboration ability of experimental class students is higher than that of the control class. This is observed in students' ability to try to solve problems and share information obtained with friends. In the indicator of working with other people, collaboration abilities in the experimental class were higher than in the control class. This is observed in students' ability to compromise to solve problems, accept criticism and suggestions given, appreciate and respect other people's opinions, and accept the results of joint decisions. In terms of time management indicators, collaboration abilities in the experimental class were higher than in the control class. This is observed in students' ability to use time efficiently to complete group assignments on time.

The increase in students' collaboration abilities in the experimental class occurred because the learning process used the discovery learning model. During learning, students are trained to always collaborate well in completing LKPD in groups with the help of steps from the discovery learning model. According to Hosnan (2014) states that the discover learning model can improve students' abilities in solving problems, develop skills, self-confidence in making the right decisions and can help students to strengthen their concepts. This is because students can work together with other students and encourage students to be active in the learning process. Apart from that, students are also encouraged to be able to think critically in identifying problems. The discovery learning model provides students with the opportunity to work together with their group to identify a problem. Using this model can encourage students to actively work together in discovering and carrying out scientific investigations. The discovery learning model can stimulate students to be enthusiastic and active in solving various problems, as well as making classroom conditions conducive, especially when students are discussing. This is in line with (Maulida et al 2018), the use of discovery learning models in learning can increase students' learning activeness.

This research is still constrained to dynamic fluid materials, temperature, heat and exchange. It is trusted that future research will utilize more complex materials with a more extensive space.

CONCLUSION

Based on the results obtained, students' collaboration abilities in the learning process using the discovery learning model provide an increase in each meeting. The results of the collaboration ability of students in the experimental class were 68.19 ± 2.49 in the good category and in the control class the collaboration ability of students was 63.43 ± 2.45 with good criteria. The magnitude of the influence of the discovery learning model on students' collaboration abilities, calculated using the effect size, was 1.9, which means it has a high influence in improving collaboration abilities. It can be concluded that the discovery learning model has a high impact on students' collaboration abilities.

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