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Improving student's self-efficacy through inquiry learning model and modeling in physical education

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ABSTRACT

The study aims to reveal the effect of inquiry learning model with modeling application to improve students' self-efficacy. Single-mastery and multiple-coping are used in the modeling. The study used nonequivalent pre-test and post-test control group design. The first experimental group received the inquiry learning model treatment with single-mastery modeling. The second group received received the inquiry learning model treatment with multiple-coping modeling. The direct learning model applied to the control group. Eighty seven students from three classes were taken as research sample using cluster random sampling technique. The treatment lasted for six meetings which were divided into one meeting every week. The instrument used is the physical education self-efficacy scale which was developed in this study based on Bandura's self-efficacy theory. Paired sample t-test and ANCOVA were used to analyze the data. In the two experimental groups, there was significant increase in students' self-efficacy through the application of the inquiry learning model with single-mastery modeling and the inquiry learning model with multiple-coping modeling. Inquiry learning model with multiple-coping modeling is more effective in increasing students' self-efficacy than inquiry learning model with single-mastery modeling and direct learning model.

Keywords: self-efficacy, inquiry learning model, modeling.

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INTRODUCTION

In recent years, self-efficacy is considered to have become one of the notable factors that can determine student achievement in physical education learning (Chen et al., 2012; Raven & Pels, 2021). Self-efficacy refers to a belief in someone's ability to be able to perform the necessary actions for a desired goal (Bandura, 1997). Self-efficacy in physical education can be interpreted as students' confidence in their success in a movement task given by the teacher (Jackson et al., 2012). Self-efficacy helps people determine how much effort they put into activities, how long they can endure in the face of obstacles, and how resilient they are in dealing with inappropriate situations. (Schunk & Pajares, 2010). Self-efficacy belief is an important factor for students to participate in physical education, especially for students who have to struggle to overcome their low mobility skills. Physical education learning that uses physical activity and movement skills often makes students who have low movement skills feel inferior compared to students who have high movement skills.

In order to promote meaningful learning, since 2013, the Indonesian curriculum has changed in terms of the application of learning which was previously teacher-centered to student-centered (Mulyasa, 2013). This is done as an effort to make learning at school meaningful. One of the student-centered learning models that can be used in physical education learning in schools is the inquiry learning model. The inquiry learning model is a learning model that uses a problem-

solving process as a learning approach. Metzler (2017) explains that in the inquiry learning model the teacher frames the problem by using questions, giving students some time to create and investigate one or more solutions or answers that make sense. Learning that emphasizes the problem-solving process is proven to increase students' self-efficacy (Chung & Ro, 2004; Luo, 2019).

Several studies of problem-solving-based learning models in physical education learning reported a positive impact on creativity (Juliantine et al., 2022) and physical fitness (Tarigan, 2021; Uzunosmanoglu et al., 2012). However, research related to inquiry learning models in physical education is still very little. Although the previous inquiry learning model was not commonly used in physical education learning, skills in inquiry learning such as observing, classifying, proposing hypotheses, testing, etc., are often applied in everyday life even in the context of sports (Millar, 1993). The inquiry learning model contains four learning phases, namely analyzing problems, proposing hypotheses, testing hypotheses, and drawing conclusions (Østergaard, 2016; Wright et al., 2013). In the application of the inquiry learning model in physical education, the teacher does not only ask students about what students want to learn in physical education lessons at school, but the teacher must ensure that students witness and experience the problem-solving process (Lynott & Bittner, 2019).

Self-efficacy can also be influenced by observational learning. Schunk (2012) explains that people obtain information about their self-efficacy in an area of ability from their practice in that field, observations of models (experience through observation), forms of social persuasion, and indexes. Physiological indices (eg, heart rate, sweating). According to the cognitive social theory of modelling, observers try to match their responses to what the model does through cognitive representations of the information contained in verbal or visual demonstrations. This information is then stored in memory and then translated in motion when there is an opportunity to present it (Weiss et al., 1998).

Observational learning or commonly referred to as modeling is one of the learning strategies for physical education (Metzler, 2017). Modeling is an activity to imitate the movement demonstrated by a model (Bandura, 1986). Observational learning applied in physical education learning has been shown to have a positive impact. One of the advantages of observational learning is that it can improve students' movement skills (Han et al., 2022).

In fact, the conditions of students at school can vary and differ from one another, including in terms of psychomotor (Lyngstad et al., 2022). Physical education learning that uses physical activity media and movement skills makes students have various levels of self-efficacy (Gao et al., 2010). Whereas physical education learning that promotes high student self-efficacy can have a positive impact on student motivation and behavior (Usher & Pajares, 2008), student persistence in demanding physical challenges (Gao et al., 2008), future health behavior (Peers et al., 2020), and higher participation and self-efficacy for future success (Chase, 2001). Curriculum changes in Indonesia that lead to student-centered learning, do not rule out the application of learning that can also promote student self-efficacy through observational learning. However, there is no research on the impact of the inquiry learning model on self-efficacy in physical education learning. In addition, there is no research that reveals how the role of observational learning is implemented in physical education learning models. Therefore, this study focuses on the impact of the inquiry learning model combined with different observational learning on increasing students' self-efficacy levels.

METHOD

This research is an experimental study with a nonequivalent pre-test and pos-test control group design. This study tested the inquiry learning model and two kinds of modeling, namely single-mastery and multiple-coping modeling. In single-mastery modeling, one student is selected by the teacher to demonstrate a movement task with minimal errors, express self-confidence, positive attitude, and high ability. While in the multiple coping model, several students were appointed by the teacher to demonstrate learning and task performance in stages, stating self-confidence statements from low to high levels, attitude statements from negative to positive,

ability statements from low to high levels, and task difficulty statements from high to low level. This study involved three experimental groups with two experimental groups and one control group. In the first experimental group, an inquiry learning model with the application of single-mastery modeling was implemented. In the second experimental group, an inquiry learning model was applied with the application of a multiple-coping model. In the control group, the direct or traditional learning model was implemented as a comparison for the experimental group.

The population of this study was the seventh-grade students of Madrasah Tsanawiyah 1 Bone located in Bone Regency, South Sulawesi Province, totaling 537 students divided into 18 classes. The sample in this study was selected through cluster random sampling technique. Samples were taken by randomizing the population and then three classes were taken to be given treatment according to the research design used. Furthermore, the three selected classes were randomized again to be placed as the experimental and control groups. The total number of students from the three classes selected as samples was 87 students.

The instrument used is the physical education self-efficacy scale which was developed in this study based on the theory of self-efficacy (Bandura, 1997). The instrument is also prepared based on the Indonesian physical education learning curriculum that uses a variety of sports activities such as soccer, basketball, and volleyball. this instrument measures students' confidence in their ability to practice the basic techniques of big ball games in physical education learning. The rating scale on this scale uses a Likert scale consisting of five response options, namely strongly disagree, disagree, neutral, agree, and strongly agree.

Before being used as a data collection tool, this scale was first tested by psychologists. After the expert test, the scale was then tested on 32 other junior high school students who had the same characteristics as the research sample. After that, the instrument validity test was carried out using the Pearson Product Moment correlation on each statement item. After the validity test, 32 items of valid statements were obtained. After testing the validity of the instrument, then the instrument reliability test is carried out and the instrument is declared reliable with a reliability coefficient of 0.91.

The study lasted for 8 weeks. In the first week, the pre-test was administered. in the same week the teacher selected students who would act as models both as mastery models and as coping models. The treatment of the learning model was carried out in the second week to the seventh week. The treatment was scheduled for six meetings. In one week, there was only one meeting according to the physical education learning schedule in junior high school. At the eighth week, the post-test was administered. The following are the learning materials that are included in the application of the learning model during this study.

Tabel 1. Subject Material Taught

Activitiy	Meeting	Subject Material
Implementation of Learning Model and Modelling	1	Basketball (dribbling)
	2	Basketball (chest pass)
	3	Football (dribbling)
	4	Football (passing)
	5	Volleyball (serve)
	6	Volleyball (passing)

Before testing the research hypothesis, the data requirements were first tested with normality test, homogeneity test, and homogeneous regression slopes as a test of requirements before conducting the ANCOVA test using SPSS 22 software. The normality test was carried out to determine whether the data obtained were normally distributed or not. Normality test used is Kolmogorov-Smirnov. The homogeneity test of the data was carried out after the normality test. Homogeneity test was conducted to determine whether the data obtained came from a homogeneous sample or population or not. The homogeneity test in this study used Levene's test. After that, the homogenous regression slopes test was carried out as a test of requirements before carrying out the ANCOVA test.

After the normality test and homogeneity test, the hypothesis was tested. Hypothesis testing is carried out to obtain conclusions from the data obtained. The test was conducted to determine whether there was a significant effect of the inquiry learning model on students' self-efficacy. The statistical technique used to test the hypothesis of this research is the paired sample t-test and the ANCOVA test using SPSS 22 software on a computer.

Paired sample t-test was used to determine whether there was an increase in student self-efficacy scores in the experimental group. While the ANCOVA test was used to determine whether there was an influence of the learning model on students' self-efficacy. ANCOVA was used in the design of this study because ANCOVA is considered better in analyzing the results of research using pre-test and post-test compared to using gain scores (Gall et al., 2015).

FINDING AND DISCUSSION

Finding

This study reveals the effect of inquiry and modeling learning models on increasing the self-efficacy of junior high school students. In the results of the data normality test, it can be seen that the three research groups are in the normal criteria.

Tabel 2. Normality test of pre-test and post-test of experimental and control group

Group	Data	n	Sig.
Inquiry Single-Mastery Model	Pre-test	29	0.985
	Post-test	29	0.741
Inquiry Multiple-Coping Model	Pre-test	28	0.964
	Post-test	28	0.902
Direct	Pre-test	30	0.812
	Post-test	30	0.831

Based on the data from the student's self-efficacy normality test in the table above, it can be seen that the significant values of the pre-test and post-test data for the inquiry group with single-mastery modeling are 0.985 and 0.741. The significant values of the pre-test and post-test data for the inquiry group with multiple-coping modeling were 0.964 and 0.902. Meanwhile, the significant values of the pre-test and post-test data in the direct group were 0.812 and 0.831. It can be seen that the significance value of the six data above is greater than 0.05, it can be concluded that the six data from the three groups in this study are normally distributed.

The homogeneity test of the data used in this study was the Levene Statistic test at a significance level of = 0.05. The following are the results of the homogeneity test of the students' self-efficacy pre-test and post-test data in the table below.

Tabel 3. Homogeneity test of pre-test and post-test grup

	Levene Statistic	df1	df2	Sig.
Pre-test	1.414	2	84	.249
Post-test	1.749	2	84	.180

Based on the data from the homogeneity test results of students' self-efficacy in the table above, it can be seen that the significant value of the pre-test data for the three groups is 0.249. Meanwhile, the significant value of the post-test data for the six groups was 0.180. It can be seen that the significant value of the pre-test and post-test data of the three groups is greater than 0.05, it can be concluded that the pre-test and post-test data of the three groups in this study are homogeneous.

The results of the homogenous regression slopes test show that the significance value of the interaction between the learning model and the pre-test is 0.777. This significance value is greater than 0.05 so that the regression slope is homogeneous. Therefore, ANCOVA testing can be continued. The average score of student self-efficacy is shown in the table below.

Tabel 4. Self-efficacy Scores of the Experimental and Control Group

Group	N	Test	Mean	SD	Sig.
Inquiry Single-Mastery	29	Pre-test	90.27	13.44	0.000
	29	Post-test	97.13	13.93	
Inquiry Multiple-Coping	28	Pre-test	83.39	12.60	0.000
	28	Post-test	97.17	13.30	
Direct	30	Pre-test	89.90	9.93	0.596
	30	Post-test	90.36	10.80	

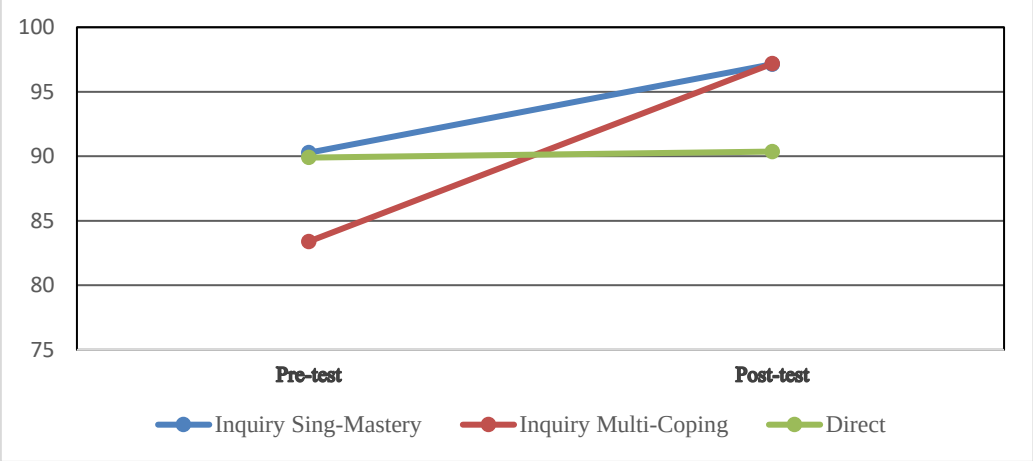

Figure 1. Pre-test and Post-test Scores of Students' Self-efficacy

On the average score of students, it can be seen that there is an increase in the average value of student self-efficacy in the experimental group using the inquiry learning model with single-mastery modeling and the group using the inquiry learning model with multiple-coping modeling. This increase can be seen from the post-test average score which is greater than the pre-test score. In the control group using the direct learning model, there was also an increase in the average score of students' self-efficacy, as seen from the post-test score which was also greater than the pre-test score.

To see the increase in scores in the three experimental groups, the pre-test and post-test data were analyzed by t-test. In the experimental group, the single-mastery inquiry learning model shows that the significance value in the comparison of the pre-test and post-test scores of students' self-efficacy is 0.000 so it can be concluded that there is a significant increase in the self-efficacy scores of students who follow the inquiry modeling learning model. single-mastery. In the experimental group of multiple-coping inquiry learning modeling, it can be seen that the significance value in the comparison of the pre-test and post-test scores of students' self-efficacy is 0.000 so it can be concluded that there is a significant increase in the score of self-efficacy of students who follow the inquiry modeling learning model. multiple-coping. In the control group that followed the direct learning model, it was seen that the significance value in the comparison of students' pre-test and post-test scores of self-efficacy was 0.596 so that although there was a difference in average scores, there was no significant increase in the scores of students' self-efficacy scores. which follows the direct learning model.

Furthermore, the ANCOVA test was conducted to examine the effect of the three groups of learning models on the post-test scores of students' self-efficacy. The test criteria is if the significance value (Sig) <0.05 then there is a significant difference in the effect of the three learning models on students' self-efficacy. From the results of the ANCOVA test in Table 4.8, it can be seen that the significance value of the learning model variable is 0.000. This significance value is smaller than 0.05 so that without the influence of pre-test or students' initial scores, there is a significant difference in students' self-efficacy scores from the three learning models. In other

words, there is an influence of the learning model on students' self-efficacy. From the post-test score, it can be seen that the post-test score on the inquiry learning model with multiple-coping modeling is greater than the inquiry learning model with single-mastery modeling and direct learning model.

Discussion

In general, self-efficacy is a person's assessment of his own ability to carry out certain behaviors in achieving certain goals (Berliner & Calfee, 2013). This study tries to reveal the increase in student self-efficacy according to the context of a curriculum that emphasizes student-centered learning. According to Bandura's social cognitive theory, self-efficacy beliefs influence the choices people make when undertaking and performing the behaviors they pursue. People tend to focus on the tasks they feel they can and believe they can do, and avoid the ones they cannot do. (Bandura, 1995). Having high self-efficacy can not only lead students to be able to do tasks in learning but can also have a wider impact. Self-efficacy can even have an impact on student achievement (Rafiola et al., 2020), student emotional management (Navarro-Mateu et al., 2020), student satisfaction with learning (Aldhahi et al., 2022), and can even affect student engagement in learning (Sökmen, 2021).

Self-efficacy and expectations of outcomes have different meanings. Self-efficacy refers to a person's perceptions of his capabilities to produce actions while expectations of results are beliefs about the results to be obtained from these actions (Flammer, 2015). In this study, student self-efficacy is a student's belief in being able to practice the movement skills assigned by the teacher. One of the problems of students in learning physical education is their inability to complete movement tasks which they think are quite difficult, especially for students who do not have sufficient experience of movement activities before.

Data analysis showed that students following the inquiry-based learning model significantly improved their self-efficacy scores. This proves that the inquiry learning model can increase students' self-efficacy. This finding is in line with previous research which revealed an increase in student self-efficacy through the application of the inquiry learning model in science (Tuan et al., 2005), art (Chung & Ro, 2004), and computer (Sulistiyo & Wijaya, 2020). This finding supports the inquiry learning model theory which is also said to be able to improve affective aspects. Metzler (2017) suggests that many teachers who use the inquiry learning model place affective learning ahead of psychomotor learning for self-awareness, exploration, creativity and self-concept. The cognitive domain is always the highest priority, but after that the teacher hopes to help students feel good about themselves in their moving environment. Therefore, it is clear that the inquiry learning can form students' good feelings towards themselves in learning. This finding is also in accordance with what Adisusilo (2012) stated that the inquiry learning model is even claimed to be able to improve cognitive, affective, and psychomotor aspects together. Inquiry which is essentially a learning model that places students as problem solvers requires the teacher to use questions in leading students to solve motion problems. Therefore, the success of students in solving motion problems is able to create a feeling of satisfaction in students.

The results of this study also show that inquiry-based learning models are more effective than direct learning models in increasing students' self-efficacy. These results are in line with previous research conducted by (Kamal & Suyanta, 2021) which compared increasing student self-efficacy through inquiry learning models and directly in science lessons. The results of the study revealed that there was an increase in student self-efficacy in both groups of learning models but the inquiry learning model was more effective than the direct learning model.

Successful experience is able to produce high self-efficacy in students. (Bandura, 1997) explains that success builds a person's strong personal efficacy. This means that when people experience success, they will have high self-efficacy for subsequent success. But the success in question is the success that is obtained not in an easy way. If people get success the easy way, they will tend to expect quick results and will easily give up when experiencing failure. The inquiry learning model requires students to solve their own problems so that the success obtained by students is not success obtained in an easy way (Pedaste et al., 2015). This is different when

students get information directly from outside themselves when they get a problem, this is certainly easier. In the direct learning model, students' experience of success is not built cognitively but through repeated practice. This is what distinguishes the possible psychological effects caused by learning models that are constructive in solving problems and drill-based learning models.

Data analysis results also show that inquiry-based learning models using multiple coping modeling are more effective in enhancing students' self-efficacy than inquiry-based learning using single mastery modeling. This finding is in line with the research of (Schunk et al., 1987) who found that multiple models and coping models were better at promoting self-efficacy, skills, and exercise performance compared to single models. This is also in accordance with research conducted by (Weiss et al., 1998) who found a greater increase in self-efficacy of students who observed the peer-coping model compared to students who observed the peer-mastery model and students who did not observe the model at all in swimming lessons. Suherman (2009) suggests that if pinpointing or modeling is carried out by more than one student, it will allow students not to feel reluctant or embarrassed, instill confidence in those who do the demonstration, and provide standard guidelines for those who see it to do the same. Therefore, the modeling factor also plays a role in the difference in students' self-efficacy scores in the three experimental groups in this study.

Modeling in physical education learning is used to provide an overview of the movement so that mistakes can be avoided (Mödinger et al., 2022). Modeling has also been shown to increase self-efficacy on students' academic performance (Raedts et al., 2007). In physical education learning, the model can be carried out by teachers and students. Suherman (2009) explains that in doing pinpointing, teachers do not always have to choose students with high skill levels but can also choose students whose skills are relatively low but the aspects that they emphasize are still reflected in these students. This is to motivate students who do it and also to those who see it so that it will give the impression that the movement is not difficult even for students with less skills.

In physical education learning, modeling both by the teacher (teacher-modeled demonstration) and by students (peer-directed modeled) are types of communication strategies that can be used by physical education teachers to present a lot of information to students (Metzler, 2017). On the other hand, experience is not the only main source of information on one's abilities (Bandura, 1997). Vicarious experience (experience that feels like one's own) is also one way to increase one's confidence about his abilities through modeling.

This study reveals differences in the effectiveness of learning models with modeling on increasing students' self-efficacy in learning physical education. There is still very little research that has been done that reveals the effectiveness of the inquiry learning model showing the importance of research in this area. On the other hand, relying on curriculum changes, it requires an understanding of meaningful learning designs for children in physical education learning.

CONCLUSION

Based on the research findings, the inquiry learning model and modeling can improve students' self-efficacy. In addition, research also proves that multiple-coping modeling is more effective in increasing students' self-efficacy compared to single-mastery modeling. This study fills the gap in the lack of empirical evidence of the effectiveness of the inquiry learning model in physical education so that it can be useful for physical education practitioners in implementing scientific-based learning models.

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