



## EXAMINING THE EFFECT OF INQUIRY-BASED LEARNING ON STUDENTS' LEARNING PERSISTENCE

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### **Abstract:**

This study aims to reveal the effect of inquiry-based learning strategies to students' learning persistence in science subjects in junior high school. The design of this research was pre-test post-test control group design. Learning Science is done by stages of inquiry learning in grade 8 students for six meetings in the experimental class with 16 students of class 8. In the classroom controlled learning with conventional strategy was employed. The results showed that there was a significant effect of inquiry-based learning strategy on student's learning persistence.

**Keywords:** persistence in learning, inquiry-based learning, conventional learning strategy

### **1. Introduction**

In order to develop the maximum potential of learners, it is very important for educators to develop life skills which include emotional and social skills. There are five social and emotional skills that encourage the students' academic success, self-control, persistence, mastery orientation, academic self-efficacy and social competence (Chien et al., 2014). Student's persistence in learning promotes the students to overcome difficulties in learning with the time specified. Learners develop their role by

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consciously trying continually in order to achieve learning goals, despite the difficulties, challenges and even despair feeling.

Persistence in learning or learning persistence is an ability of students in doing a continuous effort and struggle to achieve the target and objective of learning in accordance with the time period of learning although the students in the future of learning encounter a boredom feeling, difficulties, and challenges. Within learning persistence, aspect included is the student self-confidence. It deals with how the students is confident to accomplish learning assignment, time management of particular learning (Li, 2004, Foll et al., 2006; Vanteenkiste et al., 2004), learning objectives accomplishment, and students continuous struggle (Bedard et. al., 2012, Chien et al., 2012, Schunk et al., 2008, Bandura, 1986).

Within the notion of learning persistence, the role of the teacher as an educator is to hand over assistance during the learning process. In this case, learning persistence belongs to teacher's responsibility. The teacher is required to ensure that the students spend their time to do the assignment and any learning activity or commonly known as time on task (Slavin, 2009). Time on task is not a students' activity that deals only with behavioral activity, but also time on task deals with an emotional commitment for learning activity (emotional commitment to academic). For instance, the student is required to demonstrate writing activity, being involved in an assignment on learning, reading aloud, silent reading, posing a question. Supplementary, student is also required to promote their attention, encourage their contentment feeling in learning, and actively involved in any academic activity. Learning persistence commonly occurs the moment the student encounters a difficulty and challenges within the learning. Learning persistence is not only defined as how the students engage in the learning but also it is how the student, in the near future, could transfer what they obtain in learning to their real life.

The learning persistence that take place the moment the student encounters difficulty, challenges, and even feeling hopelessness requires an assistance from the teacher. The support of educators or teachers in the learning process for a student that continues to be persistent is the establishment of a positive learning climate that makes student becomes motivated. The establishment of positive learning climate of learners could be encouraged and developed by employing inquiry based learning method. Inquiry-based learning is a method for learning and teaching that places student questions, ideas and observations as the center of the learning experience. Educators or teachers play an active role during the process by building a culture where ideas are challenged, tested, redefined and viewed as developed, making children ask questions and interrogate further to gain understanding (Scardamalia, 2002). With the process of searching for such knowledge is expected learners persistence can increase.

Research on the effects of inquiry-based learning strategy (IBL) was done by Joyce et al. (2009), which claim that an inquiry-based learning strategy influences scientific research skills and learning persistence. Kabapinar and Simsek (2010) discover that IBL positively influences the effectiveness of science learning such as conceptual understanding of the material and the scientific process. The effectiveness of IBL on learning achievement is also discovered by Pandey et al. (2011) by comparing IBL learning strategies with conventional learning strategies. The effects of IBL on student motivation (Master et al., 2005), problem-solving (Michalopoulou, 2014). IBL is also effectively used in social science learning, which is effective in building knowledge and responsibility (Shih et al., 2010). Some of the above studies investigate IBL from the academic aspects of cognition. This study intends to examine the effects of IBL strategies from the academic side of behavioral, namely the effects of IBL strategies on persistence in student learning.

## **2. Method**

### **2.1 Design and Subject of Research**

This research used the design of pure experimental research with pre-test and post-test control group design. The subjects were randomly selected to be placed in the experimental class and control class. Subject selection is based on the subject's need for additional science lessons according to the junior high school curriculum. Subjects who enrolled to attend the additional program of science materials (IPA) there are 32 students. 32 students were divided into two groups: the experimental class consisted of 16 students (5 boys and 11 girls) and 16 control classes (5 men and 11 women) from Madrasah Tsanawiyah Al-Ihsan Jombang East Java. The experimental group was conducted by inquiry-based learning strategy, while the control group was conventional learning. The treatment was carried out for six meetings with a different material which comprised of four Biology materials and two Physics materials. Each meeting was conducted for 2x35 minutes. The pre-test was performed before treatment in both groups. Likewise, the post-test was performed after treatment in both groups.

### **2.2 Measurement and Instruments**

Learning Persistence Scale measures the students' persistence in facing difficulties, boredom and challenges of learning tasks in achieving learning objectives with the efforts and strategies that students can undertake. To the best of author's knowledge, the scale of learning persistence has not been found and generated. Persistence Scale for Children from Lufi and Cohen (1987) is a measure to measure the persistence of children's life in general which includes the academic aspect. Motivational Persistence

Scale (Constantine et al., 2011) is a measure of the persistence of motivation which is the development of various instruments on motivation. Both of the above instruments are not suitable for measuring persistence during learning by students in their adolescent period. Measurement of persistence in learning was using measurement scale of learning persistence which was composed based on learning persistence construct. Constructive persistence of learning is the result of the study of theories from some literatures suggested by Wigfield and Eccles (2000), Wigfield and Cambria (2010), Schunk et al. (2008), Foll et al. (2006), Lufi and Cohen (1987), Chien (2012), Peterson and Seligman (2004), Li (2004) and Vanteenkiste et al. (2004). The learning persistence scale is derived from exploratory factor analysis test to examine the validity of learning persistence construct. Based on the theoretical study of the learning persistence, the components of learning persistence include (a) goal setting; (B) belief in the ability to perform tasks (c) efforts conducted; and (d) time on task is the effective use of time to learn. The learning persistence measuring instrument consists of 35 items in the form of 5 Likert Scale. The results of exploratory factor analysis obtained 14 points of learning tenacity with significance > 0.5 and reliability of Alpha Cronbach 0.843. The questionnaire was used to measure learning persistence before treatment and after treatment in the experimental group or control group.

### 3. Results

In accordance with the result of this present study regarding inquiry-based learning and conventional learning strategy on eight graders of junior high school. It was discovered that inquiry-based learning significantly influences learning persistence of the student compared to the conventional learning strategy. In this present study, Science Subject was used which was conducted in six meetings.

**Table 1:** Treatment on group tested

Group	Treatment	School
Experiment	Inquiry-based learning	MTs Al-Ihsan Jombang Jawa Timur
Control	Conventional learning	

Table 1 above explains that this present study involves two different groups which were divided as experiment group and control group. In control group, the researcher employed conventional learning strategy in Science Subject. While in experiment group, the researcher employed inquiry-based learning strategy in Science Subject. The two group tested in this present study were all the students from MTS Al-Ihsan Jombang.

**Table 2:** Average score of the two group tested

Group	Mean	SD	N
Experiment	58,94	0,372	16
Control	46,63	7,070	16
Total	52,78	8,791	32

The Table 2 above present the average score of the two tested group, experiment group, and control group. Table 2 above indicated that the average score of learning persistence of the experiment group using inquiry-based learning is higher that control group which employed conventional based learning. The score above was obtained from the learning persistence measurement after the two tested group were being employed the two different learning strategy.

**Table 3:** Post-test score of Experiment group and Control group

Group	Total subject	Post-test	
		M	SD
Control	16	46,63	7,070
Experiment	16	58,94	5,372

The Table 3 above presents the score obtained by students in both experiment group class and control group class on post-test. Further, the result of post-test obtained by both group will be analyzed using one-way covariance analysis by controlling pre-test score result. Further, the result of ANCOVA analysis is presented in the following Table 4.

**Tabel 4:** ANCOVA analysis result

Tests of Between-Subjects Effects						
Dependent Variable: Pasca_Tes						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1457,830 <sup>a</sup>	2	728,915	22,544	,000	,609
Intercept	688,492	1	688,492	21,294	,000	,423
Kelompok	519,128	1	519,128	16,056	,000	,356
Pra_Tes	245,049	1	245,049	7,579	,010	,207
Error	937,638	29	32,332			
Total	91543,000	32				
Corrected Total	2395,469	31				

a. R Squared = .609 (Adjusted R Squared = .582)

The above Table 4 exposes the results of one-way variance analysis. The results above indicates that the post-test result between experiment group class and control group class, a significant difference occurs by controlling pre-test score result ( $F=7,579$   $p<0,05$ ).

In addition, the results above also indicates that experiment group class which were given by inquiry-based learning within their Science Subject could enhance the students' learning persistence. The implementation of inquiry-based learning in this present study, surprisingly, enhanced the learning persistence of the students about 35%.

**Table 5:** Category of Students Learning Persistence

Range	Category
Less than 33	Low
33-51	Average
52-70	High

The Table 5 above presents the category of students' learning persistence pursuant to the maximum and minimum score from fourteen item in the questionnaire. The maximum score is obtained by multiplying the higher score with the number of item(s), which is  $5 \times 14 = 70$ . While the minimum score is  $1 \times 14 = 14$ .

**Table 6:** Students' Learning Persistence Results based on Category Above

Score Range	Category	Frequency	Percentage
Less than 33	Low	-	0
33-51	Average	2	12,5
52-70	High	14	87,5
Total		16	100

Table 6 indicates that predominantly students' persistence is considered in high category with 87.5%. While only two students are considered as in average category (12.5%). Surprisingly, no student is considered as low category in learning persistence.

#### 4. Discussion

The results of covariance analysis test show that learning with inquiry-based learning strategy can influence persistence in learning within students. Persistence of students in doing learning tasks aims at achieving learning objectives within the time specified, although in achieving it there are difficulties, boredom, and challenges. This study is in line with previous research conducted by Joyce et al. (2009) mentions that the persistence as accompanist effect (*nurturant effect*).

In addition, this research is in line with Rozek (2012) and Lavigne et al. (2007) who discover that learning with a strategy that allows students to have autonomy in the learning process makes students persistent in doing learning tasks. Vanthournout et

al. (2012) further explain that learning strategies that use cognitive processing approach can improve persistence in learning. While Springer et al. (1997) found that learning in Science, Technology, Engineering, and Mathematics (STEM) proved effective in increasing the persistence of learning as well as to promote academic achievement and a positive attitude to learning. Harris and Rooks (2010) proved that classroom management with inquiry-based strategy with the involvement of scaffolding teachers make students diligent in learning tasks, i.e. carry out the process of inquiry well.

Supplementary, this study discovers that learning using inquiry-based learning in classroom management strategies with small groups and also with the scaffolding from the teachers improve student persistence in learning. Learning using inquiry-based learning strategy on middle school students remains to require the guidance from the teachers to make the students conduct the instruction of learning correctly. Communication and feedback to students are continuously given by the teacher to lead students toward to discover answers regarding questions in inquiry-based learning. Based on the results of this study that the inquiry-based learning strategy at junior secondary students are not effective if it is done with an open inquiry without the guidance of a teacher. Teachers still play an important role in directing the inquiry process goes well with the use of a device provided by the teacher in the form of steps a student must do. Subsequent research is needed to see the teacher's role in the inquiry-based learning strategies and instrument needed from the inquiry that still needs the guidance of teachers until the open inquiry.

## **5. Conclusion**

Inquiry-based learning is proved able to influence student's learning persistence. Students whose in the initial conditions have low persistence, in the next condition after using inquiry-based learning strategy is able to increase their persistence in learning. The process of finding the knowledge of the student still require the guidance of teacher scaffolding to assist the process of learning discoveries. Difficulties, challenges, and obstacles can be overcome by students through peer discussion in study groups, reading the literature and ask the teacher. The teacher's role is still very important in the process of this inquiry. The role of the teacher to make sure the process of inquiry run smoothly and in addition, it makes the students experience the process of discovering knowledge based on their own learning experience. Reinforcement and feedback teachers are also required to ensure the results of inquiry in accordance with the purpose of learning.

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