

## Reflection session in the ‘Basics of Biology Learning’ Lecture: Pre-service Biology Teacher’s Perspective in Choosing Learning Method/Model

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### ABSTRACT

This study was done during the reflection session at the end of the ‘Basics of Biology Learning’ lecture. In the lecture, the students learned about many types of learning methods and models. The study was carried out to strengthen the learning material. The research problem is related to pre-service teaching students’ confusion about choosing a learning method/model. The objective of this study is to obtain information from pre-service biology teachers’ perspectives about choosing a learning method and model within a biology lesson. Their preferences of learning methods and models was based on their reasoning. The subjects of this study were five biology pre-service teaching students who attended the lectures for one semester. The interview method was used in this study; interviews were based on one open-ended question to allow the teachers to express their personal viewpoint. The result showed that, as biology teachers, their preferred methods were the discussion method, scientific model (inquiry and problem based learning) and cooperative learning. Based on the results, the teachers’ learning method and model preferences depended on their reasoning and the way the lecturer presented the material during the lecture. At the end of the lecture, as a conclusion, there was a reflection session to find out more about students’ perspective regarding their learning during the session.

**Keywords:** reflection session; learning method; learning model; biology; pre-service teacher

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## INTRODUCTION

This study was initiated based on the preliminary observation, which suggested that pre-service students are curious about innovation when teaching biology. This study was carried out during reflection sessions at the end of the ‘Basics of Biology learning’ lectures. During each lecture, the pre-service teachers learned about teaching innovation, strategies of teaching, and models and methods of teaching. The general purpose of this lecture was for teaching students to be able to explain the basic concepts of biology learning, which relates to the biology learning process, strategy and planning. One of the specific purposes of this lecture is for students to understand the difference between biology learning approaches, strategies and models.

A teaching model is a description of the learning environment. According to Joyce and Weill (2002), there are four learning model classifications. They are the social model, the behavioral model, the information processing model and the personal model. The characteristics of a good model are that they have scientific procedure, a specific and clear learning outcome, a suitable learning environment and a clear teaching process. Some experts develop several models of teaching, including problem-based learning, inquiry and the learning cycle. Each model has its own characteristics that support students’ learning. For effective teaching, a good teacher must adopt an effective method. After choosing a learning method and considering the learners’ background knowledge, the teacher should then write lesson plans. A pre-service teacher must learn to recognise the right model to deliver material in biology lessons. During the learning process, teachers play an important role in the effective implementation of the curriculum through the use of learning methods. So, effective teaching methods are the key to a successful learning process. A study showed that teaching methods indicate learning strategies based on instructional strategies to promote learning (Dorgu, 2015). For this reason, teachers must be wise when choosing a learning method. Another study by Lange et al. (2012) showed that teacher pedagogical content knowledge contributes to students’ learning outcomes. Meanwhile, Karen and Beckford (2010) argue that, to support their pedagogical competencies, pre-service teachers need to be guided in how to practice teaching methods.

Several teaching strategies and methods are suitable for teaching science. Tanner and Allen (2004) argue that the choice of teaching strategies in science classrooms is based on the students and environment and that it should help students learn science effectively. This statement supports the main idea of pre-service teachers’ perspective in choosing learning models and methods for the teaching of biology. Selected teaching methods should support learning in biology, to practice biology, and to learn about problem-based learning and group investigation in biology (Jeronen et al., 2017). According to Dorgu (2015), Lange et al. (2012), Karen and Beckford (2010) and Jeronen et al. (2017), teachers must be able to choose learning methods as part of their pedagogical competencies. Understanding pre-service teachers’ perspectives regarding the choosing of learning methods and models, as well as recognising their ability to absorb lecture

materials about teaching strategies, methods and models, are facilitated by this research as described in the methodology section.

## METHODOLOGY

This study was an exploratory study. Tapilouw et al.(2018) argue that gathering teachers' ideas could be the first step for research. The five subjects of this study were all pre-service biology teachers who attended the 'Basics of Biology Learning' lectures. The classes were small and the study was done during four reflection sessions at the end of the lectures. One open-ended question was asked: 'Which learning model/method would you choose if you were a biology/science teacher?' During each of the four reflection sessions, the pre-service biology teachers were asked to answer this open-ended question. When the question had been answered, the responses were gathered and analysed. The core purpose of the analysis was to see improvement in the answers over time. The paradigm of this study was qualitative research and the researcher was involved in this research.

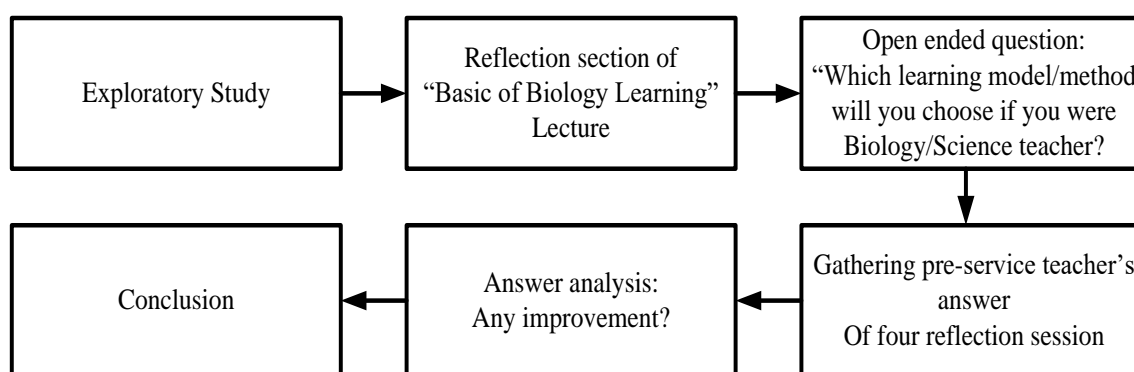


Figure 1. The research procedure

The answers was analysed qualitatively to recognise an improvement based on the 'Basics of Biology Learning' lectures. Based on Fraenkel and Wallen (2006), qualitative research can be used to understand a phenomenon by analysing the perceptions of the participants. A conclusion is written at the end of the research. The justification of the conclusion is to obtain information about the paradigm in the methods and models of learning based on pre-service biology teachers' perspectives and their progression into being biology/science teachers.

## RESULT AND DISCUSSION

According to the introduction and methodology, four groups of data were based on four reflection sessions during the 'Basics of Biology Learning' lecture. As mentioned previously, pre-service teachers were asked to answer the same question at the end of each reflection session. The first lecture discussed basic concepts and terminology about biology learning, such as learning strategies, learning approaches, learning models and learning methods.

Table 1. The answers from the first reflection

Number	Reason
1	Biology/science teachers choose learning methods based on the ability of their students, which they must understand. When using the <b>discussion</b> method, students must learn
2	actively and the teacher must be well prepared.
3	With <b>discussion</b> , the teacher can talk about a case that motivates student in relation to the lesson and their experiences. A biology/science teacher also gives an assessment on the group activity.
4	Students will learn actively through <b>discussion</b> because there are interactions between
5	students. The students and teacher will reach the learning objective. The <b>discussion</b> method is effective but can be time consuming. Biology/science teachers can motivate passive students into becoming active student during <b>discussions</b> .

From Table 1, all of the pre-service teachers who attended the ‘Basics of Biology Learning’ lecture said that they would use the discussion method if they were biology/science teachers. There are five reasons for choosing this learning method. The first reason is that students must learn actively and teachers must prepare the lesson well. The other role of the teacher besides teaching the lesson is that they motivate students to learn through active discussion. Another reason is that there are interactions between students during discussions. Based on the pre-service teachers’ reasons, the discussion method is more effective because it encourages students to be active during their learning.

According to Dallimore et al. (2004), the benefits of discussion are abundant, including encouraging students to participate. Biology and science teachers have an important role in encouraging students to be active during discussions. Through discussion, students explore concepts using materials and other students’ ideas. Table 1 shows that teachers can motivate passive students in becoming active students. However, it also shows that teachers should increase the quality of discussion. A discussion must be effective (Dallimore et al., 2004), so teachers must ask clear questions to initiate quality discussion. To motivate students during discussions, an open-ended question can increase the implementation of active learning. Through discussion, students can learn how to ask a good question and how to answer others’ question, either in group or class discussions.

At the end of the next ‘Basics of Biology Learning’ lecture, the second reflection took place. As mentioned in the methodology, the pre-service teachers were required to answer the same question. The second lecture specifically discussed learning methods.

According to the information in Table 2, three pre-service teachers chose hands-on laboratory activities as a method and two of them, again, chose the discussion method. Based on their answers, they described different reasons. The first and second were the pre-service teachers’ reasons for choosing the discussion method. This shows that difficult concepts can be more understandable and transferable. This result show that discussion is an effective method. However, biology/science teachers must be able to provide hands-on laboratory activities during biology/science lessons; a combination of these two learning methods can be used.

Table 2. The answers from the second reflection

Number	Reason
1	With <b>discussion</b> , biology/science teachers can explain their intentions with some concepts, especially complex and difficult concepts, so they can be better understood.
2	The <b>discussion</b> method can be used when teaching difficult concepts so that knowledge transfer between students can be more effective.
3	<b>The hands-on laboratory activity</b> method will help students understand biology/science concept/ matter, especially from a cognitive skills perspective. Biology/science teachers can combine this method with the discussion method; students
4	can exchange their opinions about biology/science concepts. <b>Hands-on laboratory activity</b> is a method that helps students learn skills in
5	biology/science learning. When participating in <b>hands-on laboratory activities</b> , students will be skilled in using laboratory equipment and will be able to compile a scientific report.

Three pre-service teachers stated that they would use hands-on laboratory activity if they were biology/science teachers. They expressed their reason for their selection. The first reason is that this method can be combined with the discussion method. Another reason is that hands-on laboratory activities help students develop their skills, especially laboratory skills. According to Haury and Rillero (1994), students in a hands-on science programme will remember the material better and will be able to transfer learning experiences. This method allows students to learn and engage in constructing a knowledge process.

The third reflection took place at the end of the next 'Basics of Biology Learning' lecture. As mentioned in the methodology, pre-service teachers were expected to answer the same question at the end of each reflection session. The third lecture discussed learning methods that were specifically used in biology/science learning. The pre-service teachers were very enthusiastic about this lecture focus. According to Table 3, one pre-service teacher chose the discovery learning method, three pre-service teachers chose the inquiry learning method and two pre-service teachers chose the problem-based learning method. Their answers provided different reasons for their perspective. The first reason was from the pre-service teacher who chose the discover learning method; the second, third and fourth reasons were related to inquiry-based learning, and the fifth was related to problem-based learning. Inquiry, discovery learning and problem-based learning are suggested learning methods in the National Curriculum. According to Joyce and Weil (2002), problem-based learning, inquiry and discovery were developed by experts.

Table 3. The answers from the third reflection

Number	Reason
1	In <b>discovery learning</b> , students are challenged to be skilled and develop cognitive ability. It is because students must find concepts from a problem and mix old and new concepts so they can understand the biology/science concept holistically.
2	With <b>inquiry</b> learning, cognitive aspects are encouraged because inquiry learning is
3	student-centered.
4	Through <b>inquiry</b> , students can develop their creativity, skill and scientific attitude for
5	data analysis. <b>Inquiry</b> can develop students' skills in investigative problems. <b>Problem-based learning</b> is connected to real-world problems, so students can develop their skill in solving such problems.

Based on the results, only one pre-service teacher argued that students would be challenged to develop their skills and cognitive ability if teachers used discovery learning as a method in biology/science learning. In discovery learning, students learn the concept through discovery, which is one form of content-orientated activity (Hammer, 2009). However, three of the pre-service teachers chose inquiry learning. They argued their reasons for choosing inquiry learning methods: (1) the cognitive aspect will be encouraged; (2) students can develop their creativity, skill and scientific attitude; (3) students can develop their investigation skills. According to Blyth (2010), inquiry-based methods allow students to interact with their surroundings, ask questions and draw conclusions. Inquiry elevates cognitive development to the highest levels of Bloom's taxonomy. Alongside discovery learning and inquiry learning, one pre-service teacher chose problem-based learning and argued the reason that problem-based learning is connected to real-world problems and initiates students to develop their skills in problem solving. With all of the learning methods, teachers must create a situation in which they construct environments to promote a successful learning process and help students to learn science (Tanner & Allen, 2004).

The fourth reflection took place after the last 'Basics of Biology Learning' lecture. As mentioned in the methodology, the pre-service teachers were expected to answer the same question after each reflection session. The fourth lecture discussed cooperative learning in biology/science.

According to Table 4, one pre-service teacher chose Team Games Tournament (TGT), two pre-service teachers chose the jigsaw learning method and two pre-service teachers chose the Student Team Achievement Division (STAD) learning method. Their answers showed different reasons for their choices. The first and second are related to the jigsaw learning method. The third explains the reason for choosing TGT. The fourth and fifth are related to choosing STAD.

Table 4. The answers from the fourth reflection

Number	Reason
1	I chose the <b>jigsaw learning model</b> because it can activate students' knowledge in cooperative learning.
2	A class will be active if the biology/science teacher uses <b>jigsaw learning</b> .
3	When using <b>Team Games Tournament (TGT)</b> , students will be motivated to answer questions because they earn points.
4	Through the <b>Student Team Achievement Division (STAD)</b> , active interaction between students occurs because it promotes good competition.
5	<b>The Student Team Achievement Division (STAD)</b> learning model can increase student activity and is an interesting model.

Cooperative learning is commonly used in science classes. Science teachers often face the fact that they have to cope with teaching a lot of material within a short time, which is one reason they use cooperative learning (Herreid, 2002). According to Table 4, there are two reasons for using the jigsaw learning model. The first reason is that it can activate students' knowledge. The second reason is that classes are more active. Lazarowitz et al. (2002) argue that learning goals and materials are structured by the teacher and are divided into independent sub-units, which can be learned separately. A pre-service teacher expressed that they would use TGT because students will be motivated to answer questions. Two pre-service

teachers would use STAD because it can increase student activity and activate interaction between the students. Different cooperative learning models have their own benefits. The core of cooperative learning is to challenge students in using information in new ways and creating new understanding (Ransdell, 2003).

Results show that there are reasons behind choosing a learning method/model. This result is in accordance with Dorgu (2015), Lange et al.(2012), Karen and Beckford (2010) and Jeronen et al. (2017). Teachers must be able to choose learning methods as part of their pedagogical competencies. From the results, there is a trend in which pre-service teachers choose learning methods that were based on the topics of the lecture on the 'Basics of Biology Learning'. The pre-service teachers gave reasons for choosing their learning methods with, so there is a rationale behind the selection. Preferences in learning methods will inspire pre-service teachers to be good teachers especially in relation to pedagogical competency.

## CONCLUSION

Based on the study's results, the main conclusion is that biology pre-service teachers' perspective about choosing learning methods and models for biology lessons depended on the given knowledge during the lecture session. Biology teachers play an important role in choosing learning methods because a teacher is a defining factor for successful learning. Pre-service teachers must obtain enough material through lectures, so when they become teachers, they will determine the correct learning methods in accordance with their students' learning needs. The implication of this study is a recommendation of advanced research about lesson plans based on chosen learning methods and models; this would support our understanding of the links between learning methods and models and lesson plans.

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