

# Emotional and Spiritual Quotient Approach Improve Biology Education Students' Acceptance of Evolution Theory

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**Abstract.** Emotional and spiritual aspect is one of main factors that influence students' acceptance of a theory. This study aim to measure university students' acceptance of evolution by learns evolution using emotional and spiritual quotient (ESQ) approach. This is a quasi-experimental research using one shot case study design with the subject 36 biology educational students at Biology Department, Faculty of Mathematics and Natural Science, Universitas Negeri Padang. Data collected using the MATE instrument by Rutledge and Warden (2000) after the students learn evolution for eight meetings since January until March 2017. The result showed that by learning evolution theory combine with ESQ aspects increase students acceptance from very low become moderate acceptance. It concluded that ESQ aspects can improve students' acceptance of evolution. Any criteria depend on it are discussed.

## 1. Introduction

Acceptance of evolution theory research has been conducted in some research [1], such as in United States [2], Europe [3] and Indonesia [4], because it is essential to know by educators. Some people accept the evolution theory but they do not understand it at all, and the others understand on it but do not believe this theory [5]. This condition should be a big consideration for teacher or lecturer in teaching evolution [4].

Some studies reported some factors that influence students' acceptance of evolution, for instance: students' understanding of biological evolution from school [1], the way of teacher teaching evolution [4, 6], religions [4, 7] and other factors such socio-cultural factors [8]. Religious, social, and emotional factors are the key factor for people to accept evolution, whether religious is the most dominant factor for person who rejects evolution theory [9]. Additionally, personal religious belief is the most aspect associated with acceptance of evolution [10].

In the site of religious, emotional and spiritual quotient (ESQ) is one approach to develop students literate in finding the truth [11]. ESQ can improve students' achievement in some life aspects, such as goal achievement and problem resolution, and it can be done by train [12]. Therefore, this approach predict as one solution to improve students' acceptance of evolution. Therefore this research conducted to know students' acceptance of evolution after learning evolution using ESQ approach.

Other research has reported the ambiguities of the effect of learning toward acceptance of evolution. For example, [13, 14] stated that instruction improve acceptance. On the other hand, [15, 16] reported that no progress of acceptance from learning, but it influence by other factors. This



research combine instructional factor by learning evolution and other factors such emotional and spiritual aspects in learning, then measure the effect of it.

This study conducted to know the effect of using emotional and spiritual quotient approach in teaching evolution for university students toward their acceptances of evolution. It was a preliminary research to develop a product for teaching evolution in university level by lecturer when teaching evolution theory. Thus, our study assessed students' acceptances after they learn evolutionary course at Biology Department. The research question guiding this investigation was: "Do the using of emotional and spiritual quotient approach improve the level of biology students' acceptance of evolution theory?"

## 2. Method

This research was a quasi experimental research using one shot case study design. This design applied by focused on the changes of students' attitude toward evolution, especially their acceptance on it. This research stopped until mid semester because there was significant change for students' acceptance of evolution. The detail of this study method explains as follow.

### 2.1. Participants

The participants of this study were biology education students who took Evolutionary course in the January-June semester of 2017 at Biology Department, Faculty of Mathematics and Natural Science, Universitas Negeri Padang. In this semester, there were three parallel classes which amount of 36, 34 and 27 students (total 97 students). This study only used one class as the participant that was chosen by purposive sampling technique, which was the class in amount of 36 students.

### 2.2. Measures

Students' acceptance of evolution at the beginning (before learn evolution in university) asked using one question about their acceptance of evolution: "Do you accept the truth of evolution theory?" After students taught the evolution theory using emotional and spiritual quotient approach for eight meetings (until mid term), students' acceptance level measured with MATE instrument questionnaire [17]. Furthermore, students' perception of evolution identified by open-ended questionnaire.

The MATE instruments used because it has been tested based on the reliability and validity to assess acceptance of evolution among teachers [17], university students [18], and recommended by [1] as one of the good instrument to classify level of students' acceptance in evolution.

### 2.3. Analyses

There was three step of scoring the MATE instruments [18], as follow.

Step 1. Scoring of positively-phrased items (1, 3, 5, 8, 11, 12, 13, 16, 18, and 20) is as follows; strongly agree = 5; agree = 4; undecided = 3; disagree = 2; and strongly disagree = 1.

Step 2. Scoring of negatively-phrased items (2, 4, 6, 7, 9, 10, 14, 15, 17, and 19) is as follows; strongly agree = 1; agree = 2, undecided = 3; disagree = 4; strongly disagree = 5.

Step 3. An individual score on the MATE is equal to the sum of the scaled responses to all 20 items.

By using those 3 steps, the MATE is scored with the lowest level of acceptance being 20 to the highest level of acceptance being 100. To determine the category level of acceptance, [17] provides the following scores and categories:

- 89-100 = Very High Acceptance
- 77-88 = High Acceptance
- 65-76 = Moderate Acceptance
- 53-64 = Low Acceptance
- 20-52 = Very Low Acceptance.

For scoring the questions that followed MATE instruments are: agree = 1 and disagree = 0. All the response of students calculates in percentage. The reasons that stated by students in the open-ended questionnaire is the supplementary data for MATE result.

## 3. Results and Discussion

At the beginning of the evolutionary course meeting, students asked to answer the questions about their perception of evolution as general, whether they accept it or not. Dominantly, students answer

that they do not accept evolution as the right theory. It means that only 16.67% students accept evolution theory. This value is in very low acceptance criteria (20-52) [17].

After eight meetings of using ESQ approach in evolution learning, students were asked to tell their acceptance of evolution theory by the concepts addressed by the MATE [18], and it showed a significance change, that average students in the value of 70.17. This value is in moderate acceptance of evolution (65-76) [17]. The percentage of each acceptance criteria data presents in Table 1.

**Table 1.** Biology Education Students' Acceptance of Evolution Theory after Learn Evolution Using ESQ Approach

Criteria of Acceptance	Percentage (%)
High	22.22
Moderate	47.22
Low	30.56

The supplementary data from questions that answer by students after the MATE figure in Table 2.

**Table 2.** General Opinion of Biology Education Students about Evolution Theory after Learn Evolution Using ESQ Approach

Opinion	Percentage (%)
Evolution is linked with religion	88.89
Evolution can be learned using ESQ approach	91.67
Students accept evolution after learn it in university using ESQ approach	88.89
Students do not accept evolution theory until now	36.11
Students will use ESQ approach when teach evolution	97.22

Evolution learning that use ESQ approach has been done for eight meeting, since January until March 2017. It is a combining aspect of instruction and ESQ in teaching evolution. ESQ approach applied in classroom learning by lecturer while discussion about the material and students' weekly structural assignment. Each student asked to identify religion aspect that linked with the material every week. For instance, before learn about the origin of life, students asked to identify this aspect in Al-qur'an and hadits, because all of the students are Muslim. Additionally, emotional aspects also describe in this assignments through students analysis of religions aspect, evolution theory, and students attitude on it.

This treatment improve students' acceptance significantly from very low category become moderate acceptance. It supports by the data in Table 2 which state that most students (88.89%) accept evolution theory after learn it in university using ESQ approach, but some of them (36.11%) still do not accept evolution theory until now because of some concepts. This happens because students tend to reject evolution truth because of its conflict with religions [14, 19, 20]. Whether this aspect influence students' acceptance, but it does not make students do not want to learn about evolution [4], in the other word, students' motivation to learn well was not disturb by their acceptance. This motivation formed by their wisdom that train by emotional aspect, as suggested by [12] that emotional quotient make people well adjusted and psychological balanced.

Based on the data in Table 2, it shows that 88.89% students agree that evolution linked with religions. Concepts that discuss in evolution course also have the explanation in religion. When this explanation become linear, it will reduce the conflict between religion and evolution, as stated by [21]

that when there is no gap anymore between religion and evolution, both will be a real knowledge sources which influencing and completing each other.

Whether the students have accept evolution theory after learn it using ESQ approach, some of them (36.11%) still do not accept evolution theory until now. It makes sense because their acceptances are in moderate level of acceptance. It means that they have accept some of evolution theory, but not for some others, especially about the origin of human; as stated by some students in the open-ended questionnaire.

The last open-ended questionnaire also determine that almost students (91.22%) agree to use ESQ approach when teach evolution next time if they have been being a teacher. They state that by using ESQ approach, misconception of evolution also can resolve and it changes students' mindset of learning evolution. It shows that students feel this approach make their understanding of evolution better, and they also want to change the way of teaching evolution at school use ESQ approach. Overall, students feel their acceptances of evolution theory were better by using ESQ approach in learning.

#### 4. Conclusion

Based on this research, concluded that the using of emotional and spiritual quotient approach in teaching evolution enhance students acceptance of evolution from very low acceptance criteria become moderate acceptance criteria. This significant change supported by the decrease of conflict between knowledge and religions, therefore students can accept evolution better. After the students get the good effect of their acceptance and understanding of evolution by learn it using ESQ approach, it motivate them to use it next time when they have been being a biology teacher. This fact also become a solution to make teaching evolution better, by using ESQ approach in learning; both in process and media.

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