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## The Development of Biology Module Based on Emotional Spiritual Quotient in Evolution Topic for Senior High School

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**Abstract**

This study aims to produce a valid biology module based on emotional spiritual quotient (ESQ) in an evolution topic for senior high school students grade XII. This conducted research used the Plomp development method. In this model, there were three steps established, such as; preliminary research, developing or prototype phase, and assessment phase. For implementation validity, the research subjects were a biology teacher and five biology lecturers. The instrumentation used were; interview questionnaire, self-evaluation sheet, and validity questionnaire. The obtained data analyzed by qualitative and quantitative methods. From the research, yield a new biology module with ESQ based in evolution lesson for senior high school students grade XII. Based on the expert review, obtained the score of validity 3.71 which indicated very valid criteria.

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### 1. Introduction

Evolution is one of the biological material related to some biological disciplines (Delpont, 2010). Evolution examines all forms of changes in living things that occur gradually over a certain time on a population scale that inherited to the next generation (Darussyamsu, Fadilah & Putri, 2018). Various geological and paleontological facts have supported the theory of evolution (Dahler, 2011), one method that can be used to match phylogenetic analysis of evolution is the method of natural selection (Delpont et al., 2010). Phylogenetic analysis can use genome data on living things in understanding evolution (Huelsenbeck et al, 2001). Evolutionary material is one topic that has still debated. Evolution often invited controversy between the beliefs of each individual who studied it, so that not a few ideas arise about the collapse of the theory of evolution. This statement was revealed by (Saputra, 2017) that until now various views of the pros and cons of the theory of evolution still occur and have spread among academics, religious leaders and ordinary people. Different interpretations of the theory of evolution arise due to differences in viewpoints in understanding the theory of

evolution, as well as explanations of the evolution of living things from a philosophical and religious point of view seem as contrary to the theory of biological evolution (Saputra, 2017). This problem will be the effect on learning biology on evolutionary material in senior high schools.

Based on the characteristics of the 2013 curriculum is contained that the learning process must develop intellectual, spiritual, and emotional potential (Animasahum, 2010; George, 2000). Potentially, humans can develop the potential to become human beings who have a high civilization and equipped with IQ (Intelligence Quotient), EQ (Emotional Quotient) and SQ (Spiritual Quotient) (Barling, Slater & Kevin Kelloway, 2000; Yudianto, 2005). Education is carried out not just to pursue values (Aunillah, 2011; Gusviani, 2016), but to give direction to everyone to be able to act and behave properly following the principles and spirit of scientific learning (Goleman, 2016; Nachiappan et al., 2014). The purpose of education is not only for intelligent generations only (Palmer et al., 2001; Melita Prati et al., 2003), as well as generations who have the noble character which is a reflection of the identity of a nation (Aunillah, 2011; Dhingra et al., 2005). Institutions that are oriented to intellectual intelligence but ignore emotional intelligence and spiritual intelligence, their education is like experiencing lameness in achieving ultimate goals (Gardner & Stough, 2002; Ali, Bembi & Sentosa, 2013).

The future of a country depends on the condition of its education (Rahman & Shah, 2015; Selman et al., 2005). For Indonesia to manage its country's future, the national education system must be able to offer a solution that can break out of the circle in moral values by applying aspects of intelligence which include intellectual intelligence (IQ), emotional intelligence (EQ), and spiritual intelligence (SQ) (Chin, Anantharaman, & Tong, 2011; Kaur, Sambasivan & Kumar, 2013). That is, the phenomenon of the latest century development requires the existence of a comprehensive and integral education system in fostering students in a balanced way between values and attitudes, knowledge, intelligence, skills, abilities, communication and awareness of Science and Technology and IMTAQ (Faith and Taqwa) which includes intelligence IQ, EQ, and SQ (George, 2000; Mashuri, 2014). Emotional intelligence is needed in controlling emotions (Bracket et al., 2006), accessing emotional knowledge, and can help support one's intellectual intelligence (Ahmed et al., 2016). The same thing was stated by Dhingra et al., (2005) that emotional and spiritual intelligence significantly and positively correlated with each other.

A person's success in life is 20% determined by IQ and 80% is determined by EQ or between intelligence and emotions in terms of solving problems (Goleman, 2006). The successful use of ESQ has proven from research (Putri, 2017) and (Syarif, 2014). Putri (2017) Suggested that from the results of the practicality test questionnaire, it seem that students felt happy and interested in learning with ESQ nuanced natural modules so that students could act by good moral aspects. Also, Syarif (2014) stated that from the results of the practicality test questionnaire, it appears that students feel happy because the module with the nuances of ESQ provided is very helpful for students in building emotional intelligence during the learning process. This state is also reinforced by the results of research Darussyamsu, Fadilah & Putri (2018) who reported that the ESQ approach could increase the acceptance & understanding of student evolution towards evolutionary material at the UNP Department of Biology. Therefore, teaching materials can integrate emotional and spiritual values to be read by students.

Teaching material is a learning resource device that is used to facilitate teachers or students in the learning process (Asyhar, 2012). Teaching materials are all forms of materials used to help the teacher/instructor in carrying out learning in the classroom (Majid, 2012). Teaching materials have two properties, namely informative teaching materials and non-informative teaching materials (Ramdani, 2012). Informative teaching materials are teaching materials that are presented directly without prior processing in learning activities, while noninformative teaching materials are teaching materials that have been packaged and processed in the form of problem offerings and adjusted to the demands for thinking and activities to bring up the soul of high-level thinking in themselves students (Depdiknas, 2008).

Teaching material is an integral part of the curriculum that has determined in the Outlines of the Teaching Program (Hamalik, 2003; Sudjana & Rivai, 2010). Teaching material is also the contents of the curriculum which always refers to the efforts to achieve curriculum goals and instructional objectives in the field of study (Harjanto, 2005). There is various identification of teaching materials which are the most important part of the learning process (Purwanto, 2012). Teaching material occupies a position that determines success in achieving learning objectives towards the teaching and learning process (Haviz, 2016). Teaching materials have certain classifications that classified into three fields, namely cognitive,

psychomotor, and affective (Sanjaya, 2012). That is following the objectives to achieve. One of the teaching materials that can use is a module.

The module is one of the learning resources that can be used by students and by the teacher (Daryanto, 2010). The module is a book made with various designs containing all the basic components of teaching materials (Widodo & Jasmadi, 2008) so that students can use it independently wherever and whenever without direct guidance by the teacher so that students become more active and can complete the lessons more quickly following KD that he wants to learn (Majid, 2012). By understanding the importance of ESQ scores on evolutionary materials integrated into teaching materials, We have developed a biology module based on emotional spiritual quotient in evolution topic for senior high school grade XII. This study aims to produce a valid biology module based on emotional spiritual quotient in the evolution topic for senior high school students grade XII.

## **2. Method**

### **2.1 Type of Research**

This type of research is development research. This research aimed at development products from products that only contain intellectual aspects. Thus, the authors developed a product that contained emotional and spiritual aspects in the form of a biology module based on ESQ in the evolution topic for senior high school students grade XII using the 2013 Plomp development model.

### **2.2 Research Place and Time**

This research conducted at the Fakultas Matematika dan Ilmu Pengetahuan Alam (FMIPA), Universitas Negeri Padang (UNP) and SMA Negeri 1 Lubuk Alung which was produced in the form of a biology module based on emotional spiritual quotient in the evolution topic senior high school students grade XII and validated by a biology teacher 1 Lubuk Alung and Five Biology lecturers from FMIPA UNP.

### **2.3 Research Subjects and Objects**

The test subjects of this research product were a biology teacher at SMAN 1 Lubuk Alung and five Biology lecturers from the FMIPA UNP. The object of this study is a biology module based on ESQ in the evolution topic for senior high school students grade XII.

## 2.4 Research Data

Research data sourced from a validity questionnaire. This data includes primary data, i.e. data obtained directly from research subjects.

## 2.5 Data Collection Instrumentation

The instruments used to collect data in this study are as follows.

1. Interview guidelines, at the initial research stage.
2. Self-evaluation sheet.
3. A validation sheet used to determine the validity of the modules developed.

## 2.6 Development Procedures

This biology module based on ESQ was developed using the Plomp development model which consists of a preliminary research stage, a development or prototyping phase, and an assessment phase. The assessment phase consists of two criteria, namely practicality and effectiveness tests. In this publication, researchers limit the description of research results using the Plomp development model to the development or prototype development stage, namely to the validation stage by expert review to produce a prototype of three. The test (Plomp 2013) revealed that formative evaluation has several layers including self-evaluation, expert review, one to one evaluation, small group discussion, and field tests. The complete stage in Figure 1 as follows.

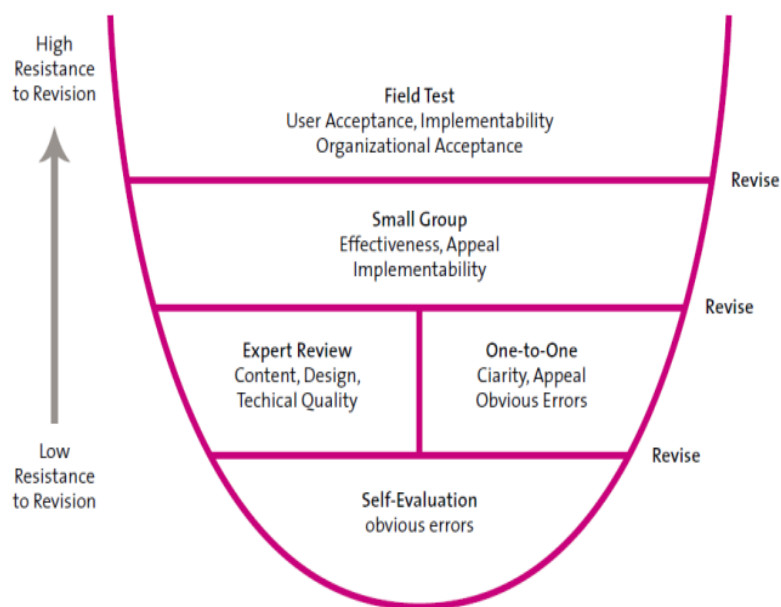


Figure 1. Formative Evaluation Layer

(Source: Plomp and Nieveen, 2013)

## 2.7 Data Analysis Techniques

1. Give a score of answers with four alternative answers arranged based on a modified Likert scale from (Nasution, 2012) as follows:

Very Agree = score 4	Disagree = score 2
Agree = score 3	Very Disagree = score 1

2. Determine the number of classes for assessment criteria. The number of assessment criteria used (Purwanto, 2009) with the following criteria.

1) Very good	3) Not good
2) Good	4) Very bad

3. Determine the length of the class interval as validity assessment criteria using the frequency method of quantitative data proposed by (Supranto, 2000) using the following formula.

$$C = \frac{X_n - X_i}{k}$$

Note:

C = length of class interval

X<sub>n</sub> = Highest score

X<sub>i</sub> = lowest score

k = Number of classes

4. Based on the formula stated by (Supranto, 2000), the class length obtained for each criterion is 0.75 with the following ranges.

Very valid = 3.25 - 4.00	Invalid = 1.75 - 2.49
Valid = 2.50 - 3.24	Very invalid = 1.00 - 1.74

5. The validity value of the product developed is determined using descriptive statistics in the form of a mean assessment using a modified formula (Supranto, 2000) as follows.

$$Va = \frac{\sum_{i=1}^n Ai}{n}$$

Note: Va = Average validity assessment results

A<sub>i</sub> = Average validity assessment results against criteria i

After the average score criteria obtained, a validity value product grouping modified according to the evaluation criteria (Purwanto, 2009) as follows.

Very Valid = 3.25 - 4.00	Invalid = 1.75 - 2.49
Valid = 2.50 - 3.24	Very invalid = 1.00 - 1.74

### 3. Results and Discussion

This research produced a biology module based on emotional spiritual quotient (ESQ) in the evolution topic for senior high school students grade XII. This module can be used as a material in evolution using the ESQ basis. Module development was carried out using the Plomp development model in 2013. Preliminary research was carried out by analyzing problems in the learning process in the form of, curriculum analysis, analysis of problems in the learning process and analysis of teaching materials. Curriculum analysis carried out so that the modules produced refer to the applicable curriculum. The curriculum that used as a reference is the 2013 curriculum.

Based on the analysis conducted, it has known that curriculum 2013 emphasizes the attainment of spiritual attitudes, social attitudes, knowledge, and skills. In the curriculum 2013, spiritual and social attitudes ranked first and second. It means that the 2013 curriculum places great emphasis on developing the character and personality of students. The realm of spiritual attitudes and social attitudes play an important role in giving to young people who have noble character. (Kemendikbud, 2016) States that although biology teachers no longer directly assess the attitudes of students in the learning process it is still a moral obligation to educate students in attitude, both spiritual, emotional, and social. Things like this are called the hidden curriculum (hidden curriculum) where the teacher is obliged to integrate spiritual values in the learning process to form positive student perceptions.

The module design focuses on Core Competencies (KI) and Basic Competencies (KD) 3.9, which are analyzing the theory of evolution and natural selection with a new view on the formation of new species on earth based on literature studies. KD 4.9 which evaluates self-understanding of various views about the evolution of living things and creates new ideas about the possibilities of the theory of evolution based on the understanding it has. Analysis of problems in learning aims to find the basic problems in evolution learning. The basic problem known in the evolution learning process is insufficient learning time due to the implementation of the National Examination. Evolution is considered a difficult and rote material. Students have not been able to take the wisdom and moral values contained in the material of evolution. Furthermore, the learning process has not been able to develop a balanced intelligence between intellectual, emotional and spirituality. With the discovery of some problems at the initial investigation stage, it is necessary to develop a biology module

based on the Emotional Spiritual Quotient in evolution material for senior high school students grade XII.

Based on the results obtained at the initial investigation stage (preliminary research), the authors developed a biology module based on emotional spiritual quotient in evolution material according to the needs of the initial investigation. After the module design produced, the authors then conduct a self-evaluation by checking the typing errors (small error), clarity of the picture/illustration, writing and suitability with good and correct Indonesian Spelling. This revision at the self-evaluation stage resulted in prototype II. After self-evaluation, the module was validated and reviewed by five Biology lecturers and a Biology teacher who taught evolution material in class XII. At this stage obtained suggestions and input from the validator according to their respective fields of study. The author revised/corrected the suggestions given by the validator. Module with very valid criteria is called prototype III.

Table 1. Validator Suggestions and Follow up on Biology Modules based on ESQ in Evolution topic.

No	Validator	Suggestion	Follow up
1.	1	a. Correct the description of the picture 40 page 55.	Has been corrected
		b. Clarify the name of the species in Figure 24.	Has been clarified
		c. The images on the module have to proportional because some images are disproportionate due to drawing when zooming in or not from an angle.Example: image 18,19,20.	Has been proportional
2.	2	a. Add Tafseer as reference the meaning of the verse	Has been added
		b. Come up with citations from the journal in the text of the references.	Has been repaired
		c. Reorganization of the analysis section on learning activities 3	Has been reorganization
		d. Correct writing errors	Has been corrected
		e. Eliminate repeating numbers on evolution	Has been eliminated
		f. Fix image numbering on the module	Has been fixed
3.	3	a. The Emotional Spiritual Aspects of Quotient are blended with the material so that the students thoroughly read it completely.	Has been blended
4.	4	a. Add Muslim scientists who explain the concept of evolution.	Has been added
		b. The ESQ scores should be written in simple sentences so easily understood by students.	Has bee repaired
		c. Add the Qur'an verses that describe the damage on earth, due to man's actions.	Has been added
		d. It is better to eliminate the value of ESQ that compares religion, focus on the religion of Islam because it can be at risk of pluralism.	Has been eliminated
5.	5	a. Add the ESQ icon to the module cover.	Has been added
		b. The position of the components of the module profile one with the other should equate.	Has been equated
6.	6	a. Correct writing errors	Has been corrected



Based on the validity questionnaire that has been filled out by the validator, in general, the module made has obtained a very valid criterion with a value of 3.71. Researchers have revised the module based on ESQ. The revised aspect is following the things suggested by the validator. The aspects of the biology module based on ESQ that are considered validators are the content, linguistic, presentation, and graphic feasibility. In terms of the content eligibility component, the module was declared to be very valid by the validator with 3.77 meaning that the material in the book was following the Core Compensation (KI) and Basic Competency (KD) in curriculum 2013 revised curriculum 2016, it was by (Depdiknas, 2008), which states that the teaching material developed must be by the curriculum. Valid criteria for the material in the module also indicate that the truth of the material substance is good. The truth of the substance of the material needs to be considered to avoid misunderstanding for students.

The linguistic aspects of the module get a validity value of 3.64 with very valid criteria. The linguistic aspect is related to the use of clear sentences so as not to confuse students, it is also under (Depdiknas, 2008) states that teaching materials must have clear sentences, the relationship between clear sentences and sentences is not too long. Based on the validity value of the linguistic aspects of the biology module based on ESQ, Indonesian is already good and right. The module gets very valid criteria from the presentation aspect with a validity value of 3.78. This criterion shows that the module meets the criteria both in terms of presentation. Modules have a clear identity in the order in which they presented and systematic inquiry syntax and contain complete material. It is also under (Depdiknas, 2008) which states that the components of the presentation include clarity of the objectives to be achieved, the order of presentation, attractiveness, interaction, and completeness of the information.

The graphic aspect of the module is stated to be very valid with a value of 3.63 This indicates that the module developed is good and interesting including the type and size of letters that have appropriate, layout, and layout that attract the attention of students to use it. Giving a variety of colors in the module aims to increase student attention, motivation, and learning interest. It is also under (Sudjana & Rivai, 2010) the colors used in making media should be colors that give a harmonious impression so that students can focus on their observations and can take important messages from the media. The provision of images in the module will help students understand the material. It is also under (Sanjaya, 2012) which states that images can be used to practice thinking skills and develop students' imagination abilities. It is also supported by (Sudjana & Rivai, 2010) which states that the illustration of

the picture helps students in understanding and remembering the accompanying material. Valid assessment of biology modules based on ESQ in the evolution topic that has developed indicates that the module can be used as teaching material in the learning process.

Components in the biology module based on Emotional Spiritual Quotient in evolution topic include the module cover, module profile sheet, module usage guide sheet, competency sheet consisting of Core Competencies (KI) and Basic Competency (KD), learning activity sheets, comprehension test sheets students, summary sheets, let's analyze sheets, evaluation question sheets, and answer key sheets. Here are some representatives of the module parts that developed.

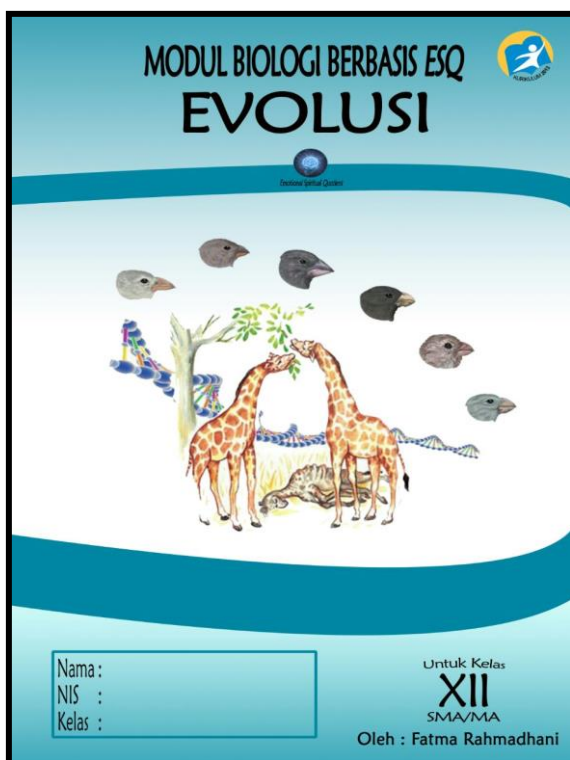


Figure 2. Module Cover

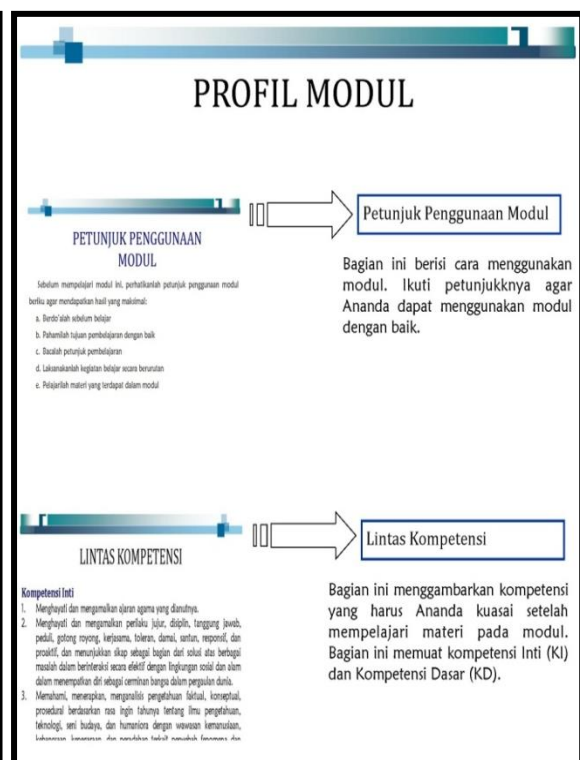


Figure 3. Module Profile

The module as a whole from the results of the validity test was declared very valid with a value of 3.71. This module is expected to use as one of the teaching materials used by students and teachers in the learning process. It is also following research conducted by (Syarif, 2014) through an interview questionnaire that the ESQ learning module can improve students' emotional and spiritual intelligence on environmental change topic. The research (Syarif, 2014) concluded that the ESQ biology learning module obtained valid criteria. The difference between this research and the research of Syarif (2014) is that this research produces a product in the form of a biology module based on ESQ while the research of

Syarif (2014) produces a module just with ESQ nuanced. Another difference is that this study produced modules on evolution material, while Sharif's (2014) research conducted on environmental change material.

sehingga berwarna hitam (gelap). Kupu-kupu berwarna gelap menjadi lebih adaptif terhadap lingkungan karena tidak lagi mudah dilihat oleh mangsa sehingga dapat terus bertahan hidup dan berkembang biak, sebaliknya kupu-kupu berwarna cerah mengalami kepunahan atau terseleksi oleh alam karena tidak adaptif terhadap lingkungan dan akibatnya kupu-kupu berwarna cerah atau putih mudah dilihat dan dimangsa oleh pemangsanya.

Dari peristiwa tersebut dapat kita ambil kesimpulan bahwa adaptasi terhadap lingkungan merupakan mekanisme seleksi alam.

Hikmah yang dapat kita petik dari pelajaran ini adalah bahwa setiap makhluk hidup harus berjuang untuk dapat tetap melangsungkan kehidupannya, tetap berusaha dan selalu berikhtiar. Bagaimanapun situasi dan kondisi yang dihadapi. Untuk mengangkat derajat kita di tengah masyarakat, maka kita harus berjuang agar bisa menjadi orang sukses dan bermanfaat bagi manusia lain. Apapun kondisi dan situasi dari perubahan zaman tidak menjadi halangan bagi kita untuk maju, maka pahamiilah zaman dan pelajarilah teknologi.

Selain itu, Allah telah memberikan tanda-tanda kuasa-Nya pada alam yang merupakan habitat makhluk hidup, dan juga yang ada pada diri manusia seperti DNA yang membawa materi genetik. Terdapat kesinambungan antara alam dan diri manusia, layaknya dua sisi mata uang yang selalu bersama. Contohnya bebek yang mencari makan di lumpur, maka bebek memiliki kaki berselaput. Contoh lain yaitu seperti ayam yang mencari makanan di tanah, maka ayam memiliki cakar untuk mengkais tanah tersebut. Begitu juga pada manusia, diberikan akal untuk mencari ilmu sebagai jalan mendapatkan rezeki yang berkah. Bentuk dan struktur tubuh makhluk hidup disesuaikan dengan lingkungannya agar ia dapat tetap bertahan hidup.

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Figure 4. ESQ Aspects

## SOAL EVALUASI

1. Perhatikan pernyataan berikut!
  - 1) Lingkungan berpengaruh terhadap proses evolusi organisme
  - 2) Makhluk hidup beradaptasi melalui organ tubuhnya
  - 3) Perubahan organ tubuh diwariskan kepada keturunannya
  - 4) Seleksi alam memacu kepunahan organisme
 Pernyataan yang berkaitan dengan teori Lamarck adalah...
  - a. 1), 2), dan 3)      c. 2) saja      e. 4) saja
  - b. 1) dan 3)          d. 2) dan 4)
  
2. Teori evolusi Darwin yang berkaitan dengan teori Charles Lyell adalah...
  - a. Keadaan fosil tidak selalu sama dengan umur batuan di tempat fosil ditemukan
  - b. Umur fosil sesuai dengan umur lapisan batuan tempat fosil ditemukan
  - c. Proses evolusi tidak selalu ditentukan berdasarkan umur dan keadaan fosil
  - d. Evolusi dapat ditentukan berdasarkan perubahan pada berbagai jenis batuan
  - e. Fosil batuan tidak dapat dijadikan satu-satunya petunjuk adanya evolusi

Figure 5. Evaluation

Furthermore, the successful implementation of ESQ in teaching materials was also proven by Putri (2017) who produced a valid ESQ biology module about living organization system material. The difference between this research and Putri's research is that this research produces a product in the form of a biology module based on ESQ while Putri's research produces an ESQ-nuanced science module product. Another difference is that this study produced modules on the evolution topic, whereas Putri's research was carried out on the material systems of life organization. The research function is relevant for researchers as a reference related to this research. The resulting module in the form of a biology module based on emotional spiritual quotient has obtained valid criteria.

#### 4. Conclusions

Based on the research that has been done, it can be concluded that biology module based on emotional spiritual quotient (ESQ) in evolution topic for senior high school students grade XII is very valid through Plomp model development research which includes the initial investigation stage, the development stage or making prototypes that researchers publish to

the revision stage by expert review. Based on research that has done, the researchers suggest the following things. We hope that further research will take the form of an effective test that can be carried out by subsequent researchers to find out the effectiveness of using this biology module in learning.

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