Biology module based on ESQ effective to improve students’ evolution knowledge for high and medium academic ability level

R Darussyamsu*, M Fadilah, D H Putri
Biology Department, Faculty of Mathematics and Natural Science, Universitas Negeri Padang, Jl. Prof. Dr. Hamka Air Tawar Barat, Padang, West Sumatra, Indonesia

*rahmawat6786@gmail.com

Abstract. Emotional and spiritual quotient (ESQ) reported as one factor that influence students’ achievement in learning. Therefore, integrating ESQ into particular topics of evolution learning material was one of our research focuses before. A biology module based on ESQ has been produced about evolution topic for grade XII students. This experimental study conducted to examine whether the module is effective or not to improve students’ knowledge about evolution. As sample, 190 grade XII students were taken with purposive sampling from three chosen schools in Padang, West Sumatera. Post-test only design using objective paper test applied with two variables; biology module as dependent and evolution knowledge as the independent. It analyzed statistically by using ANOVA and Mann Whitney test with p-value 0.05. There was a significant influence of students’ evolution knowledge in high and medium school at a significance level of 0.000 with F value 387.475 for SMAN 4 Padang and F value 63.727 for SMA Pertiwi 1 Padang. Meanwhile, for the lower school it influences did not significant based on Mann Whitney test asymptote Sig (2-tailed) 0.499. In conclusion, biology module based on ESQ about evolution topic is effective to use by students from high and medium ability.

1. Introduction
Students’ knowledge about a topic is influenced by some factors, such internal and external. ESQ is an external factor that can enhance students’ achievement in problem resolution [1] and learning evolution mindset [2]. ESQ expand both of students’ attainment, not only in intellectual, but also in attitude [3], moreover to provide the right and true comprehension [4].

ESQ consist of emotional and spiritual aspect. Seeing to the influence of ESQ to students’ achievement, [5] study show that the most influencing aspect that impact students’ accomplishment is emotional quotient, whether spiritual quotient has an intermediate effect. ESQ helps students to develop a psychologically health [6], which support optimal attainment. EQ aspect also reported by [7] that emotional quotient give a very strong contribution to students’ achievement. This is in line with [8] which stated that by developing emotional quotient, students can manage the emotional being controllable to gain the maximum attainment.

Other external factor that effect students’ conceptual understanding is learning media. One of learning media that have some benefits is module; in the topic of biology we call it biology module. Biology module supports students to learn independently within or without teacher [9]. A module can
facilitate students to learn the material before study it in the class [9], which reported as one aspect that make students attitude [10] and achievement in learning become better [11]. Considering the advantages of ESQ, some learning materials integrate ESQ aspect on it explanation, include in the product of our research before [12]. We focused on evolution topic, which is still rarely to be expanding in Indonesian research topic. Thus, a biology module based on ESQ has been produced about evolution topic for grade XII students. This experimental study conducted to examine whether the module is effective or not to improve students’ grade XII knowledge about evolution.

2. Method
This study was a quasi-experimental research which used post-test only design. This design applied by focused on students’ grade XII knowledge about evolution after learn evolutionary material in two meetings and used biology module based on ESQ at class and home. It has two variables; biology module as the dependent variable and evolution knowledge as the independent one. The detail of the method of this research explains below.

2.1. Participants
The population of this study was students’ grade XII from three representative schools in Padang, West Sumatera. The schools are: (1) SMAN 4 Padang as the representative of higher category school, (2) SMA Pertiwi 1 Padang a medium category school, and (3) SMAN 13 Padang as the lower one. From that population, the sample point out used purposive sampling technique with consideration on the qualification of the teacher; who has get educator certification. Commencing each school, two classes employed in this research; one class for experimental class and the other for control class. Each school participant’s number feature in Table 1.

Table 1. Participants’ number from representative school

| School           | SMAN 4 Padang | N   | SMA Pertiwi 1 Padang | N   | SMAN 13 Padang | N   |
|------------------|---------------|-----|----------------------|-----|----------------|-----|
| Eksperimental class | XII IPA 4     | 32  | XII IPA 3            | 32  | XII IPA 3      | 32  |
| Control class    | XII IPA 6     | 30  | XII IPA 2            | 32  | XII IPA 1      | 32  |
| Total            |               | 190 |                      |     |                |     |

2.2. Instrument and data analysis
Students’ knowledge about evolution was tested by using a multiple choice written test. Before tested, the instrument was validated by the assessment experts. Considering the validation result, the final instrument consists of 30 questions.

The given post-test was done by the students after they learn evolution material for two meetings; experimental class using biology module based on ESQ; and control class using students’ book from national publisher. It analyzed statistically by using ANOVA for normality and homogeneity data, and Mann Whitney test for vice versa, with both p-value 0.05.

3. Results and Discussion
The results of data analysis to determine the influence of biology module based on ESQ to evolution knowledge of students’ grade XII are presented sequentially for the representative school which high, medium and low criteria in Table 2 and 3.

Based on the results of variant analysis (Table 2), it explained that there was an effect of using biology module with ESQ approach as a variant at the significance level of 0.000 with a value far from 0.05. It indicates that biology module effective to use by students from high and medium academic level. Distinguish with it, Mann-Whitney test of students’ knowledge in Asymptote significance 0.499 higher far from 0.05 (Table 3). It showed that biology module do not give any effect to students knowledge in lower level school.

Table 2. ANOVA of Students Knowledge in SMAN 4 Padang and SMA Pertiwi 1 Padang
School | Sum of Squares | df | Mean Square | F | Sig. \\
--- | --- | --- | --- | --- | --- \\
SMAN 4 Padang | Between Groups | 4521.022 | 1 | 4521.022 | 387.475 | .000 \\
| Within Groups | 700.075 | 60 | 11.668 | | | \\
| Total | 5221.097 | 61 | | | | \\
SMA Pertiwi 1 Padang | Between Groups | 3888.766 | 1 | 3888.766 | 63.727 | .000 \\
| Within Groups | 3966.433 | 65 | 61.022 | | | \\
| Total | 7855.199 | 66 | | | | \\

Table 3. Mann-Whitney Test of Students Knowledge in SMAN 13 Padang

Knowledge Value

| Mann-Whitney U | 462.500 |
| Wilcoxon W | 990.500 |
| Z | -.676 |
| Asymp. Sig. (2-tailed) | .499 |

a. Grouping Variable: Class

Those data indicate that biology module based on ESQ give influence in high and medium school. On the contrary, low academic level students do not give any impact by the using of this module. To be concluded, statistical data show that biology module based on ESQ effective to use in high and medium academic criteria school.

Surprisingly, the average score of experimental and control class of medium school were under the average of low level school as present in Figure 1.

Figure 1. Students’ evolution knowledge average value

Biology module based on ESQ in evolution topic has developed with special integration of emotional and spiritual aspect. Emotional aspects added in the form of motivation for life, learn, curiosity, distress, better in achievement, adjustment, tests and evaluations [12]. EQ suggested can improve students’ motivation to study, because motivation is come from their wisdom of learn [1]. While students’ enthusiasm increases, it will support to their knowledge achievements.

Spiritual quotients included in the module by assimilate the story of evolution in Holy Quran and Hadits (Sunnah). This was done because all of the students being sampled are Muslim. This spiritual feature make students not only understand but also comprehend the theory because it linked with their personal religious. As reported by [2], ESQ approach increase students acceptance of evolution. In addition, other study suggested that ESQ decrease the gap of evolution theory and religion [13].

Based on the module’ preferential, the influence of this module to students’ knowledge become reasonable. The specification make students being motivate and comprehend better with the ESQ approach. But, it only affects students in high and medium academic level. It showed that students’ intellectual have an effect to students’ way of thinking [14]. Adding up, data also showed that high and medium criteria school students can adaptation better with the pattern of module which combines with ESQ approach. It turns out because high thinker well again in mastery learning improved motivation, and reading literacy. In other words, the specialization of the module gives impact to high ability students because they read about the supplementary information from ESQ approach and can
capture it in their memories. Therefore, experimental class students knowledge average better than the control ones in high academic school. This invention also finds in medium capability school students.

Differ with high and medium schools, low level school students did not effective to use this module. It illustrate that module with additional information on it do not proper for all category of students. This study also demonstrate that students from low level school difficult to understand about ESQ approach in the module, because it integrate in learning material, not in the special column or other features.

Meanwhile, it was strange because medium academic level students got lower knowledge average score comparing with low level students (as shown in Figure 1). We find that in medium school, experimental class students get average value 51.07 and 35.85 for the control class which significantly lower than students from low academic level who gets average score 66.45 for experimental class and 68.63 for the control class. Based on the average of both experimental and control class, medium level school get average value 43.46 and low level school 67.54, with average distance is 24.08.

To retrieve the problems of this surprisingly data, we interview the teacher of medium level school to recognize whereas the reasons of medium level students get far lower score than the low-academic level school. The teacher told us that her students have low ability to reading literacy. The students are difficult to read some text which is scientific, whether they have become grade XII students. This problem made their average score being low. “It also happens in other learning materials”, she said, especially for the subject which the teacher is still young and do not teach firmly. Besides that, the teacher also told that the students since grade XII were focused on discussing National Exam (UN-in Indonesia) as the basic test to decide students’ graduation. As the result, their motivation to study learning materials being reduces.

In contrast, even lower-academic level school has low ability in comprehending such materials, because of their motivation in learning predicted better than medium school. It assume because the teacher of this school teach the students firmly (because of the age and wisdom), that makes the students force to read the module. But because their ability on reading do not maximal, they only point out the main material and do not affect by the additional information, such ESQ approach. For that reason, their average score enough good but the treatment do not influence to their evolution knowledge.

Discovering the limited effectiveness of the module, we suggest other invention to design other learning material that right and proper for all students’ academic level, especially in evolution topic. It may will need some innovations in presenting the learning information, such as using learning strategy or model in learning material, facilitate learning media with internet access, or make the learning media being multimedia that more interestingly.

4. Conclusion
Based on the above discussion, biology module based on ESQ about evolution topic is proven effective in improving students’ evolution knowledge for high academic level school. The statistical analysis informed that this module significantly influence the evolution knowledge of high and medium level school. Difference with both high and medium school, low level school statistical data indicate there is no influencing of using module to experimental and control class, even the control average score better than the experiment ones. In sum, biology module based on ESQ about evolution topic is effective to use by students grade XII in high and medium academic school.

Acknowledgements
We would like to thank the students’ grade XII of SMAN 4 Padang, SMA Pertiwi 1 Padang, and SMAN 13 Padang for their participation as the subject of this study. Furthermore, special thanks to the teachers that have taught evolution in experimental and control class using biology module about evolution based on ESQ namely; Dra. Fitra Yenni; Nova Irianti, S.Pd.; and Fitria Rahmi, S.Pd. In addition, thanks for Universitas Negeri Padang as the financial support of this research.
References
[1] Mishra, P. & Vashist, K. (2014). “A Review Study of Spiritual Intelligence, Stress and Well-Being of Adolescents in 21st Century.” IMPACT IJRANSS: International Journal of Research in Applied, Natural and Social Sciences 2(4), 11-24.
[2] Darussyamsu, R., Fadilah, M., & Putri, D. H. (2018). Emotional and Spiritual Quotient Approach Improve Biology Education Students’ Acceptance of Evolution Theory. In IOP Conf. Ser.: Mater. Sci. Eng. 335 012090. https://doi.org/10.1088/1757-899X/335/1/012090
[3] Pratiwi, A.C., Ardi, & Putri, I.L.E. (2017). Pengembangan Multimedia Interaktif Bernuansa Emotional Spiritual Quotient (ESQ) tentang Materi Sistem Sirkulasi Manusia untuk SMA/MA. Jurnal Biosains. 1(2), 148-155.
[4] Utama, F. (2018). ESQ Way 165: Alternatif Metode Pengembangan Kecerdasan Emosional Anak. Journal of Early Childhood Care & Education. 1(1), 7-12. https://doi.org/10.26555/jecce.v1i1.59
[5] Herawati, W.L. & Mulyanratna, M. (2014). Studi Korelasi Antara Kecerdasan Emosional Spiritual (ESQ) dan Hasil Belajar Fisika Siswa Madrasah Aliyah Swasta (MAS) di Wilayah Kecamatan Dukun Kabupaten Gresik. Jurnal Inovasi Pendidikan Fisika (JIPF). 3(2), 161-166
[6] Koohbanani, Shahin E., Reza D., Taghi V., & Mohammad-Hassan G.F. (2013). The Relationship Between Spiritual Intelligence and Emotional Intelligence with Life Satisfaction Among Birjand Gifted Female High School Students. Procedia - Social and Behavioral Sciences. 84, 314-320
[7] https://doi.org/10.1016/j.sbspro.2013.06.558
[8] Anshori, F. A. (2017). Hubungan Kecerdasan Emosional Dan Konsep Diri dengan Hasil Belajar Biologi Siswa SMA Negeri Di Kabupaten Jeneponto. Jurnal Pendidikan Biologi 1(2), 11-22
[9] Pangestika, W.N. & Manurung, T. (2016). Hubungan Kecerdasan Emosional dan Minat Belajar dengan Hasil Belajar Biologi Siswa Kelas XI IPA SMA Negeri 2 Pematang Siantar T.P. 2015/2016. Jurnal Pelita Pendidikan. 4(1), 179-187.
[10] Firdaus, I. (2015). Pengaruh Penggunaan Modul Pembelajaran Biologi Berbasis Inkuiri Terhadap Hasil Belajar dan Retensi Siswa Kelas X SMAN Kota Pasuruan. Jurnal Universitas Negeri Malang. 1(2), 1-9.
[11] Darussyamsu, R. & Fadilah, M. (2016). Analisis Aktivitas Mahasiswa Jurusan Biologi FMIPA UNP pada Mata kuliah Evolusi Menggunakan Buku Ajar Evolusi Molekuler dengan Strategi Pembelajaran Reading, Questioning, and Answering dan Konvensional. Proceeding Seminar Nasional Pendidikan dan Sains Biologi 2, 61-71
[12] D., Rahmaawati. (2014). Increasing Student’s Learning Activities and Achievement in General Biology Course Using Reading, Questioning, and Answering Method. Proceeding of International Conference on Research, Implementation and Education Of Mathematics And Sciences 2014, BE-77-82
[13] Costa, A. & Faria, L. (2015). The impact of Emotional Intelligence on academic achievement: A longitudinal study in Portuguese secondary school. Learning and Individual Differences.37, 38–47. http://dx.doi.org/10.1016/j.lindif.2014.11.011
[14] Dahler, F. (2011). Teori Evolusi: Asal dan Tujuan Manusia. Yogyakarta: Penerbit Kanisius, p. 127
[15] Darussyamsu, R. & Fadilah, M. (2017). Pengaruh Strategi Pembelajaran Reading, Questioning and Answering terhadap Kemampuan Berpikir Kreatif Mahasiswa Jurusan Biologi FMIPA Universitas Negeri Padang pada Mata kuliah Evolusi. Bioeducation Journal, 1(1), 10-21