

CHEMISTRY EDUCATION STUDENT RESPONSE TOWARD GENERAL BIOLOGY COURSE: A DESCRIPTIVE STUDY

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ABSTRACT

Chemistry and biology are interrelated branches of science, but students majoring in Chemistry Education are often considering as less ability to understand several biological concepts. The study aim was to obtain the information about the response of Chemistry Education students on the General Biology course. The research was a descriptive study conducted in August to December 2017 in which the subjects were twenty-four first-semester students of Chemistry Education who take General Biology course at Faculty of Tarbiyah and Teaching Sciences, State Islamic Institute of Batusangkar, West Sumatera. The instrument used was the questionnaire of student responses on the General Biology course. The analysis used was a descriptive statistical analysis by using percentage. The best response of students on the General Biology course was on assessment transparency aspect, while the lowest was on lecture attractiveness aspect. The conclusion of this research showed that the student response was considered as good criteria. Although from Department of Chemistry Education, most students give positive responses to the General Biology course. Information obtained from this study can be used as a basis to improve the quality of the General Biology course, especially in the Department of Chemistry Education.

Keywords: *Chemistry, general biology, student's response*

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INTRODUCTION

Universities are the highest institutions of formal education that play an important role in producing qualified graduates. A university can be said successful if able to guarantee its graduates to be able to improve the quality of their life (Hassanbeigi et al., 2011; Pereira & Costa, 2017). Therefore, universities should accommodate their students, both empowering the mastery of science concepts (Hassanbeigi et al., 2011) as well as achieving the various skills needed in the 21st-century (Ghazivakili et al., 2014; Pereira & Costa, 2017). Every department in every faculty of a university must achieve these goals, including the Department of Chemistry Education.

The Faculty of Tarbiyah and Science Education is one the faculty at State Islamic Institute of Batusangkar that has Department of Chemistry Education. In this department, students will take various courses. In general, the courses facilitate the students to explore

various chemical concepts. Related to chemistry concepts, according to Barke (Barke, Hazari, & Yitbarek, 2009), chemical learning is one of the lessons that has some abstract concepts and difficult to understand. The example of abstract concepts, such as the concept of atoms, a chemical bond, nomenclature of chemistry, the concentration and chemical equilibrium. Some of the chemistry concepts also often generate misconception, such as the chemical bond, chemical equilibrium and reduction-oxidation reaction (Barke et al., 2009).

Beside of various courses related to chemistry, chemistry education students must also take General Biology course. General Biology course is one of the compulsory subjects in the Department of Biology Education which is also available in the Department of Chemical Education at State Islamic Institute of Batusangkar. The students are taking the course which has 2 credits (16 meeting) during the first semester. There are some topics which studied in General Biology

course. One of the topics is ecosystem, environmental education that describe and analyse the understanding of the biosphere, the earth and its living things.

Chemistry and biology are two interrelated branches of science (Boltax, Armanious, Kosinski-Collins, & Pontrello, 2015; Ebetino et al., 2011; Hruby, 2009; Pross, 2009). Both of them are studying various natural phenomena and have important role in human life. Various courses of biology are required to be the basis for the understanding of some chemical concepts, as well as some chemistry courses related to several concepts of Biology.

In contrast, the character of several biological concepts have a difference in the chemical concepts characteristics. Biology is the science of life that studying the symptoms and the processes of life (Rustaman, 2016). Moreover, Biology is one of the science subjects which actively developed. The ever-expanding of biology is focused on learning, from micro to macro levels, leads students to receive a wide range of topics and abstract concepts. Furthermore, Biology is not only concerning to mastery knowledge but also studying the process of discovery that emphasizes the direct experience (Hayati & Berlianti, 2016). Various concepts of biology are discovered and developed by researchers through scientific methods involving model organisms, so that biology learning should be directed toward students to gain knowledge through the stages of the scientific method.

Related to its characteristics, various types of learning alternatives are recommended in biology learning. To deal with many of the concepts studied, some previous research recommends the implementation of some learning models, such as cooperative script, reciprocal teaching (Fauzi, 2013; Ramadani, Fauzi, Sukmawati, & Corebima, 2015; Sukmawati, Ramadani, Fauzi, & Corebima, 2015), and problem based learning (Bidokht & Assareh, 2011; Nazir & Zabit, 2010; Permana, Suwono, & Listyorini, 2016; Savery, 2006). To deal with the abstract of the concept and the difficulty of understanding the style of the language in reference, especially Foreign Language references, the educators are encouraged to develop various media and learning resources (Fauzi, 2017; Widiensyah, Indriwati, Munzil, & Fauzi, 2018). The use of a variety of model organisms is also recommended as an alternative that teachers can

use it to overcome the abstract of biological concepts, in addition to improving students' learning motivation and student skills (Fauzi & Corebima, 2016c, 2016a, 2016b; Fauzi, Corebima, & Zubaidah, 2016; Fauzi & Ramadani, 2017). Finally, related to the efforts of teachers in empowering 21st-century skills, the implementation of cooperative learning can be used as an alternative form of learning held during Biology learning (Buku, Mite, Fauzi, Widiensyah, & Anugerah, 2015; Ramadani et al., 2015).

However, based on pre-research or in the first meeting that has been done on students at the Department of Chemistry Education who have taken the course of General Biology, some students said several concepts in the course are classified as elusive. The concepts are too theoretical and less contextual so it is difficult to understand and this condition can be carved on the teaching and learning process. Moreover, there are various problems encountered, such as students are less interest in reading books, less search for reference materials, as well as students are still low in their independence and mentality especially in compiling the sentence in question and answer. It showed that the power of the analysis is still low. Furthermore, it can be seen that the students' scientific attitude (i.e. curiosity, cooperation, accuracy, responsibility, and critical thinking) is also still not optimal.

Several previous studies have reported student responses to courses that have different characteristics than the common courses in their department (Anggraini, 2016; Sudaryanto & Purwanti, 2009). However, these previous studies examined the response of other major students towards chemistry course, not vice versa. Research that examines the chemistry student's response to biology lectures has not yet been found. The existing research is limited to optimizing the process of biology course in the Department of Chemistry Education (Subiantoro, Paidi, & Ariyanti, 2012).

In addition, based on students' responses from pre-research that previously described, the temporary conclusion is: Department of Chemistry Education students feel difficulty and less interested on General Biology course. Such information needs to be validated through more systematic and in-depth study. So, the aim of this study is to obtain the information about the response of chemical education students in the implementation of the General Biology

course. This research is expected to contribute: a) as a basic data for the development of general biology learning especially in the implementation of future lectures; and b) provide information about the response of students in the implementation of General Biology course.

Students' assumptions about a course will have an impact on their learning motivation in the course. Motivation to learn is one of the main factors that influence the involvement of students in the lecture process (Filak & Sheldon, 2008; Widiensyah et al., 2018). The higher frequency of student involvement in learning process, the more optimal achievement of their learning outcome (Gunuc, 2014). Therefore, the information about the response of students to the General Biology course can be used as a basis to reflect on how the process of General Biology course from the student's point of view.

METHOD

This research was conducted at the Faculty of Tarbiyah and Sciences Education, State Islamic Institute of Batusangkar which is located on Jl. Jenderal Sudirman No. 137 Lima Kaum, Batusangkar, West Sumatera. The research was conducted from August to December 2017. The subjects of this research were all first semester students at Department of Chemistry Education who take General Biology course, with a total of 24 respondents/students. This research was descriptive research that was interpreting and telling data about student response on General Biology course in the Department of Chemistry Education. The instrument that used in this research was a questionnaire on the General Biology course.

There were eight aspects asked in the questionnaire used: (1) the attractiveness of biology lectures; (2) suitability of the lecturing process with lecture plan; (3) ease of understanding of learned concepts; (4) utilization of instructional media; (5) empowering critical thinking skills during lectures; (6) challenges during lectures; (7) transparency of the assessment and evaluation; and (8) suitability of evaluation questions with learning outcomes. Each aspect has two responses, yes and no. The response result is used as the basis for data analysis in this study.

The response scoring in this study using the guidance presented in Table 1.

Table 1. Assessment of student response

Answer	Value/score
Yes (Y)	1
No (N)	0

(Source: Riduwan, 2011)

Scores obtained on each aspect of each student are then summed and converted in percentage form. Conversions in percentage form are based on formula 1 (Huda, 2013).

$$P = (E/N) \times 100\% \quad (1)$$

Information:

P = Percentage of respondents' answers

E = Number of respondents' answers

N = Number of respondents

As the percentage obtained, it was then matched to the guidance criteria (see Table 2).

Table 2. Criteria for student response

Percentage (%)	Category
86-100	Very good
76-85	Good
60-75	Enough
0-59	Not good

RESULT AND DISCUSSION

The results represent the response of Chemistry Education students to the General Biology course. The results are presented in Table 3. The General Biology lecture was not included in the "very good" category. This result relates to the condition of the learning in which most students have low interest to the material being presented. This condition due to the biological concepts discussed in General Biology course have more theories than practice. This result is line with Aji who explained that the General Biology course has a material that is classified as an elusive level (Prasetyo & Perwiraningtyas, 2017). The concepts are more theoretical than contextual learning. The attractiveness of biology course can actually be improved through several ways, such as the use of model organisms (Fauzi et al., 2016; Fauzi & Ramadani, 2017) and other learning media (Widiensyah et al., 2018).

Furthermore, there were 75% of 24 students who say the material that has been delivered is in accordance with the semester's learning plan

that has been made by the lecturer. Semester Learning Plan (SLP) is a projection of activities (activities) that will be conducted by lecturers with students in the process of learning or lectures in the classroom (Nurdin, 2017). Therefore, SLP is an integral part that cannot be separated from "learning or lecture". This means every lecturer who will conduct learning process must prepare a learning plan firstly.

Table 3. Student response to general biology courses.

No.	Statement	Percentage (%)
1	Is the general biology course very interesting?	60
2	Are the materials being studied in accordance with the planning of the general biology course?	75
3	Do these biology easily understandable?	71
4	Is the learning media used to help understand the material in learning?	88
5	Do these general biology courses train the ability to think critically?	72
6	Have assignments give challenges in learning?	92
7	Are assessments and evaluations implemented in a transparent manner?	96
8	Do the test questions match the competencies demanded?	88
Average		79.6

At the level of understanding, the student's response to General Biology is at the "enough" level, rather than being "good" or "very good". These results indicate that students feel difficulties to learn Biological concepts. This condition is in line with some previous studies that reported that Biology contains several concepts that are not easy to learn (Çimer, 2012; Etobro & Fabinu, 2017). Although these previous reports were not positioning Chemistry Education students as the subject of his research, the reported information has proven that Biology is sometimes difficult to learn.

Then, 88% of students said that the media can help to understand the material in the learning process of the General Biology course. The use of media is essential in the learning process (Susilana & Riyana, 2009). The existence of learning media can assist the task of teachers in delivering messages from the

lesson material given by the teacher to the students. The use of appropriate media in biology learning is one of the solutions of various problems related to student's interest, learning outcomes and motivation (Fauzi, 2017; Suhartono, 2015; Widiyansyah et al., 2018). The utilization of appropriate media will increase students' attention and motivation on the topics to be studied. This condition gives an impact on students to be more concentrated and student achievement can be improved (Purwono, Yutmini, & Anitah, 2014).

The very important role of learning media is to motivate students, provide experience and facilitate students in understanding the material presented (Chen & Chen, 2011; Walker, 2003). It can be concluded that the lecturers are effective in using the media and it can increase student interest in teaching and learning process and students will be faster and easier to understand and understand the material presented by lecturers.

Furthermore, 72% of students assume that General Biology lectures can train students' critical thinking skills. Critical thinking is the ability of evaluative thinking that shows the human ability to see the gap between reality and truth and able to analyze and evaluate as well as to solve the problem (Ennis, 2011; Phan, 2010; Sykes, Wills, Rowlands, & Popple, 2013). Critical thinking is also the ability to apply the concepts that have been learned in class on various phenomena encountered both at school, at home, and in social life in accordance with the norms that apply (Rachmadtullah, 2015). Critical thinking is one of thinking ability. Thinking ability is obtained from the ability of students to convey questions and answers during the learning process. This skill is one of the skills needed in the 21st Century and Biology educators should be able to empower these skills during the learning process (Ghazivakili et al., 2014; Phan, 2010).

Then, 92% of the students also stated that the lecture assignments given to the General Biology lectures can challenge them. Students need to be challenged to stimulate the learning process. Through assignments, it can be realized (Scager, Akkerman, Pilot, & Wubbels, 2017). In addition, assignments can also improve student engagement in the learning process (Buijs & Admiraal, 2013).

The next, 96% of students responded that the assessment was done transparently. This information indicates before the tests

conducted, the lecturer has explained how the weight of the question or the test will be given and the test results are returned to students. Assessment is an activity to provide continuous and comprehensive information about the process and results achieved by students (Fadillah, 2017). The assessment of learning outcomes of learners is very important, because it can give an information about how much learners mastered the competence or material that has been taught by the teacher (Lile & Bran, 2014). The assessment is the process of interpreting the measurement data on the process and learning outcomes in the form of a score by converting it into a value based on some certain to make a decision about the learning process.

While the student's response to the test items, 88% of students said the items of the test is in accordance with the competence. Teachers must have the skills and experience in preparing various forms of questions and each kind of question is not only suitable for measuring one particular type of ability (Tofade, Elsner, & Haines, 2013). Tests are generally used to assess and measure student learning outcomes, especially cognitive learning outcomes regarding the mastery of teaching materials in accordance with education and learning at that time (Widyantoro, 2009).

Various factors affect the student learning outcomes in certain courses. One of the main factors is the students' learning motivation (Filak & Sheldon, 2008; Widiensyah et al., 2018). The level of motivation to learn will determine how high the effort of students to get involved in the learning process. This condition is influenced by the student's assumption of the course. The better of student response effect on the better of student involvement in the lecturing process. This condition tends the student to obtain optimal academic achievement (Gunuc, 2014)

Based on the results obtained from this study, a positive response is shown by Department of Chemistry Education students on the General Biology course. This information indicates, although biological characteristics are different from chemistry, the students still have the potential to obtain optimal learning outcomes in this course. The results of this study can also be used as a basis for improving the quality of the General Biology course so students' positive responses to the General Biology course can be increased.

CONCLUSION

The result of this study is the average percentage of student response to the General Biology course was 79.6%. The result indicates the response of chemical education student who has taken course in General Biology in State Islamic Institute of Batusangkar as good criteria. Biology is sometimes regarded as a difficult and less interesting learning. The use of learning media or learning model can be used as an alternative to overcome the problems in the process of learning Biology, including in General Biology course.

In this study, students gave positive responses to the General Biology course, although the positive response is still not optimal. This information indicates that students have the potential to obtain good learning outcomes in the General Biology course. This potency can still be optimized. Therefore, it is recommended to improve the quality of the General Biology course, especially on the aspects that the percentage of student's positive response is lower than other aspects.

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