Profile of life-long learning of prospective teacher in learning biology

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Abstract. Instead of constructing knowledge, learning also debriefs the student’s skills to be survive in life. Especially in biology learning which has a conceptual structure about life, it is relevant to address the program toward life-long learning orientation. Therefore, debriefing life-long learning is important. As preliminary study, the focus of this article is to investigate the profile of student life-long learning in biology instruction. A number of 22 students in Plant Physiology course from Biology education department in one teacher college in Central Java was involved as participants. Data were collected by using questionnaire with 30 statements representing five standard life-long learning (complex thinking, information processing, effective communication, collaboration, and habits of mind standards). Research result shows that overall, the average score of life-long learning student profile is 2.91 from a maximum score of 4.00. From each standard, the average scores of complex thinking standard (3.14), information processing standard (2.77), effective communication standard (2.89), collaboration standard (3.08), and habits of mind standard (2.69). Based on the data collected, life-long learning profile of students is still quite low especially for habits of mind, information processing, and effective communication. Thus, it is very urgent to develop a program of debriefing life-long learning for next biology courses (Plant Biodiversity and horticulture) for them in near future.

1. Introduction

Life-long learning is a learning paradigm that is oriented towards student life. The concept of life-long learning as an educational paradigm is triggered by UNESCO [1] with four pillars of education: learning to know, learning to do, learning to live together, and learning to be [2]. Life-long learning has become a global phenomenon that significantly changes the basic form of the national education system in a conventional way [3] and has become a key word in almost all countries because of its growing influence on education policy in the global world [4]. Life-long learning is now a big topic in the discourse of human resources, employment, entrepreneurship and national education [5], and the EU’s (European Union) long-standing priorities, with an emphasis on key needs that everyone is pursuing [6].

The world is changing very rapidly, especially the advancement of biology that is integrated with technology to create innovations that can be useful and have a real impact on life [7]. It indicates that life-long learning becomes increasingly important, not only as a key organizing principle for all forms of education and learning, but also as an absolute necessity for everyone [8]. That is, life-long learning has a very large orientation to provide skills for the community in improving the welfare of one’s life.
In the Marzano framework of life-long learning there are five standards. First, complex thinking standard has two categories: effectively uses a variety of complex reasoning strategies; effectively translates issues and situation into manageable tasks that have a clear purpose. Second, information processing standard contains four categories: effectively uses a variety of information gathering techniques and information resources, effectively interprets and synthesizes information, accurately assesses the value of information, and recognizes where and how projects would benefit from additional information. Third, effective communication standard has five categories: expresses ideas clearly, effectively communicates with diverse audiences, effectively communicates in a variety of ways, effectively communicates for a variety of purposes, and creates quality products. Fourth, cooperation/collaboration standard develops four categories: works toward the achievement of group goals, effectively uses interpersonal skills, contributes to group maintenance, and effectively performs variety of roles. The last is habits of mind standard identified into three categories: self-regulation, critical thinking, and creative thinking [9].

Many studies on life-long learning has been conducted by educational researchers, among others, about the policies, strategies and life-long learning practices applied in various countries [10-15]. Another research on the expansion of Ghana's national qualification framework through life-long learning demonstrates some successes in the field of formal learning [15]. Lifelong learning has become the agenda of UNESCO and the World Bank as a new educational model for improving education policies and programs in developing countries [4]. As for [16] examines the development of “masters” as good habits in life-long learning. This paper consider the "master" as an ideal archetype for workers.

From several studies that has been done, there has been no research that developed lifelong learning train in biology learning by raising the potential of biological content as its area. Therefore, the authors plan to develop entrepreneurship-oriented inquiry learning in the field of plant studies to provide students with life-long learning. However, before doing further research it is necessary to carry out preliminary research to find out the life-long learning profile of students in learning biology. Data were collected by using questionnaires filled by 4th semester students’ of Department of Biology Education who joint Plant Physiology course. Generally obtained result that mean of life student learning profile still in low enough category. This indicates that it is necessary to develop a program of debriefing life-long learning for next biology courses (Plant Biodiversity and horticulture) for them in near future.

2. Method
This preliminary study that aims to determine the life-long learning profile of prospective teachers in biology learning in one teacher college in Central Java. The subjects involved in this study were 22 students of Biology Education Program from 4th semester who joint Plant Physiology course. The instrument used to collect data is a questionnaire developed based on Marzano life-long learning framework consisting of five standards: complex thinking, information processing, effective communication, collaboration, and habits of mind. There are 30 statements on the questionnaire that were constructed in such a way that represents the five life-long learning standards. Questionnaires were made in the form of a choice of SA (strongly agree), A (agree), DA (disagree), and SDA (strongly disagree) with a maximum score of 4.00. Questionnaire statements are arranged randomly between positive statements and negative statements, thus encouraging students to respond honestly.

The data that had been collected from the respondents were then analyzed descriptively to interpret the indication. There are two main focuses on data interpretation, firstly the average score of life-long learning profiles of students as a whole, the two average scores of each life-long learning standard. Based on the focus it will be known how the life-long learning profile of students in general and which standards need to be given more intensive debriefing.

3. Results and discussion
The result of data collecting about life-long learning profile of students in biology learning by using questionnaires can be interpreted into two main parts. The division is based on the general description
of the life-long learning profile of the student as a whole and the life-long learning student profile seen from each standard.

3.1. General description of life-long learning overall student profile
Prospective teachers’ profile on life-long learning in general shows the average score as a whole and average of each standard. Those results are illustrated in Figure 1.

![Figure 1. Average total life-long learning.](image)

Based on Figure 1 the total average score is 2.91 out of a maximum score of 4.00. That is, the life-long learning profile of students as a whole is not too good. It is necessary to improve conditions in various sectors, especially for the standard lifelong learning that has a very low average score.

Referring to the profile of each standard based on average scores, Figure 1 shows that there are two standards with the lowest average score, i.e. habits of mind standard (2.69) and standard information processing (2.77). This fact indicates that students do not have good habits of mind in learning the concept and not yet have good skills in processing information from the concepts studied.

3.2. Specific description life-long learning student profile on every standards
This section discusses specifically the data and findings shown in each life-long learning standard.

3.2.1. Complex thinking standard
This standard has two statements in the questionnaire that represent two aspects: 1) effectively uses a variety of complex reasoning strategies; 2) effectively translates issues and situations into manageable tasks that have a clear purpose. The data are illustrated in Figure 2.

![Figure 2. Score every aspect of complex thinking standard.](image)

The two aspects shown in Figure 2 show a fairly high score, i.e. statement 1 (3.23) and statement 2 (3.05). This data indicates that students’ complex thinking skills is good enough, such as complex
reasoning strategies in thinking and effectively translating issues as meaningful tasks and having clear goals.

3.2.2. Information processing standard
This standard has four aspects represented by four statements: 1) effectively uses a variety of information gathering techniques and information resources; 2) effectively interprets and synthesizes information; 3) accurately assesses the value of information; 4) recognizes where and how projects would benefit from additional information. The data are described by Figure 3.

![Figure 3](image)

**Figure 3.** Score every aspect of information processing standard.

Figure 3 illustrates that the average score of student information processing standards are still low at 2.77. Of the four aspects of this standard, there are two aspects that the category is very low, i.e. aspect 1 (2.05) and aspect 3 (2.50). The indication of the data is that students are still very difficult in interpreting and synthesizing information, such as interpreting graphs, diagrams, charts and tables. In addition, students are also weak in assessing the value of information accurately, such as concluding and choosing the essence of a source reading.

Another fact that can be shown by Figure 3 is the presence of two aspects whose condition is already better than aspects 1 and 3, i.e. aspect 2 (3.55) and aspect 4 (3.00). Based on these data indicates that the students have been able to use various techniques of collecting information and information sources. This is shown when doing the task, students are used to finding reading material from the package book, or e-books and articles they are looking for by using a smartphone or the internet. In addition, they also have a good knowledge about the advantages of information resources to the task.

3.2.3. Effective communication standards
This standard has five aspects that are represented by the five statements in the questionnaire: 1) expresses ideas clearly; 2) effectively communicates with diverse audiences; 3) effectively communicates in a variety of ways; 4) effectively communicates for a variety of purposes; 5) creates quality products. The data capture results are described in Figure 4.
Figure 4 shows the average score of this standard are not high enough. That is, students have been accustomed to communicate in biology learning such as discussions, team work and presentations. However, their communication has not been effective enough. For example, when discussing their groups thinking more about each other, the division of roles in team work has not been structured and the presentation of the results of the discussion has not been interactive. Aspects that show the lowest category in this standard are aspect 3 (score 2.55) and aspect 5 (score 2.73). The problem is caused by unskilled students to communicate in various ways. Even in expressing the opinion was not supported warrant and backing argument. In addition, their difficulty is creating quality products. This is still a problem, students do not have standardization and good skills in creating quality products.

However, there are two aspects whose condition are better, one aspect (3.00) and aspect 4 (3.23). The data indicate that the student is skilled enough to express his idea clearly. In addition, they also have effective communication skills for various purposes in learning. That is, among students already have the same vision in the purpose of learning.

3.2.4. Collaboration/ cooperation standards
This fourth standard has four aspects measured: 1) works toward the achievement of group goals; 2) effectively uses interpersonal skills; 3) contributes to group maintenance; 4) effectively performs a variety of roles. The data are shown in Figure 5.

Figure 5 shows the average score of this standard are not high enough. That is, students have been accustomed to communicate in biology learning such as discussions, team work and presentations. However, their communication has not been effective enough. For example, when discussing their groups thinking more about each other, the division of roles in team work has not been structured and the presentation of the results of the discussion has not been interactive. Aspects that show the lowest category in this standard are aspect 3 (score 2.55) and aspect 5 (score 2.73). The problem is caused by unskilled students to communicate in various ways. Even in expressing the opinion was not supported warrant and backing argument. In addition, their difficulty is creating quality products. This is still a problem, students do not have standardization and good skills in creating quality products.

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related to the learning objectives in his group. In addition, students also tend to work only depending on their respective duties and have not thought comprehensively to work in collaborative learning.

3.2.5. Habits of mind
The last standard has three aspects: 1) self regulation; 2) critical thinking; dan 3) creative thinking. The result of data selection is shown in Figure 6.

![Habits of Mind Stadard](image)

Figure 6. Score every aspect of habits of mind standard.

Figure 6 shows that the average student habits of mind are quite low. Similarly with scores on each aspect, the three aspects of this standard show relatively low data. This data represents that students are not accustomed to using intensive critical thinking skills, creative thinking and self-regulation in learning. Based on the analysis of the questionnaires, students have been using more low-level thinking skills in learning, such as memorizing concepts, mentioning examples and explaining descriptions. It is not enough to drill habits of mind to students well.

Based on data collected from all respondents, the general lifelong learning profile of students has not been too good, especially in habits of mind standard and information processing standard. Some indicators of the condition were found when the researchers conducted a search for the respondents in the lectures of Plant Physiology, i.e.: 1) more students looking for answers to problems encountered by using their smartphone rather than identifying the object of observation; 2) students still have difficulty interpreting and making graphs, charts, diagrams, drawings and tables; 3) students are not used to thinking critically, using various alternative ideas, and devise appropriate strategies in answering the problem. The low lifelong learning profile of students represents that there is a need for a program specifically designed to supply the skills that become indicators of lifelong learning for students in learning.

The designed program should adapt from the framework designed by experts and the results of previous research. In the framework of lifelong learning Marzano has formulated a detailed lifelong learning assessment with its rubric even equipped with learning dimensions [9], then adapted to the context of biology learning. A lifelong learner will be a "master" because it can make the process of learning by developing morality/authority as a 'habitus' of lifelong learning [16].

Other experts say that the success of lifelong learning in a country is the policy applied by the government. For example in Singapore, the government urges its citizens to become lifelong learners in order to improve their work skills and remind them that lifelong learning is a defensive strategy for the country [5]. The Viet Nam government has made a commitment to build a Lifelong learning Society in 2020. A range of related initiatives have been launched, including the Southeast Asian Ministers of Education Organization's Center for Lifelong Learning (SEAMEO CELLL) and "Book Day" - a day aimed at encouraging reading and awareness of its importance for the development of knowledge and skills [17]. In addition, in other research it is said that the lifelong learning approach can foster underdeveloped countries (49 countries outside the Millennium Development Goals / MDGs) to welcome the post-2015 education agenda [4].
4. Conclusion
Overall lifelong learning profile of students in biology learning has not been too good. Similarly, the results of the analysis are specific to each standard, only the complexity of standard and collaboration standards that the average is quite high; effective communication standard is in the middle position; while the habits of mind standard and standard information processing have a low average. The condition is quite apprehensive, because the lifelong learning profile of students is still low, while learning must have an orientation towards the development of lifelong learning. Thus, it is necessary to recommend the development of biology learning programs that is oriented to supply lifelong learning students.

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