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Implementation of Independent Learning: Chemobio-Enterpreneurship in Junior High School

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Abstract

In order to achieve learning objectives that can assist students in discovering and understanding chemical and biological concepts related to everyday life, an approach is needed that is able to make chemistry and biology material a very interesting and important subject to study and understand. The Chemo-Bio Entrepreneurship (CBEP) approach incorporates entrepreneurial values into learning according to the demands of independent learning. This is in response to the needs of the Industrial Revolution 4.0 era. The purpose of this research was to help motivate teachers and students to have an entrepreneurial spirit. In addition, learning chemistry and biology will be more fun and provide opportunities for students to optimize their potential to produce products. Thus, the economy of the school community can be developed, as a source of financial input for schools. The research samples were students and teachers of Junior High School 3 Tanjung Morawa 3, Deli Serdang which were taken using purposive sampling. The methods used were observation, interviews, Focus Group Discussion (FGD) and training in making compost and natural hand sanitizers. Data were analyzed using qualitative and quantitative descriptive statistics. The results showed that the understanding and skills of students and teachers before and after being given training in making compost and natural hand sanitizers were found to be increased. It was suggested to science teachers and school members to continue to practice good practices and be able to pass them on to teachers of other subjects. Thus, the productivity of teachers and students as entrepreneurs is well maintained.

Keywords: *Chemo-bio, Entrepreneurship, Sciences, and Independent learning*

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INTRODUCTION

Science learning based on the independent learning system in the schools during a pandemic is a new challenge for students, teachers and parents. Freedom to learn is a program initiated by the Minister of Education that aims to create a fun learning

atmosphere, sharp analytical skills, and a comprehensive understanding (Rahmawati & Rahmawati, 2020). Chemistry and biology are one of the subjects that have many applications in everyday life. Many natural phenomena that occur in everyday life can be solved with chemistry and biology, so that this lesson has been introduced in the Natural Science Subject in Junior High Schools.

Many opinions state that learning chemistry and biology is a lessons that are quite difficult to accept so that students' interest in chemistry and biology tends to decrease. As stated by Asyari (2018) that chemistry is a difficult subject, many chemical concepts are abstract in nature, the amount of material that must be understood and mastered makes students get bored quickly and are not interested in participating in chemistry learning. This is similarly stated by (Sudjana, 2015) that the process of teaching and learning chemistry is still limited to products.

Chemistry as a process and product should be able to make a significant contribution in increasing the intelligence of students. Various symptoms or natural phenomena can be known by studying chemistry. Therefore, the process of learning chemistry can be directly related to various useful objects around human life. Chemistry is also used as a tool to educate students to have scientific knowledge, skills, and attitudes as a provision for life in the future (Sari, 2010).

In addition, teachers with a non-chemistry background will also face problems, namely their lack of competence in teaching chemistry material in the science subject. As such, teachers are in dire need of specific assistance in their training and skills development. One program that can help teachers to train and develop their skills is through systematic training. This means that training activities must be carried out continuously which are also well planned and managed. In contrast to biology teachers, even though biology teachers are sufficient, they also need skill development so that biology teaching and learning activities are not only delivered as products.

Chemo-bio entrepreneurship based learning (CBEP) is a learning model that is able to integrate hard skills and soft skills in a balanced way. This training is considered very appropriate for science teachers, because it applies integrated soft skills that are appropriate to the subject and apply to real life as learned in science. This is in accordance with the concept of independent learning, where education must be able to develop critical and creative thinking so that it can discover new things and be able to produce graduates with an entrepreneurial spirit (Faiz & Kurniawaty, 2020).

According to Zam & Khoiriyyah (2018) and Brase (2009) that CEP is a chemistry-biology learning approach that is not only oriented towards mastering the material (subject-matter oriented), but places more emphasis on the application of concepts by associating phenomena around life (life-skill oriented). So, in addition to mastering the concept, this approach allows students to learn the process of processing a material into a product that is useful, has economic value, and motivates students to entrepreneurship, learning chemistry becomes interesting, fun, and more meaningful. One form of life skills that will equip students to improve their quality of life (life skills) is entrepreneurship education (Tohani, 2015).

The junior high school namely SMP Negeri 3 Tanjung Morawa has several activities that can be used as a business such as composting, waste banks, medicinal plants, nurseries, green houses, biopori, and school forests. However, this activity cannot

yet be utilized as a development of the school's economic community. Based on the background mentioned above, this research focuses on the application of chemobio-entrepreneurship as an application of independent learning at SMP Negeri 3 Tanjung Morawa.

METHOD

This research was conducted in September 2020 at SMPN 3 Tanjung Morawa with total sample of 21 people consisting of 11 teachers and 10 students who were taken by purposive sampling. The methodology used in the research was carried out using a combination of descriptive statistics, using qualitative (observation, interview consist of identity respondens, background, knowledges, procedure and benefit to manage waste from household wastes). Then, Focus Group Discussion (FGD) have been done, while quantitative (pre-test and post-test) with the same of 10 questions by questionnaire link, consists of Material of compost; Equipment of compost; Procedure of compost; Composting training; Benefit of compost; Material of handsanitizers; Equipment of handsanitizers; Procedure of handsanitizers; Training of handsanitizers; and Benefit of handsanitizers. The data data analysis is presented in the form of diagrams and discussed in the results and discussion.

RESULTS AND DISCUSSIONS

SMP Negeri 3 Tanjung Morawa is located at SMPN 3 Street No.035, Hamlet IX, Wonosari Village, Tanjung Morawa District, Deli Serdang Regency. The community's desire to attend SMP Negeri 3 Tanjung Morawa is high, this can also illustrate that the development of people's awareness of the importance of education is getting higher. Community members who attend SMP Negeri 3 Tanjung Morawa have the view that this school has high discipline, adequate facilities and infrastructure supported by IT and a beautiful school environment that is very conducive for teaching and learning activities.

Figure 1 shows the physical conditions and learning activities at SMPN 3 Tanjung Morawa. It is an “adiwiyata” independent school with A accreditation. The number of students in the even semester 2018/2019 is amounted to 676 people, had 21 classes consisting of 7 of IX grades, 7 of VIII grades and 7 of grades VII.

Computer room, library, science laboratory, student council room, UKS room, prayer room, and school canteen, one each room. There are ball, basketball, badminton and volleyball courts available. There are four science teachers with backgrounds in biology (2 people), chemistry (1 person), and physics (1 person). Science laboratory is available in one room, but there is no laboratory assistant. In addition, the 2013 curriculum is applied in its learning.

Figure 1. Physical conditions & learning activities at SMPN 3 Tanjung Morawa

Based on the results of observations and interviews with teachers and students at the school, there were several findings that can be analyzed based on several aspects, *i.e.*, the limited ability of teachers to teach chemistry and biology in science subjects. Most teachers did not have a background in chemistry, so teachers have limitations in teaching them. With these limitations, the teacher was unable to teach how the chemistry-biology concept relates to its benefits in everyday life, let alone develop it as an entrepreneur. Furthermore, students' difficulties in understanding chemistry and biology in science subjects. The teacher required students to continue to study independently through reading activities or literacy, so that they can better understand the material being taught. However, students were still not fully motivated to study independently by reading books only. This difficulty was generally felt by students because they were embedded in the belief that chemistry-biology was an abstract subject that was classified as difficult. This paradigm then affected to students reluctant to try to learn more deeply in order to understand it.

The life skills approach was not yet a priority. Learning media was still less varied, limited to pictures only, and even then, if there is one. According to S. A. Sari *et. al.*, (2023) The teaching approach used was the lecture method. The life skills approach was not yet a priority, so they did not understand how to utilize the chemo-bio entrepreneurship approawh as an approach that combines hard and soft skills. Another finding obtained in this study was that the average occupation of the parents of the students was a farmer, where the parents' income was included in the middle to lower category. Only 10 to 15 percent of students get Smart Indonesia Cards. This means that more students were poor and only depended on their parents' income.

Another problem was the teacher's lack of ability to connect the concepts of chemistry learning in science into something more useful in everyday life. Even though, school facilities and infrastructure were very supportive for its implementation. There were several activities at school, such as nurseries, medicinal plants, school forests, waste banks, composting, and green houses. The organizers were teachers and students in groups. The problem was that this activity was only limited, but did not have an impact on the school's economic community development. This activity was not utilized as entrepreneurship at all.

Based on the results of the analysis described above, an alternative solution to the problem of limited teachers' ability to teach chemistry in natural sciences was to provide material on creative and innovative approaches in linking chemistry-biology concepts and their use in everyday life. The solution to the problem of students' difficulties in understanding chemistry-biology in science subjects, namely in addition to utilizing literacy, students could be given learning media that originates from the surrounding environment in a tangible form. Train students to take advantage of several activities that have been started at school, such as: nurseries, medicinal plants, school forests, waste banks, composting, and green houses. Learning like this would be more fun for students to optimize their potential to produce products. If students were used to such learning conditions, it was possible that this will motivate them to become entrepreneurs. In this dedication there were limits to the ability of chemo-bio entrepreneurship, namely up to the production stage.

The solution to the problem of the life skills approach that has not yet become a priority was to provide training on academic entrepreneurship which was realized through CBEP through natural science subjects aimed at commercializing innovations developed by science academics in schools. The FGD was attended by a sample of 10 people consisting of school leaders, science teachers and the Adiwiyata school team work group. This activity was carried out using a socialization and discussion approach to find several issues related to the economic community. The stages were carried out in this FGD activity are as follows: (i) providing socialization about community service activities that will be carried out at SMPN 3 Tanjung Morawa, (ii) digging up some information from participants about various potentials and activities in schools that can be used as entrepreneurs, and (iii) providing participants with an understanding of the importance of integrating the CBEP approach in learning science at school.

This school has several activities that could be used as a business such as composting, waste banks, medicinal plants, nurseries, green houses, biopori, and school forests. However, this activity cannot yet be utilized as a development of the school's economic community. After conducting the FGD, it was decided to focus on conducting composting training because this school already had a composting team, but it was no longer active. Apart from that, so that the onat plants in schools can be utilized, training activities will also be focused on making handsanitizers from medicinal plants in schools. FGD activities at SMPN 3 Tanjung Morawa are shown in Figure 2.

Furthermore, as an effort to shape entrepreneurial skills in schools, the research sample consisted of 21 people, namely 10 students and 11 teachers. The stages carried out in this activity were: (i) participants filled out a pre-test related to waste management, as many as 10 questions using the google form application, (ii) participants filled out a pre-test about handsanitizer as many as 10 questions using the google form application, (iii) giving material on procedures for managing and processing waste, and (iv) providing material on using waste to become entrepreneurs for schools.

Figure 2. FGD Activities AT SMPN 3 Tanjung Morawa

Then continued by training, *i.e.* (i) making compost, and (ii) making handsanitizer from medicinal plants. After everything has been implemented, an analysis of the training activities that have been carried out and conclusions were drawn. Then the participants filled out the post-test related to waste management and handsanitizer, each with 10 questions using the google form application. The composting and handsanitizer training activities at SMPN 3 Tanjung Morawa are shown in Figure 3.

Figure 3. Training Activities For Making Natural Compost & Hand Sanitizer

The results of the respondents' pre-test and post-test on compost and handsanitizer can be seen in Figures 4 and 5.

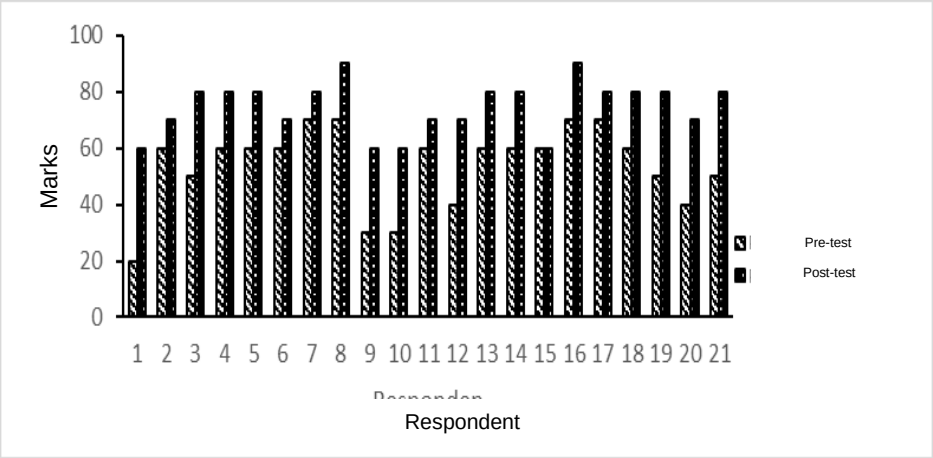

Figure 4. Pre and Post Test Results Regarding Compost

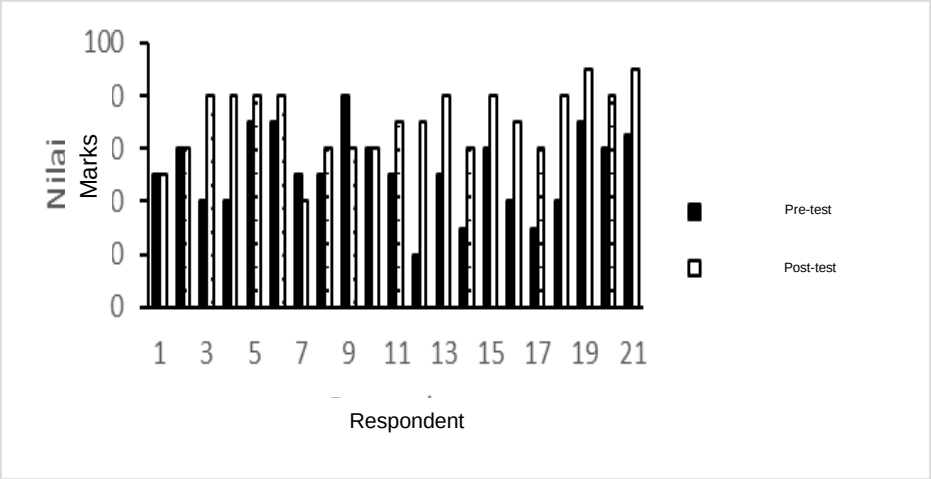

Figure 5. Pre and post test results on hand sanitizer

Based on the data in Figures 4 and 5, the average pre and post tests results regarding compost and handsanitizer were 54, 75, and 50 and 70, respectively, as shown in Figure 6. These results indicated that there was an increase in the understanding and skills of the sample before and after being given material and training.

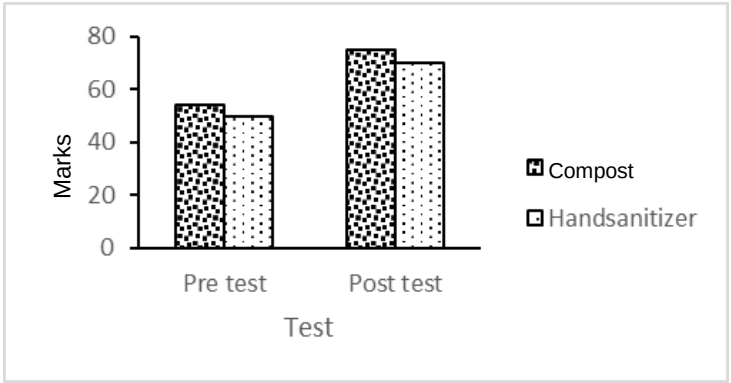

Figure 6. Average pre and post-test results

The results of this study are in line with the opinion which states that the CEP approach could improve soft skills. The abilities in question include communication, leadership, creative thinking, and teamwork (Zam & Khoiriyyah, 2018). CEP was also able to increase students' interest in entrepreneurship, besides being able to improve chemistry learning outcomes (Ismulyati & Ikhwani, 2018). In addition, the CEP approach could increase students' positive attitudes towards chemistry lessons and increase students' entrepreneurial interest (Rahmawanna & Halim, 2016). One thing that was very positive, CBEP which was integrated with character education in chemistry-biology learning was feasible and effective for use in the learning process (Triawan, 2016).

The findings of this study were also in line with the findings Lelono & Saptorini, (2015) that there was an increase in students' CEP abilities through the application of life skill-oriented concepts. Further research results Paristiowati *et. al*., (2015) found that CEP could improve students' cooperation and communication skills. Olatunbosun & Mobolaji, (2017) has tested chemical entrepreneurship as a panacea for unemployed chemistry graduates in Nigeria. They recommended that it was necessary to prioritize academic entrepreneurship and especially chemical entrepreneurship in all institutions, in addition to curbing unemployment of chemistry graduates, also strengthening the economy in the country.

CONCLUSION

Based on the results of the research that has been done, it can be concluded that the application of independent learning CBEP can improve understanding and skills regarding composting and handsanitizers. The results of this study were expected to help schools in integrating entrepreneurship into science subjects. In addition, through this activity could help partners improve the economic community. Training activities like this need to be carried out in many other schools, because the need for entrepreneurship could help schools obtain additional sources of funding.

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