

## SERVICE LEARNING IN BIOLOGY CLASS: Philosophy Foundation, Principles, Benefits, and Implementation

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**Abstract** - Service learning (SL) is a teaching method that combines classroom learning materials with service activities. The aim of this study to provide a foundation for the development of SL into teaching, especially in biology classroom. This study will explain the philosophy foundation for development of SL, describes the basic principles of SL implementation in teaching, outlining the benefits of SL implementation in teaching, as well as to describe the implementation of SL in biology learning. This study was a metaanalysis study. Data obtained from books and journals in the library or obtained online. From the study known that SL develops from a philosophy foundation of progressivism, experimentalists, and experiential of John Dewey. Development of SL motivated by three things: (1) the lack of relevance of the curriculum with the real world, (2) lack of commitment of teaching staff in the learning process, and (3) lack of a response education institutions (colleges) on community issues. Step-by-step SL in the form of a cycle known as IPARD (Investigation, Planning and Prepare, Action, Reflection, and Demonstration). From the literature study know that SL can improve learning outcomes of cognitive, affective, character, involvement in school, motivation, and the ability to think critically. SL can be developed in biology learning to adjust service activities with learning materials in the classroom.

**Keywords:** *Service learning, teaching, biology, methods*

### I. INTRODUCTION

Service learning is a teaching method that combines formal instruction with community service activities. Service learning is a teaching method in which students are exposed directly to the issues raised in the community. Students are challenged to implement a program that can help overcome the problems that occur in the community armed with the theory that they have acquired during the learning process in class. In its activities, service learning will integrate the activities of public services, the concept of learning and reflection to enrich the learning experience, concern for the community, and encourage community involvement.

Many definitions of SL that has been proposed by the experts. Kezar & Rhoads (2001) defines SL as an "*academic service learning*", as seen in the following quote:

*"Service learning is a pedagogical model; it is first and foremost a teaching methodology, more than a values model or a leadership development model or a social responsibility model. Second, there is an intentional effort made to utilize the community-based learning on behalf of academic learning, and to utilize academic learning to inform community service. This presupposes that academic service learning will not happen unless concerted effort is made to harvest community-based learning and strategically bridge it with academic learning. Third, there is an integration of the two kinds of learning-experiential and academic; they work to strengthen one another. And last, the community service experiences must be relevant to the academic course of study".*

Rhodes & Davis (2001) in (Warren, 2012) states that SL is a pedagogical strategy in which students engage in community service that will enhance their understanding of the learning concept and enable them to make a contribution to society. G19iles (2011) in Karmasyah, *et al.*, (2013) explains that SL is a

learning model that combines classroom learning with public service activities, and the learning process is reinforced by their reflection.

In practice, SL can be categorized as a form of experiential learning where students are involved in activities that aimed at the needs of people and society (Jacoby, 2015). In its activities, SL will integrate the activities of public services, the learning concept and reflection to enrich their learning experience, concern for the community, and encourage community involvement. *The Community Service Act* of 1990 provides a definition of SL as follows:

*"A method where students or participants can learn and develop through active participation in an organized service activities is carried out based on the problems encountered in the community; in practice occurred coordination between primary schools, secondary schools, higher education institutions, or public service programs with the communities to be served; integrated into the academic curriculum or educational component as well as providing time for students or participants to reflect on the experience of service to the community".*

Keeton (1983) in Lunar (2012) states that SL activity is rooted in the theory of constructivism, which connects the students with the experience of reflection and analysis in a learning curriculum. Thus, the learning experience aligned to be able to change the learners, helping them revise and increase knowledge and change their practices. It can affect the aesthetic and ethical commitment of individuals and alter their perceptions and interpretations of the world. Some definitions clearly states that SL must be part of the academic curriculum (Jacoby, 2015).

Andrew Furco (1996) in Jacoby (2015) provide a model that describes the uniqueness of SL that distinguishes it from other forms of *community-based work* and experiential learning, as seen in Fig. 1.

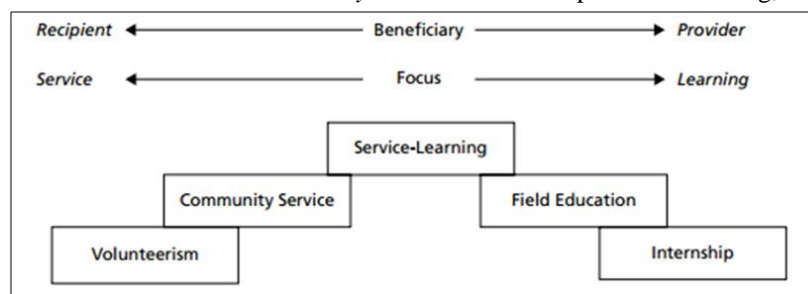


FIGURE 1. Difference In Service Program (Furco, 1996 in Jacoby, 2015)

*Volunteerism* and *community service* is on the left side, which is focused on and intended for the benefit of individuals, organizations, or the community being served. Volunteerism is at the base, a form of charity. Volunteerism associated with providing the services, with no connection between reflection and learning. Up to the next level, "community service" in which students engage in activities designed to meet the needs of human and society. The program is more structured and more sustainable than in volunteerism, thus providing greater benefits to service recipients. Community service does not necessarily include reflection and may be weak in terms of academic credibility. On the right side there are *internship* and *field education*, which is intended for students with the main goal is the learning process. Internship is an experience in which the students involved to learn more about their field and to gain practical experience in the field of employment potential. Internships can be associated or not associated with learning material, it could be involved or not involved reflection. Field education, generally related to the curriculum. The focus of the field education is to improve student learning in the field they studied. Reflection can be part of the experience. Internships and field education targeted at the needs of man and society, but students do not do it voluntarily. At the center of the model, SL trying to strike a balance between student's learning process by providing benefits to the community. One basic principle is "Service, combined with learning, adds value to each and transform both" (Porter-Honnet & Poulsen, 1990). SL is based on the assumption that learning is not always the result of experience, but also reflects the results of which are designed to obtain a specific learning outcomes. In this case, expanding on the concept of SL and community service volunteerism (Furco, 1996) in (Jacoby, 2015).

Implementation of service learning can develop student's cognitive and affective aspect or character. Until now, the process of learning in biology education largely apply the learning in the classroom and laboratory. Not many subjects that apply learning outside the classroom. Not many teachers who

provide direct experience for students to go into the community to apply the knowledge they have acquired in class. With such activities students can explore his abilities as well as to develop their personality and character. Service learning has been widely applied in teaching, especially in American's college. In Indonesia, this method was rarely used. This method is feasible to be developed in Indonesia because of the advantage were great especially for developing the character. For developing SL as a learning method, we have to understand the background of development SL, the phylosophy foundation, how the process, and learn the implemantation of SL at biology subject. With this study we will find the right design for implementing SL in learning process, especially learning biology, in Indonesia.

The aims of this study was formulated as follows:

- a. To explain the development background of SL
- b. To describe the basic principles of implementation SL
- c. To describe the benefits of the implementation SL in the learning process
- d. To describe the implementation of SL in biology class

## II. METHODOLOGY

This research was a metaanalysis study which analyse the aspect of service learning as background developments , basic principles of implementation, the benefits of implementation, and how implementation of SL in biology class. The source of this metaanalysis study was collect from 10 article and 2 books and analyse with description from the source.

## III. RESULT AND DISCUSSION

### A. Background of Service Learning Development

Development and interest in SL is a response to three criticisms of the college, (1) lack of relevance of the curriculum with the real world, (2) lack of commitment from educators in the learning process, and (3) lack of a response from education institutions at community issues (Kezar & Rhoads, 2001). Experties at philosophy of education argue that the main purpose of education, higher education in particular, is to produce citizens who are ready to serve the community. John Locke (1997) and Immanuel Kant (1997) also issued an opinion regarding character education. Expert on philosophy education agree that education should not only on scientific facts and theories, but also contained learning about the principles of moral and character development and implementation (Speck & Hoppe, 2004).

In the late 1960s and early 1970s there was a wave of changes in higher education. Many pedagogical innovations that developed in this period, including multikulturalism, collaborative learning, learning communities, and SL. This pedagogical innovation evolved from the philosophy of education based on experiential learning approaches and emancipatory (Kezar & Rhoads, 2001).

*"Students need to see the connection between what they learn with how their lives. Specifically, we recommend that each student completing a service project to the community, such as doing voluntary work in a community or in college ... The goal is to help students see that he is a member of the community in which they also have a responsibility" (Boyer ,1987 in Kezar & Rhoads, 2001)*

The growth of organizations like Campus Compact and Campus Outreach Opportunity League (COOL) in the late 1980s was a part of a response to the irrelevant curriculum and students as well as leaders of institutions to generate meaningful experience. Criticism during the 1980s and 1990s about the changing role of schools (colleges) also contributed to the emergence of SL. A number of academics and policy experts have seen a growing trend for more teachers or lecturers to start focusing on the research and publications in addition to its main activities, teaching. Not faculty who spend a lot of time to teach that obtain a larger salary (Boyer, 1987, 1990) in (Kezar & Rhoads, 2001). SL is a pedagogical strategy that is regarded by the academic community as a strategy that offers innovative and fresh air for the learning process (Howard, 1998; Stanton, 1994; Zlotkowski, 1998) in (Kezar & Rhoads, 2001). As an innovative pedagogical strategies, SL can link between teaching and research.

The emergence of SL is also related to the criticism that the university, in general, and faculty, in particular, are less responsive to the problems of society (Bok, 1982; Ehrlich, 1995; Hackney, 1994). Works of literature that emerged in the 1980s and continued until the 1990s showed significant attention to the modern conception of society and often education target as a source of problems as well as giving a solution (Barber, 1992; Battistoni, 1985; Bellah, Sullivan, Swidler, & Tipton, 1985; Parks Daloz, Keen, Keen, & Daloz Parks, 1996; Rhoads, 1997; Wuthnow, 1995). Linking the process of teaching and learning with the interests of the community through activities such as SL allow institution to be involved in responding to community problems and challenges students to make judgments about their role in society. Campus Compact emergence in the late 1980s was not just an attempt to improve the relevance of the curriculum to the student experience, but also helps to improve the relationship between higher education institutions with society (Kezar & Rhoads, 2001).

Service learning is also known as as experiential learning. The growth of SL many colored by the experiential grounding philosophy of John Dewey, as apparent in the writings of Dewey's "Democracy and Education (1916)", "How We Think (1933)", and "Experience and Education (1938)" (Jacoby, 2015). Dewey is a progressive education leaders who developed the theory of pragmatic or instrumentalist or experimentalists as the root of SL (Speck & Hoppe, 2004). Dewey's educational philosophy develops from the analysis that the history of philosophy is influenced by dualism (practice and knowledge) that prevent the evolution of education for a democratic society. This is evident in Dewey's statement:

*"The notion that experience consists of a variety of segregated domains, or interests, each having its own interdependent value, material, and method, each checking every other, and each is kept properly bounded by the others, forming a kind of balance of powers in education. On the practical side, they were found to have their cause in the divisions of society into more or less rigidly marked off classes and groups-in other words, in obstruction to full and flexible social interaction and intercourse, . . . resulting in various dualisms such as practical and intellectual activity, labor and leisure, individuality and association". (1916, p. 323) in Kezar & Rhoads (2001)*

Dewey shows that education in a democratic society must evolve beyond the problem of dualism in education, because education methods and processes should be in accordance with the purpose of education. Dewey opposes dualism that separates knowledge with practice. An education system that adheres to dualism, resulting in no involvement of pedagogical techniques, curriculum empty, lack of moral development, a lack of unity, as well as the lack of integration between experience and knowledge (Kezar & Rhoads, 2001).

Dewey argued about philosophy of continuity. This philosophy based on the belief that human beings, as a holistic being, will learn better with the mind, body, spirit, experience and knowledge (Kezar & Rhoads, 2001). Continuity provides the opportunity for students to test the theory and solve problems so that they can respond to situations in the future (Speck & Hoppe, 2004).

Famous opinion of Dewey's "Education of, by and for experience". "Education by experience" mean that students learn through experience. Through the "education of experience", Dewey expect student's capacity to understand the world will increase. Experience was an active response to a situation (Speck & Hoppe, 2004).

Dewey saw that the experience can be a part of education, as in the following passage (Jacoby, 2015):

*"The belief that all genuine education comes about through experience does not mean that all experiences are genuinely or equally educative. Experience and education cannot be directly equated to each other. For some experiences are mis-educative" (1938, p. 25)*

From the quote above clearly shows that Dewey emphasized an award of experience in the learning process, but not all contain aspects of educational experience. Exposure to an experience should be arranged in such a way so as to provide meaningful learning for students. Students will acquire the meaning of learning from experience through the process of reflective thinking. In the absence of reflection, then the experience will have no meaning. Reflection is a core element of SL (Jacoby, 2015). The capacity of reflection in problem solving is a sign that someone is educated (Speck & Hoppe, 2004).

From the above explanation it appears that SL is one form of progressive education that based on a Dewey's model. SL involves the exposure of social problems to the students, challenging students to provide solutions and applying the ideas that come from learning in the classroom (Speck & Hoppe, 2004). In SL, students will learn about solving the problem. In the process the activity involves the

reflection of the experience they get. With all activities, SL can help prepare students to become citizens who are ready to join in communities to provide solutions for existing problems.

#### *B. Basic Principles on Application of Service Learning in Education*

Rooted in work Dewey, Jean Piaget, and Kurt Lewin, David Kolb's Experiential Learning Model provides the basis for the implementation of SL. The model has four components: (1) concrete experience, (2) observation and reflection on the experience, (3) the establishment and the development of abstract concepts based on reflection, and (4) active experimentation to test the concept in a new situation. These four components are form a learning cycle where students can enter into the cycle of all points. However, in general, the design of SL begins with exposure to the real experience. Learning occurs with the repetition of the cycle, where learners test the new concept that he developed into a real experience and continues with other components (Kolb, 1984) in (Jacoby, 2015). The Principles of Good Practices in Combining Service and Learning, commonly known as "the Wingspread Principles", provides guidance in the development of SL since the 1990s. There are 10 principles in combining learning with service : (Jacoby, 2015)

1. Involve the students in a responsible action and challenging with a view to the common good
2. Provide opportunities (structured) for learners to reflect critically on their service experience
3. Convey clear learning objectives and services performed
4. Allow for reviews those in need to define reviews those needs
5. Clarify the responsibility of any person or organization involved in activities
6. Match the needs of service providers with the needs of the service through a process that recognizes changes in circumstances
7. Active and continuous commitment
8. It involves training, supervision, monitoring, support, recognition, and evaluation in achieving the learning objectives and service
9. Make sure that the learner has to be a flexible and adequate time commitment
10. Having the commitment to participate in the program and together with a diverse population

Youth Service America provides steps in the implementation of SL, known as IPARD (Investigation, Planning and Prepare, Action, Reflection, and Demonstration) (America, 2011). Investigation is an early stage, in which students are required to analyze the problems that exist in society. The second phase is the Planning and Preparation, where students create a plan of action what he would do to solve the existing problems in the community. In this stage, students also prepare all the necessary things for the activities of the action. In the third phase, Action, students carry out planned activities directly to the public beforehand. Phase 4, Reflection, students look back at the experience to take action and learn to conduct an evaluation of the activities already carried out. And the last stage is Demonstration, where students shared his convey of their activities and their evaluation (Cahyani, Santosa & Indrowati, 2012).

Fig. 2 below shows the development model of SL experience. This model is repetitive, which allows students to share, reflect, and process their experience and their learning. Teachers can guide students through the questions with open answers, stimulate thinking and feeling. In this stage of generalization and application, teachers can guide students to make the connection between the meaning of the activity in private with the wider world, giving emphasis on the important thing, and answer the question, "Now what?" To record the activity and student reflection, can be helped by using journal. This journal can simultaneously used as one of the evaluation material. Reflection can be guided with questions or free reflection (MacFall & Braun 2007).

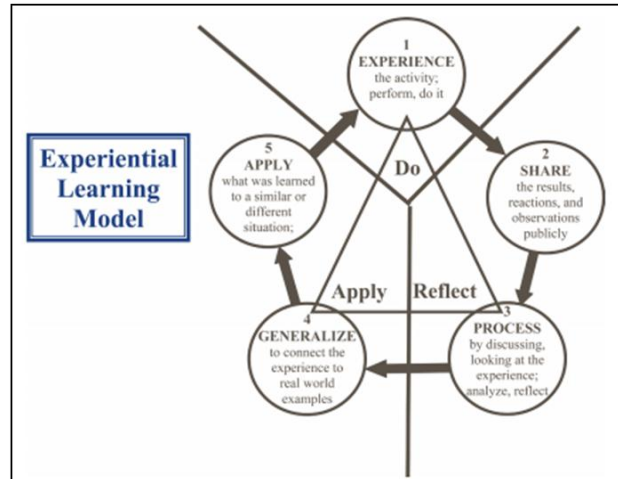


FIGURE 2. Conceptual Model of Service Learning (McFall and Braun, 2007)

Eyler and Giles (1999) states that there are four criteria that states a successful SL activity, (1) the development of personal and interpersonal; (2) understanding and application of knowledge student get in the classroom; (3) transformation of perspective; and (4) the development of citizenship (Warren, 2012). Numerous studies show the positive influence of the implementation of SL as developmental level thinking, empathy, awareness of cultural, personal and interpersonal development, motivation to get involved in social issues, motivation to learn, social inclusion (Warren, 2012).

### *C. Benefit of The Application of Service Learning on Learning Process*

SL continues to grow, but the question arises what exactly the learning outcomes expected from the implementation of SL. Kezar & Rhoads (2001), states that the primary emphasis on SL is the cognitive development of students. Zlotkowski (1995) asserts that the instigators of SL should be able to connect their service activities with academic learning practices. Barber & Battistoni (1993), explicitly linking SL with classroom learning in order formalization of civic education, the main principle, "Educational institutions are learning communities, not service agencies, and... The primary justification for service programs has to be pedagogical" (Kezar & Rhoads, 2001).

Kendrick (1996) made a research about the comparison between students who apply SL and students who do not implement SL in learning sociology, and found that students who apply SL achieve slightly higher score on quiz and essay than students who do not implement SL. The results are in contrast found by Moely, McFarland, Miron, Mercer, and Ilustre (2002), where students who applying SL gain results slightly lower than students who do not implement SL. This is in line with the meta-analysis conducted by Novak et al. (2007) which states that SL has a positive effect on student learning outcomes. In addition, it also has contributed to increasing student's awareness and social responsibility (Warren, 2012).

Research by Weiler, LaGoy, Crane and Rovner (1998) in Furco & Root (2010) on 775 students at the first and middle level in 12 classes that perform SL and 310 students in the eighth grade who are not doing SL. The results showed that there were significant differences in learning achievement at both groups. In addition, students who implementing SL said that they learned more with SL activities. The results of several studies indicate that SL has a positive impact on student achievement. SL also contributes to the learning outcomes at affective domain of students, such as self-confidence, social responsibility and respect for themselves (Astin & Sax, 1998; Boss, 1994; Eyler & Giles, 1996; Giles & Eyler, 1994; Gray et al. 1996; Kendrick, 1996; Mark, Howard, & King, 1993; Waterman, 1993), developed tolerant behavior of cultural differences (Coles, 1993; Myers Lipton, 1996; Neururer & Rhoads, 1998; Rhoads, 1997, 1998a, 1998b) in (Kezar & Rhoads, 2001), developing the leadership capacity of students (Ladewig and Thomas, 1987; Weiler, et al, 1998; and Boyd, 2001). SL is seen as an approach to education that allows students to think, assess, care, or do something and prepare to face the challenges of the future (Karmansyah, Muljadi, & Saputro, 2013).

SL can improve student engagement in school and learning process. In a quasi-experimental research conducted by Conrad and Hedin (1981) in Furco & Root (2010) to more than 1000 students (aged 12-19 years) show that students which involved in SL have an interest and a higher motivation in learning when

compared with students who are not involved in SL. In addition, this study also found that SL provides an opportunity for students to act autonomously, develop collegial relationships with adults and peers, and improve their self-esteem and the ability to organize themselves to do something more effectively. Increased school motivation and positive attitude has also been reported by several other studies. Furco & Root (2010) summarizes a number of studies, for example on research Melchior (1998) that shows that students who carry involvement in SL has a higher learning than students who do not implement SL. Further Rockquemore & Schaffer (2000) also stated the same thing that SL can increase student engagement. If students are engaged, they become more motivated to learn (Flournoy, 2007; Shulman, 1995). As a result, they will learn more, in terms of both cognitive and affective (Frymier, Shulman, and Houser, 1996) in (Warren, 2012).

Research on the application of SL to cultivate an attitude of environmental concern ever undertaken by Bernardo C. Lunar in the research entitled "Creating Environmental Awareness and Sensitivity through Service Learning in Ecology Class". The study involved 35 students who attend ecology class. From these studies know that SL activity is a good way to cultivate an attitude of concern for the environment so that it can affect the attitude of responsibility and active participation of students. Another study conducted by Kastuhandani in 2012. In his paper entitled "Our Dream, Effort, and Reflection: SLP AJCU Participant's Lived experience" mentioned that the SL activity can increase the sense of social awareness within the student. Research by Handoyo in 2014, also showed consistent results. The results of the study entitled "Cultivating Character Students through the Service Learning Program in Subjects of Nutrition and Health", indicates that SL can enhance creative character, responsibility, hard work, communicative and social care of the students.

Research by Eyler and Giles (1999) in MacFall & Braun (2007) also stated the same thing. In his research found the positive correlation between SL with the ability to understand the complexity, application of knowledge, critical thinking, tolerance, personal efficiency, leadership ability, and is open to the new opinions.

From the above explanation, it can be seen that SL has many positive benefits for the development of students, not only a positive effect on the cognitive learning, but also impacts on the development of affection, develop character, improve motivation also develop the ability to think critically.

#### *D. Application of Service Learning in Biology Class*

Not many studies that illustrate the application of SL as a learning method in biology classroom. Several studies have found is the study of Handoyo (2015) and Nugroho & Sucahyo (2013). Handoyo (2015) conducted a study on 65 students who attended the Nutrition and Health Science class. SL which carried out in this course have the aims to develop the character of social care, especially related to food security issues. SL is part of the course of Nutrition and Health Science and included in the final assessment component. Students were divided into 12 groups. Activities undertaken by the student is doing outreach to the community related to the issue of food security at household level as increasing knowledge and awareness of food and nutrition, skills to manage the food and the consumption of a balanced diet, sanitation and hygiene in the food sector, and family resources to improve nutrition, and increased awareness of food quality and safety in the community. Topics selected based on the extension of existing problems in the target communities. In addition to providing counseling, student groups also helped posyandu in place of their goals. In doing so, students conducted field observations in advance to see the problems that occur as well as apply for permission to carry out activities. After observation, the students plan what programs will be implemented. The next stage is the implementation of the program, followed by an evaluation and reflection.

Research by Nugroho & Sucahyo (2013) about implementation of SL in the Faculty of Biology, Satya Wacana Christian University, Salatiga. SL target is to engage students in service activities to promote behavioral change and increase awareness of students. The program is known as the "Environmental Service Learning", held in the Gintungan village, Central Java, for 3 days at 2 family farmers. More specifically, these activities aim to provide the opportunity for students to learn about the impact of agricultural practices on human health (farmers) and on the environment. The program is intended for a group of students who have been selected based on their interest and knowledge on issues related to the environment. 8 students from 25 applicants were selected to join the activities of SL give a briefing about environmental service learning, research and participatory field research, the impact of pesticides on

human health and the environment, a description of the location of activities, reflection method, engineering reports and presentations.

Prior to the implementation of SL, the faculty give a socialization for the farmers in the Gintungan Gintungan village about the general purpose activities, what activities will be done, as well as the benefits of cooperation in the implementation of SL. There are two families who are willing to be a "landlord" in the program in the year 2013. Students were divided into two groups, 4 people each group, staying with family farmers for 3 days. During the three days, they explore rice fields around them, helping farmers like farming activities in the fields, harvest the fruit, flowers, and vegetables, as well as helping to sell agricultural products in traditional markets Bandungan, Semarang. Students also help perform routine chores, such as cooking, cleaning, and child care.

After the SL activity is completed, students reflect on what they have learned during the SL activities and how the service activities that they have done in environmental issues, such as the effects of pesticides on the health of farmers and the environment. Reflection of students showed that SL has changed student's perceptions of their role on the environment. SL is also improving academic skills for students such as communication, team-building, and critical thinking.

MacFall & Braun (2007) provides an overview of workshop given to the ESA Annual Meeting, San Jose, California, on August 5, 2007. This workshop is given to teachers who want to implement SL in the ecology class. From the workshop found that many of the approaches that can be done in application of SL in the ecology class. Activities that can be done for example testing, monitoring and assessment of environmental quality; collaborate with teachers in local schools to identify plants, manufacture of herbarium; involve students to conduct research projects to observe animal behavior; and so forth.

#### IV. CONCLUSION

From the above study can be concluded as follows:

1. Service learning is a teaching method that combines learning materials in the classroom with activities of service to the community, through a process of reflection, which can enhance student's understanding of the learning concept. Service learning develops from a foundation philosophy of progressivism, experimentalists, and experiential of John Dewey. Development motivated by three things: (1) the lack of relevance of the curriculum with the real world, (2) lack of commitment of teacher in the learning process, and (3) lack of a response from institutions on community issues.
2. The basic principle of the implementation of service learning in the learning consists of four components, (1) concrete experience, (2) observation and reflection on the experience, (3) the establishment and the development of concepts based on reflection, and (4) active experimentation to test a concept in a new situation. The fourth component is forming a cycle of learning. The steps in the implementation of service learning known as IPARD (Investigation, Planning and Prepare, Action, Reflection, and Demonstration).
3. Service learning can improve learning outcomes of cognitive/learning achievement, affective, character, involvement in school, motivation, and the ability to think critically.
4. Service learning in biology class is done by adjusting the learning materials to the problems in the target communities. Two studies in the review showed a slightly different procedure. In the study from Handoyo (2015), service learning is integrated with learning, and in Nugroho & Sucahyo study (2013), service learning is outside the classroom learning.

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