learning experiences that complexly engage the students and are designed to develop according to the real world.

4. Weaknesses in Implementing PBL

Researchers have shown that behind the advantages possessed by PBL, of course, there also found many deficiencies in the implementation affecting the success of PBL, especially when implementing project based learning approach in a large class. Although generally PBL can increase students' motivation, but many researchers revealed that if the PBL is applied in large classes, teachers experience difficulty in improving students' motivation, difficulty in making the students to concentrate on learning tasks, difficulty in helping students to connect new content with their prior knowledge, and difficulty in performing cooperative learning activities efficiently (Blumenfeld et al., 1991; Gülbahar & Tinmaz, 2006; Marx et al., 1997; Lee & Tsai, 2004).

Other disadvantages encountered in the implementation of PBL are as follows.

1. PBL requires a lot of time that must be provided to solve complex problems (Grant, 2002). This will lead to a lack of time available for the material/content.
2. Many parents of students who feel aggrieved, because it adds to the cost of entering the new system.
3. Many instructors/teachers feel comfortable with traditional classroom, where the instructor/ teacher play a central role in the classroom. This is a difficult transition, especially for instructors/teachers who have little or no control of the technology (Scott, 1994).
4. Applying project based learning in the classroom may be intimidating for some experienced teachers and will be even worse for beginners (Grant, 2002).
5. The amount of equipment to be provided, so that the demand for electricity increases.
6. Almost all examples of successful project based learning capitalize on the success of cooperative or collaborative learning (Land & Greene, 2000; Marx et al., 1997). Students who have a weakness in the experiment and the collection of information will have trouble (Grant, 2002; Kurzel & Rath, 2007).
7. Students who are not experienced with working in groups may have difficulty in negotiation and compromise (Grant, 2002; Kurzel & Rath, 2007). If this method has not been used before, it may be necessary to teach students how to interact in a group and manage conflict within the group. There is a possibility of students who are less active in group work.
8. When the topic given to each group is different, it is feared that students cannot understand the topic entirely (Grant, 2002; Kurzel & Rath, 2007).
9. For a self-assessment survey, the data may have been influenced by a slight inconsistency (Elam & Nesbit, 2012).
10. Lack of student interest in the subject, including methods of teaching (Kurzel & Rath, 2007).

By referring to the deficiencies in the implementation of PBL, those can be minimized by the use of team teaching in the learning process, and it would be more interesting if the classroom atmosphere is not monotonous, a few examples of the lay-out changes in the classroom, such as: traditional class (theory), discussion group (drafting and distribution of group tasks), laboratory tables (for independent assignment), circle (presentation). Or create a fun learning environment, even for discussion can be carried out in the park, meaning that learning does not have to be done in the classroom. The role of the instructor or teacher in PBL should be as facilitators, coaches, advisors and intermediaries to obtain optimal results in accordance with the power of imagination, creativity and innovation of students.

To overcome the weaknesses of PBL above, an educator should be able to cope in a way to facilitate students in dealing with the problem, limit the time for students to complete the project, minimize and provide simple tools available in surrounding environment, choose a location that is easily accessible so that research does not require a lot of time and cost, create a pleasant learning atmosphere so that instructors and students feel comfortable in the learning process.

5. Conclusions & Suggestions

Through the literature reviews that have been done, PBL which is applied has the following characteristics: cooperative learning, have a facilitator with the characteristics and psychological motives, and have other elements of lifelong learning, and student-centered. However, seeing the of self-directed learning elements in this program, to increase creativity among students, then in implementing the PBL, the teacher should give more freedom to the students to explore their own learning and construct their own meaning. This program will pay more attention up to the end of the process in producing innovative products rather than just concentrating on knowing the facts.

In order to implement the PBL, it is highly required lecturers/teachers who are also creative. The ability to solve problems and to improve the content knowledge and skills is a challenge, especially to deal with students with low ability, lack of motivation and lack of focus, the lecturers/teachers should be more patient and should try to improve the lecturer-student relationship. PBL is an approach that has these three characteristics, they should be evident in the verbal interactions of students in the process of PBL (Wrigley, 1998).

With PBL, then the ability of students has increased in those things as follows: (1) Making a combination of several parts to form a new thing; (2) Using the random characteristics of an object resulting in a change of the existing design into a new design; (3) Eliminating a part of something so that something new is obtained; (4) Thinking about alternative uses of something in order to obtain new uses; (5) Developing ideas which are contrary to the ideas that are commonly used by people in order to obtain new ideas; (6) Determining the usefulness of an extreme form of an object that is found a new use for the object. From these PBL activities, four components, namely: fluency, flexibility, originality, and elaboration will be increased. Fluency characteristics are: (1) sparked many ideas, many answers, many troubleshooting, many questions smoothly; (2)

Provide many ways or suggestions of doing things; (3) Always think of more than one answer. The characteristics of flexibility are: (1) Generate ideas, answers, or various questions, can look at a problem from different perspectives; (2) Look for many alternatives or different directions; (4) Able to change the approach or way of thinking. Originality traits are: (1) Able to give birth to a new and unique expression; (2) Think of unusual ways for self-expression; (3) Able to create unusual combinations of parts or elements. Elaboration traits are: (1) Able to enrich and develop an idea or a product; (2) Increase or specifies the details of an object, idea, or situation so that it becomes more attractive.

To the lecturers of education department and school teachers, it is recommended to develop a learning process which based on PBL approach, since this approach could theoretically be used for the internalization of Scientific Method to the teachers candidates and students in secondary schools. This practice will have a long-term effect because the students are now internalized Scientific Method, so later on in the classroom when they are teaching, it is expected that they will teach their students in a more meaningful way.

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