JPPI, Vol. 3, No. 1, May 2017, p. 53-64 Jurnal Penelitian dan Pembelajaran IPA
e-ISSN 2477-2038

THE LEARNING EFFECTIVITY OF CHEMISTRY EXPERIMENTAL ACTIVITY IN LABORATORIUM TOWARD THE STUDENT'S LEARNING MOTIVATION

(Accepted 6 September 2016; Revised 31 May 2017; Published 31 May 2017)

Luki Yunita

[1,2,3]Department of Chemistry Education, Faculty of Tarbiya and Teaching Science,
UIN Syarif Hidayatullah, Jakarta, Indonesia
Email : luki.yunita@uinjkt.ac.id

Abstract

The problem of this research is the effectiveness of learning chemical by using the method lab work in the laboratory.The main study on this research was focused on factors affecting the effectiveness of learning, covering internal and external factors. The internal factor in this research is the student's motivation study and the external factor is the chemistry lab management. The purposes of this research are: 1) the motivation to study of high school students in South Tangerang, 2) the effectiveness of learning chemical with the use of laboratory, 3) analyze the contribution of the student's motivation to study, 4) management of chemistry lab in senior high school in South Tangerang.A method of this research is a method of survey with the quantitative approach towards two public high schools and two private senior high school in South Tangerang with the total sample 200 students. The instrument used in this research is the questionnaire with Likert scale. The research result in public senior high school and private senior high school showed that in general the activity lab work in the laboratory plays an important role in supporting chemical learning and give effectiveness in understandingof chemical lesson and to increase the student's interest in learning so that the student's learning motivation becomes fairly high towards the chemical subjects have been taught.

Keywords:Chemical Laboratory, Motivation to Study, Effectiveness of Learning

INTRODUCTION

The learning process conducted in the classroom is the activity of transforming knowledge, attitude and skills. The learning should be more student-centered, so the students can participate in the learning process, develop the independent ways of learning, play a role in the planning, implementation, assessment and learning process itself, so that the student experience is more prioritizedly in focusing the starting point of learning activities.

In fact, the current learning process is not fully student-centered. This condition can be seen when doing the direct observation of the learning process that took place in several schools in South Tangerang. According to the observations have been conducted from some schools indicate that the students have not been involved in many learning activities, one of them is because the method is often used by the teacher by using the lecture method. The meaningful learning process occurs when the students are able to actively participated in the learning process (Siregar &Nara, 2011).

Science learning emphasizes on the direct experience to develop the competence so that the studentscan understand the natural environment, in studying science, the students are directed to compare the students' prediction results with experimental theory using scientific method. Science education in school is expected to be a vehicle for learners to learn about themselves and the natural surroundings, as well as prospects for further development in applying in everyday life, based on the scientific methods(Zulfiani, 2009).

The effectiveness of learning process, especially science learning is also influenced by internal factors, namely student learning motivation. The teachers should be able to create a condition that can lead the student'slearning motivation so that the students can be enthusiast to learn (Gage and Berliner, 1988) described, without attention it is impossible to learn.

The use of creative and appropriate methods will arouse the students' interest in learning. The interest becomes a strong source of motivation to be the cause of student participation and creativity in learning activities (Djaali, 2008). The use of various of teaching methods is using the practice/experimental methods. Teaching by using the experimental method emphasizes the full involvement of students in the learning process.

The Government through the Ministry of Education and Culture allocates funds for secondary education

through the mechanism of Special Allocation Fund (DAK) sourced from APBN used for the procurement of educational improvement facilities by providing financial support in the form of equipment and laboratory materials IPA to schools that meets administrative requirements. In the academic year 2013/2014 there are several high schools in South Tangerang city who receive the assistance, both the public senior high school (SMA Negeri) and the private senior high school (SMA Swasta). Through this research is expected to see the effectiveness of the use of tools and chemistry lab materials that can motivate the students' learning, especially on chemistry subjects in school.

Teaching by practicum method requires the laboratory equipment and materials to be able to develop students' science process skill. With the practicum in lab, the students areexpected to be more appreciative of the process or activity, so that the results obtained from the process is more meaningful and last longer in student memory. Practical method is a way of teaching by doing an experiment on something, observing the process and writing the results of experiments, then observations are submitted in class and evaluated by the teachers. The practical method is a way of presenting lessons, where the students doing the experiment by experiencing and proving it themselves (Bahri, 2006). The existence of laboratory activities in the teaching of chemistry depends on the goals and objectives to be achieved from the teaching, According to Amien (1987), the purpose of teaching science through the laboratory activities in connection with its functionas the facilityto:

a. Strengthen or clarify the information about understanding the content (matter) of science teaching.

b. Prove (verify) the process or symptoms of science that has been known.

c. Finding the concepts or principles of science through scientific methods in solving the problem.

d. Learn to apply the principles of science in terms of actual thing.

Practicum or experiment is a way of presenting a lesson in which the students doing the experiment with experiencing and proving it themselves.Chemistry is a science based experiment or "experimentscience" qualitatively and quantitatively. On this basis, then the activities of chemistry labin the laboratory should be an integral activity in chemistry learning. Through laboratory activities, the students can learn the facts, symptoms; formulate the concepts, principles, laws and etc. The purpose of practicum

activities in addition to acquiring knowledge cognitively, also aims to acquire skills, can apply these knowledge and skills to the new situation or other and gain the scientific attitude.

The purpose of this study is to obtain the empirical data and analyze the effectiveness of learning by using the practice method to the student's learning motivation. Operationally can obtain data about : 1) The description of the student's learning motivation in high school students in South Tangerang, 2) The effectiveness of learning chemistry with the use of laboratory, 3) The contribution of the student's learning motivation, 4) The management of chemistry labat the high school in South Tangerang. This research is expected to be useful to: 1) provide a mapping description about the use of laboratory tools and chemicals materials can be effective in school, 2) teachers can increase the knowledge about learning methods that can increase the student's learning motivation during the learning process, 3) students become more active, gaining a lot of new knowledge and learning experiences, 4) the results of this study are expected to be used to the the broadeninsight of empirical information and also be a benchmark for other researchers when developing a more in-depth study of this research.

In planning the making and arrangement of laboratorium, can be conducted the various activities to find the various information to be used as comparison and consideration material for user.

Amien (1987) stated that the laboratorium activity as one of teaching and learning strategies that plays a role in supporting the teaching and learning process of science. With the laboratory activity, the students can learn science through direct observation of symptoms and the process of science; can train the skills of scientific thinking, and can find or solve new problems through scientific methods.

Practicum or experiment is a way of presenting a lesson in which students doing experiment with experiencing and proving it themselves. Chemistry is a science based experiment or "science experiments"qualitatively and quantitatively. On this basis, the laboratory activities of chemistry lab must be an integral activity in chemistry learning. Through the laboratory activities, the students can learn facts, symptoms, formulate concepts, principles, laws and etc. The purpose of practicum activities in addition to acquiring knowledge that is cognitive, also aims to acquire skills, can apply these knowledge and skills to new situations/other and gain a scientific

attitude. Most experiments or lab activities are often performed in the laboratory. Experiments do not require the difficult skills to implement it and not only can be conducted by a group of people, but can be done by anyone after studying natural science (IPA) through the process.

Learning is the activity to plan gradually/sequentially. These stages generally begin from the adaptation stage, for example by introduction to the laboratory. Furthermore, given the increasingly complex experiments and finally the students were expected to plan their own experiments. In addition, the students can learn teaching skills, especially in the use of tools and materials. Laboratory activities also give them the opportunity to repeat some of the old experiments as part of studying the history of natural science in chemistry and change the experimental variables, to investigate the effect on actual experiments, and to do the actual experimental projects in the laboratory for a certain period of time.

The laboratory activities will arouse the students' curiosity about natural phenomena, and challenge them to think critically in finding alternative solutions to a problem; train the students to be persistence through observation, data collection,data analysis, and developing the students' innovation power in generating ideas of thought in presenting problems, so the students are challenged to develop a new form of experiment. Success in laboratory activities will increase student learning interest (Gega, 1977). The increasingof interest in learning and scientific attitudes will lead to the increasing ofthe student's learning achievement and the meaningful of learning outcomes.

Learning in a laboratory is a unique experience to involve both intellectual ability and social ability. Science can be explored by the way of practice to deepen the science which can be seen from the psychomotor aspects of the students such as doing the practicum in the laboratory. The practical activities in the laboratory conducted were intended so that the students can learn through practicum so that they can wholy understand the science correctly (Sagala, 2010).

Amien (1987) stated that the laboratory activities is one of the teaching and learning strategy which is very important in supporting the teaching and learning process of science (Syahmani, 2002). With laboratory activities, the students can learn science through direct observation of symptoms and the process of science, can train the skills of scientific thinking, and can find or solve new problems through scientific methods.

Chemistry laboratory is a place where the teachers and students doingthe experiments, observations and research. Laboratory activities have aspects to connect: 1) the aesthetic appreciation of chemistry, 2) arousing the desire for chemistry, 3) recognizing both chemicals and reactions, 4) the students participate actively and 5) developing from concrete to abstract (Yunita, 2007). Laboratories can provide opportunities for students to work on certain tools and materials, working with colleagues to have the spirit to express or discover something unknown and to enjoy the satisfaction or results achieved.

Laboratory activities can increase student interest so that students are able to learn, related to what is meant motivation is a force that becomes the driving of individual activities to do something activities to achieve goals. According to Mc Donald in Majid, (2009) explained the motivation is a energy changein a person is characterized by the emergence of feelings and reactions to achieve goals. Motivation is a force that becomes the driving force for a person both from within himself and from outside the individual to achieve certain goals.

The student's learning motivation can be seen from several aspects such as learning persistence, frequency of learning, commitment in writing school assignment and attendance frequency of students in school (Supriyadi, 2005). While Sudirman (2011) revealed that the characteristics of people who are motivated as follows: 1) Diligent in facing the tasks, 2) Persevering to facethe difficulties, 3) Shows interests, 4) Pleased self-employed, 5) Not quickly tired of routine tasks, 6) Can defend his opinion, 7) Not easy to let go of things already believed, 8) Happy to find and solve problems.

According to Majid (2009), motivation is a force that encourages the activities of individuals to perform an activity to achieve goals. For example, someone's need for food requires a person to work. While Mc Donald (1959) formulated that..... "Motivation is energy change within the person characterized by affective arousal and anticapotary goal reaction",In the formula, there are three interrelated elements, namely:

a. Motivation begins with a change of energy in the person. These changes occur due to the certain changes in the neurophysiology system in human organisms, for example because of changes in the digestive system, so that the hunger motives arouse.

b. Motivation is characterized by the emergence of feelings (affective arousal). At first a psychological tension, then the emotional changes

happen. This emotional change creates the motived behavior. This change can be observed in his deeds.

c. Motivation is characterized by reactions to achieve goals. Motivated individuals provide responses toward a particular goal. Those responses work to reduce the tension caused by the energy changes in him. Each response is a step towards a goal.

METHOD

Research methods are basically a scientific way of getting data with a specific purpose and usefulness. Based on that, there are four keywords that need to be considered, namely the scientific way, data, goals, and usability. This research used descriptive qualitative research approach. The method used in this research is descriptive method by investigating the condition, situation or event which result presented in the form of research report (Arikunto, 2010). Descriptive research does not provide treatment, but describes the condition as it is (Syaodih, 2011). In accordance with the problems in this study, then the population is all high school students in South Tangerang but this study sample schools which receive assistance from the government by taking 4 schools that are two SMA Negeri and two SMA Swasta in South Tangerang.

The sampling in this research used cluster random sampling by taking students class XI IPA existing in the school with the number of sample research is 200 students. The research instrument is a tool used to measure natural and social phenomena observed (Sugiyono, 2006). The instruments used in this study in the form of a questionnaire of students' perceptions about student motivation in the use of chemical laboratories. Analysis of data obtained by using descriptive statistical analysis. The processing of questionnaire data is conducted by scoring on each item, calculating the percentage of score and determining the interpretation of responses. This research was conducted at a school in South Tangerang area which has obtained equipment and chemical laboratory materials from the local education office.

Data collection techniques used in this research is to conduct questionnaires about student learning motivation by analyzing the questionnaire that uses five scales (Likert scale). The questionnaire is a data collection technique that is done by giving a set of questions or written statement to the respondent to be answered. (Sugiyono, 2006). Data collection techniques by using questionnaires to students about the analysis of student learning

motivation on learning in the laboratory and interviews to support research activities. Conducting the unstructured interviews to obtain more in-depth information on respondents (research sample) to strengthen the results of the analysis contained in the questionnaire. The data obtained in this study were analyzed by using descriptive statistical analysis. The data processing of respondent questionnaire was conducted by scoring on each item, calculating the percentage of scores and determining the response interpretation.

RESULTS AND DISCUSSION

1) The Student's Motivation on Practicum Method in Laboratory in South Tangerang

The research on students' learning motivation is conducted to students on grade XIin four schools that are two SMA Negeri and SMA Swasta who have followed lab activities in the laboratory. The research result of student's motivation to practical method in this laboratory showed that the students in class XI in SMA Negeri and SMA Swasta in South Tangerang have good learning motivation, from the data obtained based on the overall average of student's learning motivation at four high schoolin SMA Negeri and SMA Swastacan be said that both have percentage obtained of 79%.

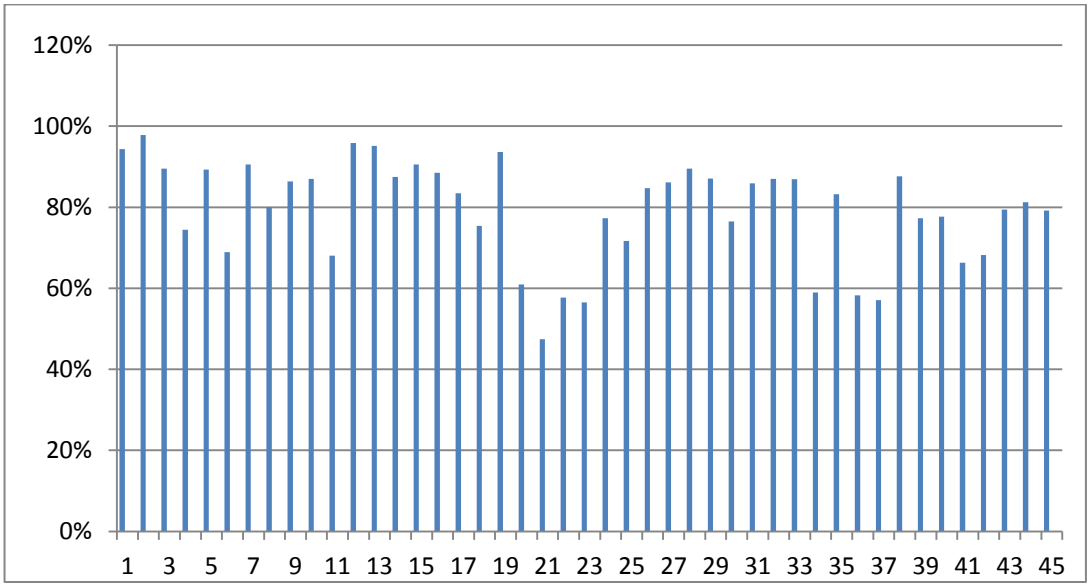

Figure 1. The Analysis Result of Student's Motivation Questionnaire

Figure 1 showed the results of students' learning motivation measurements with each item problems of all respondents in four schools. The number of questions consists of 45 statements. From these data, some questions have a large percentage and almost of the overall statement items have a good category.

The interview result conducted with chemistry subject teachers and the principals suggest that lab work in laboratory is very important and support the learning of chemistry, learning by practicum method in this laboratory is able to motivate the student to study. However, some of the obstacles that were experienced are the inadequate laboratory space because it is combined with other subjects (physics and biology) so that the laboratory learning is less maximal because it is difficult to manage the time between subjects of science (chemistry, physics and biology), even though the tools are in the laboratory is complete, but can not be used optimally.

2.) The Effectiveness of High Schools Learning Process in South Tangerang City

Effectiveness can be achieved if all elements and components contained in the learning system functions in accordance with the goals and objectives setting. Learning effectiveness can be achieved if the design on preparation, implementation, and evaluation can be executed according to procedures and in accordance with their respective functions. The effectiveness of the learning process can be measured by adapting the measurement of the effectiveness of learning, such as from the dimensions of teacher and student characteristics (Watkins, 2002). After doing research in the field, then obtained the results of calculation effectiveness of the overall learning process of the questionnaire analysis obtained has a percentage indicator of 87%, which means most of the effectiveness of high school learning process in South Tangerang with very good criteria.

3.) Analyze the contribution of students' learning motivation

The student’s learning motivation is one of the important components that contribute to the effectiveness of the learning process. This is in line with the opinion of Craft (2005) suggested the factors that contribute to the effectiveness of learning are personal and school factors. Overall the motivation contribution ofstudent learning has a percentage of 87% with very good criteria. This indicator is related to student's interest in laboratory methods that can lead to the student’s learning motivation. The students who have a good interest, so it can be said that students have a high motivation, it can be said too have the high interest or

motivation to learn, the students listen to the teacher's explanation of the practicum procedure that will be conducted in the laboratory, the students do the procedures according to the guidance of the teacher/laboran, the students are motivated in doing the tasks during practicum, such as working on the problems contained in the worksheet (LKS)seriously or seriously in doing the lab activity.

4.) The Management of High School Chemical Laboratoryin South Tangerang

The results showed the indicator of chemistry laboratory requirement in schools, more looking for the equipment and materials which available in the laboratory is complete and feasible, have laboran, chemical laboratory equipped with fire extinguishers and first aid and laboratory lighting system. Of the five points of the statement, there are two negative statements and three positive statements. From the positive statements obtained 90% with very good category of students' response to the chemical laboratory must be equipped with equipment and materials for practicum activities must be complete and feasible to use and equipped with fire extinguishers and first aid kit. While the two statements have a result of 57% with enough category because of the four schools studied, the size of the laboratory in the school is less extensive and the lighting of the chemical laboratory in the school is less bright. It is in line with the opinion of Day (2002), the effectiveness of learning is one of them influenced by the facilities owned by the school. Laboratory is one of the facilities that must be owned by schools to support the learning process of science/chemistry. Good laboratory management is expected to meet the students' need to understand the chemistry learning materials. Based on observations made from four schools, there is one SMA Negeri that already has complete facilities and has laboran in the laboratory. The exact room between science subjects has been separated is not combined, and according to the teacher at the school Laboratory in SMA Negeri A seen in room is enoughideal. The teacher argues that it should not impose a complete laboratory conditions but more expectation to rise the student’s spirit and motivation to do the lab activities and the students want to develop their learning interest. Besides the problem of space limitations, the teachers in the schools said that the lack of manager who specifically manage the laboratory is also a constraint in doing the learningactivities in the lab because learning in the laboratory takes time to prepare and provide tools and materials, in addition to materials that have expired

is also one of the obstacles for teachers of chemistry subjects, so the application of practicum methods in schools has not been done optimally.

Although this research has been pursued maximally, there are still limitations which must be scientifically put forward in this study. Limitations become the basis of consideration to make conclusions and generalisationin this research. The limitation of the research is related to the application of descriptive qualitative research design.

CONCLUSION

Based on the results of research on the effectiveness of learning chemistry practicum in the laboratory toward students' learning motivation in high school in South Tangerang city can be concluded, that in general the lab activities in laboratory play a role in supporting the learning of chemistry and give effectivity in chemical learning process. This can be seen from the progress of students in understanding the chemistry lessons in school and with the activities of chemistry laboratories can increase student interest in learning so that the students' learning motivation is high enough to the chemistry subjects that the teachers taught.

The constraints that occur in chemical laboratory activities is the timing of practicum activities in chemical laboratories that are less scheduled and lack of coordination from various parties to advance the chemical laboratories in the South Tangerangcity.

REFERENCES

Arikunto, S. 2010. *Prosedur Penelitian: Suatu Pendekatan Praktik.* Rineka Cipta. Jakarta

Craft, A. 2000. *Continuing Profesional Development.Educational Leadership.* 6 (50). Ritledge. London

Day, C. 2002. *Developing Teachers The Challenges of Life Long Learning.* Falmer Press. London.

Direktorat Jenderal Pendidikan Menengah,. 2014. *Buku Panduan DAK Sekolah Menengah Atas*. Kementerian Pendidikan dan Kebudayaan. Jakarta.

Djaali dan P. Muljono. 2008.*Pengukuran dalam bidang Pendidikan*. PT. Grasindo. Jakarta.

Djamarah, S. B., et al. 2006. *Strategi Belajar Mengajar*. Rineka Cipta. Jakarta.

Gage, N. L., Bernliner, DC. 1988. *Educational Psychology*. 4th edition. Houghton Mifflin**.** Houston.

Majid, A. 2009. *Perencanaan Pembelajaran Mengembangkan Standar Kompetensi Guru.* PT. Remaja Rosdakarya. Bandung.

Sagala, S. 2010. *Supervisi Pembelajaran dalam Profesi Pendidikan*. Alfabeta. Bandung.

Sardiman, 2011. *Interaksi dan Motivasi Belajar Mengajar*. Raja Grafindo Persada. Jakarta.

Siregar, E. dan Hartini. 2011.*Teori Belajar dan Pembelajaran*. Ghalia Indonesia. Bogor.

Sukmadinata, N. S. 2011. *Metode Penelitian Pendidikan*. PT Remaja Rosdakarya. Bandung.

Sugiyono. *2006*. *Metode Penelitian Kuantitatif Kualitatif* dan R&D. Alfabeta. Bandung.

Supriyadi, D. 2005. *Membangun Bangsa Melalui Pendidikan*. PT Remaja Rosda Karya. Jakarta.

Watkins, C. And E. Carnell. *Effective Learning*. Institute Of Education University Of London. London.

Yunita, 2007. *Panduan Demonstrasi dan Percobaan Permainan Kimia Jilid 2 untuk SD, SMP, SMA dan Sederajat*. Pudak Scientific. Bandung.

Zulfiani, et al. 2009. *Strategi Pembelajaran Sains.* Lembaga Penelitian UIN Jakarta. Jakarta