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The Profile and The Understanding of Science Process Skills Surakarta Open University Students in Science Lab Courses

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Abstract: The aim of this study is to find out the profile and the student's understanding about science process skill of Elementary School Teacher Study Program (Prodi PGSD), Teacher Training and Education Faculty, Distance Learning Business Unit Open University (UPBJJ-UT Surakarta). The study used a survey method by spreading questionnaire to 65 students who join Science Lab Courses in April 2015. The Result of the study shows that the students' profiles of PGSD program dominated by female and non-science graduates who work as non-civil servant teachers with 1-10 year job experience. Most of them have practical learning experience but they have low understanding to the lab tools and materials. Students assume that the lab kits and modules that are used on the lesson are difficult to be understood. They also know the model of learning and assessed aspects in the study. The result of science process skill measurement shows on medium category. Based on the result mentioned above, it is necessary to conduct further research by using models and instructional media which are able to optimize the students' science process skills.

Keywords: Student's profile, science process skills, science lab

1 INTRODUCTION

Science concerns with how to find out nature systematically. Science not only master about the collection of knowledge in the form of facts, concepts, or principles, but also a process of discovery. Cain & Evans (1990) states that, "science contains four things, namely, content/products, processes/methods, attitudes, and technology". Science as the product means that in science there are facts, laws, principles, and theories that have been accepted as true by universal. Science as the process means that, in getting science products require process or scientific method. Science as an attitude means that science can develop because of the attitudes of science such as diligent, conscientious, open, and honest. Science as technology means that science is associated with increasing the quality human life. So, learning science also must pay attention to the product, process, attitudes, and technology.

As a science teacher should understand the essence of science and also the profile of the students. Students who are faced by lecturers are individuals who are unique and different from one another. They come and gathered in the classrooms from different backgrounds, social, cultural, and economic strata. They also come because they bring shades of personality, characteristics, behaviour, interests, talents, intelligence and other various levels of development. Suparmin (2012) revealed that in order to be able to confront and teach the learners with various background, style personality, and level of development of a diverse, then teachers need to know the learner's basic skills, motivation, academic background, socio-economic and many others. In addition, the lectures should know about the profile of the students so that they can chose which strategy that can be used.

Learning lab plays an important role in science. The most important role is to facilitate students to develop science process skills (Trowbridge *et al,* 2000), Lawson (2005) states that the concept of science should be studied through a process of inquiry, not a way to remember the words. Moreover Osborn and Dillon (2008) states that the lab is a center of teaching and learning in science and a good quality of work, and help to develop the students' understanding of scientific processes and concepts. The measurement of science process skills uses test and non-test. Gerald &

Okey (1980) has developed an instrument to assess the integrated science process skills.

A Science process skill is the complex ability which is used by scientists in conducting scientific investigation into the series of the learning process. According Dahar (1996), science process skills is the ability of students to apply scientific methods to understand, develop and discover science. KPS is very important for every student in preparing to use scientific methods in developing science and are expected to acquire new knowledge or develop the knowledge that has been owned.

In fact, there are many science teachers who do not implement the lab activities due to certain constraints. According Anggraeni (2001), many science teachers are reluctant to carry out practical activities because it spends too much time and energy. Meanwhile, according to Gabel (1993), the constraints in implementing the practical activities include lack of equipment and lab materials and also lack of the teacher skills in managing lab activities. Lack of practical implementation causes the science process skills of students is less well developed.

Elementary School Teacher Course (PGSD) Open University (UT) as one of the creator of academician degree for primary school teachers also has an important role in preparing the elementary school teachers to have good science process skills. UT lab learning which is implemented with the tutorial system is expected to facilitate the training of students in the science process skills. UT Rector Decree No. 3466 / H31 / KEP / 2008 states that science practical learning is compulsory subject for students in the primary school. Subjects with PDGK code 4107 have load 3 credits. The topics which are studied consists of practical living creature, living creatures relationship with the environment, food, mechanics, heat, waves, optics, electricity, magnetism, and the earth and the universe. Students are expected to have competency in applying the basic concepts of science through an experimental activity so that students will better understand the basic concepts of science and able to teach in the elementary school. Practically, this course requires supporting facilities that are practical and experimental module kit.

This lecture should pay attention to the characteristics of UT students. Their characteristics are different with students from another university. Because, UT is opened to anyone who wants to continue their studies regardless their age and years pass. Therefore, it is necessary to survey about student profiles and understanding of the science process skills.

2 RESEARCH METHODS

The research method that is used in this study is a survey method. According to Singarimbun (1989), in a survey research, the steps that commonly taken are as follows: 1) formulating the research problem and determining the purpose of the survey; 2) defining the concepts and hypotheses and also exploring the literature. Sometimes the hypothesis is not required, for example in operational research; 3) sampling; 4) developing the questionnaire; 5) field work, include selecting and training interviewers; 6) data processing; 7) analyzing and reporting.

2.1 Types of Data and Data Collection Techniques

The data which is used in this study are primary data in the form of a check list and a questionnaire. Check list is used to determine the UT student's profiles that include personal identification such as name, class, age, gender, address, academic background, and employment status. Check list is also used to survey the learning activity lab science in elementary school that includes lab science experience, experience of practical learning, knowledge about tools and laboratory materials, completeness kit lab, completeness module lab, understanding modules, learning model, aspects of assessment in the lab, and knowledge of skills in the process of science. The questionnaire is used to learn more about the student's understanding of science. Science process skills in this study use the indicators that have been developed by Rustaman, N (2010) which includes the skills to observe, classify, predict, plan the experiments, and communicate. The questionnaire is prepared by the Likert scale.

Data collection was done on Saturday, November 1st, 2014 at UPBJJ-UT Surakarta class group Boyolali, and Sragen. Respondents in this study were students of PGSD, UPBJJ-UT Surakarta equalization program in second semester of academic year 2014, who were following lectures in science lab elementary school. Data collection was done before the

learning activity began. The questionnaire was given personally to the 85 respondents as students. They filled it and submit it to the *surveyors*.

2.2 Data Analysis

The data obtained from questionnaires then included in the tabulation of data using *Microsoft Excel* 2010 *software*. Furthermore, the data was analysed using descriptive analysis techniques.

3 RESULT

Based on the research that has been done, it shows the results in the form of data-UT student's profiles UBJJ Surakarta, Science Practical learning in primary schools, and the student's comprehension of the science process.

3.1 The Profile of UPBJJ-UT Surakarta Students

The profile of UPBJJ-UT Surakarta students include gender, academic background and work are presented in Table 1.

Table1. Profile of students UPBJJ-UT Surakarta which include gender, academic background and Jobs

Gender		Academic Background		Jobs (Teacher)	
Male	Female	Science	Non-Science	Public servant	Non Public Servant
9%	91%	0%	100%	8%	92%

Based on Table 1, it can be seen that most of the students in Prodi PGSD UPBJJ-UT Surakarta equalization program are female (91%) who have non-science undergraduate education (100%) and has worked as an elementary school teacher non-civil servants.

The survey about their age and how long they teach the students while attending these lectures are presented in Table 2.

Table 2. The percentage of student's UT UPBJJ Surakarta teaching experience at the elementary school

Age (Years)	Percentage	Teaching Experience (Years)	Percentage
21-25	14%	1-5	48%
26-30	48%	6-10	47%
31-35	29%	11-15	4%
36-40	4%	16-20	1%
> 40	5%	> 20	0

Based on the Table 2, it can be seen that the age of the students is ranged from 21 years to over 40 years. The age range of 26-30 years (48%) is the highest range. While teaching experience as an elementary school teacher between 1-5 years (48%) is balance with 6-10 years (47%).

The student's experience in doing practical and learning activity is presented in Table 3.

Table 3. The percentage of Students Experience Doing science lab activity and Teaching Science Lab Activity

Science lab activity		Teaching Science Lab Activity		
Not yet	Ever	0x	1-3x	> 3x
33%	67%	44%	44%	13%

Based on Table 3, most of the students had done practical activities (67%). Meanwhile, the students who had never done practical learning is 44% students.

The survey about students' understanding of the tools and lab materials are presented in Table 4.

Table 4. The percentage level of Students' Understanding about Lab Tools and Materials

Category	Percentage
Very high	2%
Height	8%
Moderate	21%
Low	46%
Very low	22%

Based on Table 4, it was revealed that the majority of the student's knowledge about lab equipment is still low (46%).

Student assessment of the completeness of kits and modules as well as abiding by lab module is presented in Table 5.

Table 4. The Percentage of Students' Assessment and Understanding about Lab kit and Module

Lab Kit		Understanding Modules		
Complete	Incomplete	Easy	Moderate	Difficult
25 %	75%	6%	78%	16%

Based on Table 5, it can be seen that 75% students think that the kit provided by UT is not complete, and 78% students understand the module at medium level.

Student's Assessment about learning models and practical aspects of assessment in science in elementary school are presented in Table 6.

Table 6. The Percentage of Student's assessment about learning model and assessment aspects of lab science courses in SD

Knowing Assessment Aspects		Knowing Learning Methods	
No	Yes	No	Yes
41%	59%	29%	71%

Based on Table 6, it can be seen that 71% students know the learning model and 59% students know the practical aspects of assessment in learning science in elementary school.

3.2 Student Understands about Science Process Skills

The students' understanding about science process skills are presented in Table 7.

Table 7. The Percentage of Students' Understanding about Science Process Skills

Category	Percentage
Very high	16%
High	25%
Moderate	44%
Low	13%
Very low	2%

Based on Table 7, it can be seen that most of the students' understanding about the process skills science is in medium category (44%).

4 DISSCUSSION

4.1 UT Student's profile

Based on this research, it was revealed PGSD student profile UPBJJ-UT Surakarta equalization program study groups Sragen and Boyolali. In general, female students, aged 26-30 years have completed undergraduate non-science and work as a primary school teacher non-Public Servant. They have a teaching experience ranging, from 1-10 years. Equalization program for elementary school teacher is interested by some people especially those who teach in elementary school and has not graduated from elementary school education.

Based on the government's policy, the teacher who teaches in elementary school should be graduated from primary school teacher education. It also based on a high need of primary teachers but teachers who graduate from primary school teacher education study programs are limited.

Student's characteristics from non-science universities are different with students from the science college. The main distinguishing characteristic is the beginning knowledge of the fundamental concepts of science, knowledge about tools and lab materials, and the habit of doing scientific procedures. Therefore, the learning of science, especially for students of non-science colleges requires special treatment in designing learning. Moreover, the student is an elementary school teacher who became the spearhead in basic education. Harlen (2001) states that learning should begin with the introduction of things that are simple to complex. Learning can be done with the technique of asking students about the problem / scientific phenomena in daily life.

Based on the results of the study revealed that 67% of students have practical experience; the remaining 33% have not been doing lab activities. A total of 44% had been implementing it while teaching in elementary school. Lab science experience had by the students is acquired during his secondary education. Of course, it was quite a long lag time when they were studying S1 that makes the experience becomes less meaningful.

The student's understanding of the tools and lab materials is relatively low and it becomes one of the indicators that the lab science experience that they get is less meaningful. Besides their understanding of the lab module is in the moderate category and 16% of students have difficulty in understanding the experimental module provided by UT. The module supplied by UT lab is too complex so that the students are not focus in doing lab activities. The modules should be arranged in a simple way and easy to understand based on the characteristics of the students. In the learning process, the students should be introduced to the tools and lab materials from the beginning.

The result of research also revealed that learning in primary school science lab had some

problems at the lab kit. The majority of students considered that the kit provided by UT is not according to the needs of students. Even, in the earliest semester, there was some problems in delivering the kit so it bothered the learning process.

Student's knowledge about models of learning and practical aspects of assessment is good. However, there are still 29% of students who do not know the model of learning and 41% of students do not know the aspects of. Students need to know the learning model and evaluation method. Understanding the learning models and the assessment can control the learning process. Students will also make learning strategies to get the better learning outcomes.

4.2 The Understanding of Science Process Skills

Results of the study revealed that the understanding of the science process skills of students categorized as being as much as 44%, lower by 13% and 2% is very low. This result is not optimal. The lab science should facilitate students to develop their science process skills (Trowbridge *et al,* 2000). These results are caused by problems that occur during the learning process.

Some problems in learning lab lead science process skills of students are less than optimal. The main problem is the infrastructure of the lab science itself. Lab science activities should be done in laboratories and use the right equipment and lab material. The atmosphere in laboratories is equipped with apparatus capable of providing motivation to students to undertake practical activities. It is different if the students use classroom as laboratories. Hamdu & Agustina says that learning motivation affects to the result of students' achievement. While Hofstein & Lunetta says that laboratory environment will have a positive influence on the perception of students. Lab science kits provided by the university is quite helpful in the implementation process of learning, but the limited amount of equipment and materials lead to less than optimal learning lab. Thus, there should be should be solutions to overcome the problem. One of these solutions is the use of local materials to support practical limitations kit.

Local materials are materials or equipment which is easily found in our daily life according to where the person is live (Gustina, 2012). Learning activities with local materials certainly do not have a standard lab equipment provision. However, some researchers have succeeded in doing the learning activities using local materials. Mugagga (2014) states that using wood for skeleton model is the innovation for leaning activity and also can support the course of human anatomy. It could be the solution of student's anxiety when using the original model. This local material is also cheaper than framework models created by the factory. Furthermore, Budiastuti *et al* (2009) states that the former straw waste plastic glass bottled mineral water can be used for teaching materials, therefore, it could overcome the limitations of the infrastructure needed in the learning process. Adiarti (2009) states that using the principle of learning through the use of waste can be implemented optimally in science, because science is a science which invites students to explore nature. Reuse of waste will foster sensitivity of students to always preserve the environment.

Practical learning should also apply the right learning process. Meyers (1986) stated that in order to develop science process skills of students in the learning process needs to be carried out the following strategies. First, the content and process should be balanced. Â learning science should be balanced between products (presentation of facts, concepts, principles, laws, etc.) and process (science process skills), such as observing the scene, formulating problems, hypothesizing, measuring, concluding, and controlling variable. Second, lectures and discussion should be balanced. Third, we should create a discussion class. Teacher should begin the presentation with giving a question. This question should make student more creative.

Another factor is derived from the internal students. Lack of student's interest will affect the results of their study, including science process skills. Therefore, we should find the alternative models of learning and training process science lecturer that able to arouse the interest of students. Meyers (1986) states that there are five keys to increase interest and create a classroom interactive atmosphere; (1) start each lesson with a problem or controversy; (2) use a clarity to arouse reflection; (3) set the classroom to generate interaction in learning; (4) If possible, extend learning time. The

process of science would happen if the students have a great time to get on reflection; and (5) create a comfortable learning environment

5. CONCLUSIONS AND RECOMMENDATIONS

The conclusions of this study are the student's profile of PGSD Prodi is dominated by female non-science graduates who work as non-civil servant teachers working with 1-10 year old. Most of them have experience in doing lab science and implementing it, but their understanding of the tools and materials lab is still low. Students assess that lab kits and modules used in learning is incomplete. They also know the model of learning and aspects considered in the study. The result of their understasing in the science process is in the medium category.

There are several Recommendations that can be given based on the results of this research: 1) there should be further research on learning model to optimize the science process skills in accordance with the characteristics / UT student profile; 2) The learning process should not be filled with practical, but also must be balanced between lab work (processes) and delivery of its content (product); 3) we need another innovation to overcome the problem of limited kits and modules provided by UT, one of them is by using local materials and the development of learning tools.

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