



## Assessing Students' Ethnicities and Critical Thinking Skill to Develop PBL Based-Biology Learning Tools

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### Abstract

A survey has been conducted in grade XI natural science of senior high school, at odd semester, academic year 2016/2017 in Samarinda, Indonesia. The focus of this research are to determine the students' ethnicities, and the responses of biology teachers about students' critical thinking skills, and Problem-Based Learning. Sampling technique was total sampling. The research instrument was a questionnaire. Data was analysed by techniques used descriptive. The results of the data analysis show that the compositions of students' ethnics are: Java (12.7%), Bugis (6.9%), Kutai (13.3%), Banjar (13.3%), and other ethnics (28.5%). Most of the teachers (86.0%) who already understood about the learning approaches, said that they already understood, while the remaining 14% did not understand the patterns of Problem-Based Learning. In addition, 23.3% teachers said that students were less able to explain, express opinions, and make conclusions; 76.7% said that students are sufficiently able to explain, express opinions, and make conclusions. Future research related to biology learning in multiethnic students needs to be conducted to get more information. The design of learning tools needs to consider the ethnic of the students in strengthening critical thinking skills. Similar research needs to be done to obtain more information. The findings of this research are the students' ethnicities of the XI class of Natural Sciences, as well as the responses of high school biology teachers about students' critical thinking skills in Biology.

### How to Cite

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## INTRODUCTION

Students ethnic are both internal and external factors that influence student learning. Therefore, in the design of learning tools, teachers need to understand the ethnic condition of their students. By understanding the ethnic condition of the students, the teacher can design the learning process so as to achieve the expected learning objectives. A survey conducted by Boleng (2014) on 1.776 students of grade IX science program in academic year 2012/2013 found that there were four large ethnic groups of students. The biggest ethnic was respectively Javanese (41.7%), Banjar ethnic group (15.1%), Bugis (14.7%), and Kutai (6.2%). Other ethnicities (22.3%) were comprised of relatively few students.

In relation to the students' critical thinking skills in biology, the results of surveys and interviews in May, 2012 of 40 senior high school biology teachers in Samarinda on the students' critical thinking skills in biology concept (cells, tissues, motion systems, and circulatory systems) revealed that many students of grade XI science were not able to express their opinions in a structured and logical way. The survey results, related to the students' ability to voice their opinions, indicate that as many as 20.0% teachers were less satisfied, 37.5% teachers quite satisfied, 25.0% teachers satisfied, and 17.5% teachers very satisfied. Likewise, many students were not able to express their arguments in explaining a problem in biology learning materials context (cells, tissues, motion systems, and circulatory systems). However, until now the information on the level of critical thinking skills in biology of senior high school students of grade XI science in Samarinda is still not available.

The survey in senior high schools might obtain the data on: students' ethnicities, biology teachers' responses on students' critical thinking skills in biology, and PBL. Such information may be used to begin the development of the learning material that teachers will use, because the development of such initial information-based learning material is related to the critical thinking thinking in biology.

Yamin (2013) states that as teachers, we need to familiarize them with the learning process that empowers their ability to find and formulate problems, plan data collection, process and discuss data, make conclusions, and present their research results to others friends with different ethnicities.

Related to the learning atmosphere which implements PBL, Yamin (2013) explains that

the PBL are: (1) creating meaningful learning in which learners can solve their own problems in their own way based on their knowledge and experience, (2) integrating the their knowledge and skills simultaneously and applying them in the relevant contexts, (3) improving critical thinking skills, fostering students' initiatives in work, increasing internal motivation to work. Related to ethnicity, Liliweri (2007) explains that ethnic or often called ethnic group is a group of people united by a consciousness or similarity of a particular culture or subculture, or because of racial equality, religion, even of certain roles and functions.

Kuswarno (2008) says that the development of intelligence is strongly influenced by the development of language. Therefore, by using good, correct and understandable language, students can work together in solving a problem in biology learning (cells, tissues, motion systems, and circulatory systems) in the classroom. Furthermore, Agatha (2012) adds that the efficient and productive role of teachers in learning is to create a situation for each learner to learn in their own unique way. The classes are not designed to hide student identity, but to allow students to actualize themselves.

The developed learning tools include: the syllabus, lesson plans and student worksheets, by implementing the patterns of PBL learning, with materials: cells, tissues, motion system, and circulatory system. In addition, this research is also directed to reveal the effectiveness of learning tools which implements PBL on the critical thinking skills of multiethnic senior high school students in Samarinda.

The focuses of this research are to determine the students' ethnicities, and the responses of biology teachers about students' critical thinking skill, and Problem-Based Learning. This preliminary study would be used to develop learning tool for multi-ethnic students. The research benefits are for senior high school biology teachers, in order to understand the ethnic character of learners in the classroom and to develop the structure of learning tools based on PBL. This study is a preliminary research as a need assessment to develop PBL based- learning tool to encourage students' critical thinking skill on concepts of cell, tissues, human movement system, and circulatory system.

## METHODS

This study was a survey, with no treatments toward the research subjects. The survey

was conducted in all senior high schools, both public and private senior high schools in city of Samarinda. The schools targets of this survey were the senior high schools with sciences major/ science class. The survey were: (1) the students of grade XI science in the odd semester of academic year 2016/2017, (2) teachers who taught Biology in senior high schools which had science majors in city of Samarinda.

The population of this research was all students of grade XI science in the odd semester of academic year 2016/2017. The number of the students was 2010 students. In addition, senior high school biology teachers in that academic year were as many as 30 teachers. The samples were taken by using total sampling technique.

The research instruments were some questionnaires. The questionnaires used were in the form of: (1) ethnic student card, to know the students' ethnicity, and (2) questionnaires for teachers, to know the type of curriculum implemented in senior high school, reveal the responses of Biology teachers about students' critical thinking skills in biology (cells, tissues, motion systems, and circulatory systems), and the pattern of PBL.

The data were analyzed using descriptive analysis technique. Descriptive analysis technique was used to know: (1) the students' ethnicities of class XI science, (2) type of curriculum implemented in senior high schools in Samarinda, (3) the responses of biology teacher about students' critical thinking skill in biology (cells, tissues, motion systems, and circulatory systems) , and the pattern of PBL.

## RESULTS AND DISCUSSION

### *Curriculum Implemented in senior high schools in City of Samarinda*

The results of the survey show that from the 21 senior high schools surveyed in Samarinda, 15 senior high schools (71.4%) have implemented curriculum 2013 (K-13), while the remaining 6 senior high schools (28.6%) still apply *KTSP*

(*Kurikulum Tingkat Satuan Pendidikan*) curriculum [education unit level curriculum]. Besides, there are senior high schools which in the previous years still implement *KTSP* curriculum and starting in the academic year 2016/2017 implement K-13 in grade X.

### *The Students' Ethnicities*

A thorough survey of students of grade XI science in all senior high schools with science majors in Samarinda obtained 2.010 students for academic year 2016/2017. The results of the data analysis show that from 2.010 students of grade XI sciences of all senior high schools in Samarinda, it is found that there were four students' ethnicities dominating the existence of students' ethnicities, namely: Java, Bugis, Kutai, and Banjar; and coupled with some other ethnicities. Table 1 below shows the distribution of students by ethnicity.

### *Teacher Responses on Problem-Based Learning*

The number of biology teachers surveyed was 30 teachers. The teachers surveyed are teachers who teach Biology in senior high schools of sciences major in Samarinda.

Related to the results of the study to thirty biology teachers about their responses to PBL learning, it was found that as many as 28 teachers (93.0%) claimed to have comprehended about learning approaches, while the remaining 2 teachers (7.0%) claimed not to understand about the learning approaches. Table 2, contains the recognition of 28 biology teachers who claimed to have understood the learning approach (28 teachers) about their understanding of PBL.

Of the 24 teachers who claimed to have understood PBL, 10 teachers (42.0%) defined problems as a situation that must be solved, 9 teachers (38.0%) said problems as the difference between expectations and reality, 5 teachers (21.0%) stated problems as a case.

Related to the implementation of PBL learning in the classroom, from the 24 teachers

**Table 1.** Distribution of students of class XI science by ethnicity

Ethnic of students	Number (N)	Percentage (%)	Information
Java	773	38.4	Ethnic immigrants
Bugis	256	12.7	Ethnic immigrants
Kutai	140	6.9	Local ethnicity
Banjar	265	13.3	Local ethnicity
Other ethnicities	576	28.5	Ethnicity other than Bugis, Java, Kutai, and Banjar
Total	2010	100	

Source: Survey results of 2016

**Table 2.** Distribution of biology teachers based on their understanding of PBL

His understanding of PBL	Total	Percentage
Understand PBL	24	86.0
do not understand PBL	4	14.0
Total	28	100

**Table 3.** Distribution of respondents (teachers) according to their responses on the percentage of students who are able to explain, express opinions, and make conclusions

Criteria (%)	Number (N)	Percentage	Category
< 25	4	13.3	Less
26-50	17	56.7	Enough
51-75	9	30.0	Good
76-100	0	0.0	Very good
Total	30	100	

Source: Survey results (2016)

who claimed to have a grasp of PBL, 19 teachers (79.0%) said that they had implemented PBL learning, and the remaining 5 teachers (21.0%) claimed to have never implemented PBL learning pattern in the classroom. Among the 5 teachers who claimed to have never implemented PBL in the classroom, 2 teachers (40.0%) said that they had not clearly understood the implementation of PBL, 1 teacher (20.0%) said that the learning tools did not support the implementation of PBL, and 2 teachers (40.0%) said that students became less active in participating in the PBL learning.

#### ***Teacher Responses on Student Critical Thinking Skills***

In addition to PBL learning, a survey of biology teachers aimed to reveal the teacher responses on the level of students' critical thinking skills. Of the 30 teachers surveyed, 7 biology teachers (23.3%) said that the students were less able to explain, express opinions, and make conclusions when discussing biology problems in the classroom; While the remaining 23 biology teachers (76.7%) said that the students were quite able to explain, express opinions, and make conclusions, when discussing biology problems in the classroom. None of the biology teachers said that the students' ability to explain, to express opinions, and to draw conclusions in discussing biology problems was categorized as good.

Furthermore, it was also found that from the 30 biology teachers surveyed, most of the teachers (56.67%) said that the percentage of students who were able to explain, express opinions, and make conclusions was in enough category, 4 teachers (13.33%) said less category, 9 teachers (30.0%) said good category. Table 2 shows the

distribution of respondents according to their responses on the percentage of students who were able to explain, express opinions, and make conclusions in the learning process with biology materials.

The criteria used to rank students by their ability to explain, express opinions, and make conclusions are: < 25% (less), 26-50% (enough), 51-75 (good), 76-100 (very good). Table 3 contains details of the distribution of teachers based on their responses on the percentage of students who are able to explain, express opinions, and make conclusions.

#### **The Students' Ethnicities**

The data analysis shows that the racial state of the students of grade XI science senior high school in academic year 2016/2017 is quite varied. Such racial conditions indicate that the classes, especially science majors in senior high schools in Samarinda, have various students ethnicities in Indonesia, even from abroad. The results of this research support the findings by (Boleng, 2014) that there are four major ethnics of senior high school students of grade XI science, namely: Java, Bugis, Kutai, and Banjar; as well as other ethnic groups. Hendry (2013) explains that social relations depends on the intensity of direct contact between members. The social relations goes hand in hand with the homogenization of the group's ideals and directly affects the continuity of ordinary life. The existence of the students with different ethnic backgrounds is found in the regions, such as in East Kalimantan Province, especially in Samarinda, as the destination of job seekers. Moreover, the job seekers come from almost all regions in Indonesia, even

also come from abroad. Such conditions make Samarinda inhabited by people from diverse ethnic backgrounds. Muhfahroyin & Oka (2017) add that in accordance to learning community formation in the implementation of contextual learning, according to social constructivism theory, during learning process students experience conceptual changes as results of social and academic interactions.

There are four major ethnic groups that dominate the ethnic composition of students, namely Javanese, Bugis, Banjar, and Kutai. Javanese and Bugis ethnics are group of students whose parents are immigrant. While Banjar is a group of students whose parents are immigrants from South Kalimantan. According to Maasawet, (in Boleng, 2014), Banjar ethnic is a local ethnic of South Kalimantan, residing in Samarinda. Banjar ethnic migrated to East Kalimantan, including to Samarinda, in 1565 from Amuntai, South Kalimantan. While the Kutai ethnic is a group of students whose the parents are local inhabitants of Samarinda.

The results of the data analysis also show few students with other ethnic backgrounds. The other ethnic groups are Sunda, Padang, Dayak, Toraja, Madura, Palembang, Manado, Batak, Flores, Aceh, Sanger, Bali, Bengkulu, Betawi, Bima, Buton, Berau, Melayu, Lombok, Minahasa, Ambon, Sasak, Bangka Belitung, Lampung, Tidung, Paser; Jambi. In addition, there are also some students from abroad: South Korea, India, China, and the Philippines.

Students with different ethnic backgrounds have different life characters. Thus, in managing classroom with that situation, teachers need to prepare instructional media that enable all students with various ethnic backgrounds to be able to learn, interact with other students, and with teachers. A learning atmosphere which takes into account the students' characters enables the students to develop all of his potential and achieve the expected learning results. Boleng (2013) suggests in his research that students need to continue to interact with all friends, without discriminating their ethnic background, increasing tolerance among the multiethnic students in the classroom.

The life philosophy particular ethnic will be different from that of other ethnics. Related to the philosophy of life of Javanese, Bugis, Kutai, and Banjar ethnics; Sonhadji (2012) describes the life philosophy of several ethnic groups, such as: Banjar ethnic, *pergi haji menaikkan status keluarga* [*hajj raises the status of the family*]; Javanese "*mikul dhuwur mendem jero*" [Getting high in the deep],

and *alon-alon kelakon* [*slow but sure*], Bugis ethnic, "*kita orang harus pemberani*" [*our people must be brave*]. Kutai ethnic has character: *ramah tamah, jujur, semangat gotong royong tinggi, sangat menghormati tamu atau pendatang dari luar* [*being warm-hearted, honest, high spirit of mutual cooperation, respect for guests or outsiders*].

Multi-ethnic students require teachers to prepare instructional media that can accommodate the development of students' academic potential with different ethnic backgrounds. Teachers need to pay attention to the aspect of students' character in the classroom in developing learning tools, so that the learning process involves all the students. Slameto (2010) explains that students who have less pleasing behavior to other friends have a sense of inferiority or are experiencing inner pressures and will be alienated from the groups. As a result, the problem will be worse and will disrupt his learning.

#### **Teachers' Understanding on PBL Learning**

The data analysis indicate that there were 24 biology teachers (86.0%) claimed to have a good comprehension about the pattern of PBL learning. However, of the 24 teachers, 5 teachers (21.0%) claimed that they never implemented PBL learning in their classes. Such conditions cause the students' potential in solving problems in biology learning to be less empowered. Nur & Wikandari (2008) assert that many students and even some other competent adults may still find it difficult to solve problems. Problem solving is a skill that can be taught and learned. Furthermore, Resti *et al.* (2015) adds that the development of learning tools with 4D model, particularly in the *define* phase, has found several biology problems and the appropriate learning strategies to overcome these challenges. One of the learning models offered is PBL.

Related to the implementation of PBL learning in the classroom, teachers need to prepare many requirements set out in the learning tools. The schools implementing the KTSP curriculum as well as K-13 are necessary to develop the requirements (learning tool, time, instruments and lab materials, and other infrastructure), for the success of the PBL learning. Yuniarti & Subanti (2014) emphasizes that educational institutions that have applied problem-based learning could improve students' skills. The PBL made the students enjoyed learning theories and concepts. Problem-based learning requires, students deal with realities which demand the students' involvement in learning.

Related to the empowerment of students'

critical thinking skills, teachers need to apply learning patterns, which allow students to be able to formulate and solve a problem, and make conclusions. In addition, teachers need to facilitate the development of students' curiosity, learning atmosphere that applies the principles of science.

Indeed, the early stage in preparing PBL learning is challenging and quite troublesome. Similarly, the implementation the PBL learning in the classroom is also quite difficult. However, if students are taught to experience the PBL learning continuously, they will become accustomed to not only receive information from teachers, but also find the desired data by themselves and are able to make a conclusion to the problem that has been formulated. Haerullah (2012) reported that social interaction with other friends through group work triggers the formation of students' ideas and enrich their mental development.

#### ***Level of Students' Critical Thinking Skills in Biology***

In general, according to biology teachers, the level of students' critical thinking skills is still in middle category. The results of the data analysis show that most teachers, namely as many as 17 teachers (56.67%), said that the percentage of students who are able to explain, express opinions, and make conclusions, is still in enough categories. This information shows that although most biology teachers say that the percentage of students who are able to explain, express opinions, and make conclusions, but the level of students' critical thinking skills is also still in enough category. This means that although students can give explanations, express opinions, and make conclusions, the level of the truth of the explanation, and the finding made by the student is still in sufficient category. Yasir emphasizes that one of the development of students' critical thinking skills is to be able to actively control the thinking process to find answers from the students' own thinking. Furthermore, Yuan *et al.* (2008) add that the learning results obtained by 24 nurses who have undergone a process of PBL learning for one year include critical thinking, learning how to learn, creativity in learning, the focus of community, teamwork, the skill of conducting research and personal growth (Wardah, 2016).

Therefore, teachers need to plan their learning, in the form of developing learning tools (syllabus, Lesson Plans, students' worksheet, and evaluation instruments), which in the implementation in the classroom, are able to provide a meaningful learning experience and able to empower students' critical thinking skills. Learning

scenarios, which are planned in learning tools, are meant to make students able to formulate problems. By constructing a clear problem, students will be able to collect data, explain the data they obtain, and then make conclusions related to the problems that have been express. Nur & Wikandari (2008) asserted that problem solving is a skill that can be taught and learned. The students' critical thinking skills can be increased by using PBL, because of the presence of authentic problems (Resti *et al.*, 2015).

Learning scenario is strived for students to work independently, and in groups under the teachers supervision. Students were allowed to find each stage of learning by themselves, accompanied by the motivation and explanation from the teacher as a guide for students in solving problems. Therefore, it is ultimately expected that students should be able to compile their own sentences, related to each stage of the task completion. Such condition is expected to be able to develop students' potential in understanding and expressing their opinions either in written or oral form. Nur & Wikandari (2008) asserts that one of the primary goals of schooling is to improve students' ability to think critically, to make rational decisions about what is done or what is believed. Practical teaching on critical thinking depends on the arrangement of classroom atmosphere which encourages the acceptance of divergent (differential) views and free discussion.

The scenario of classroom learning with biology materials needs to be designed, so as to empower students' skills in performing scientific stages or processes. The students' abilities in formulating problems, selecting ways of collecting data, discussing data or phenomena, and finally being able to draw conclusions. Capacity to perform the scientific process is needed in the present era, 21st century era, which demands people to have high order thinking skills, including critical thinking skills to solve various problems of life. A child (student) will be a great hope for the future, if he has had the ability that is needed now and in the future. A definite belief that is highly possible to occur, as stated by Turumbetova (2013) that the younger generation today leads the world in the future.

The research findings show that there were four dominant ethnic students other than the other ethnic. The four ethnic groups are: Kutai, Banjar, Bugis, and Java. The design of learning tools that include: syllabus, lesson plan, and student activity sheet, should consider the potential empowerment of different students' character from different ethnic groups in the learning pro-

cess in the classroom and other tasks related to the implementation of PBL syntax. The syllabus, lesson plan, and student activity sheet, developed need to be colored PBL syntax, which optimizes cooperation and reinforces each ethnic student.

Development of learning tools by understanding the characters of students in the classroom. In designing learning, students with different ethnicities, need to strengthen each other in solving a problem related to biological material. Students from different ethnic groups need to be designed to sit in the classroom so students have to sit alternating with students from other ethnic groups so that they can interact with each other. In addition, students from all ethnic groups need to be involved in each discussion group and the implementation of other tasks in learning with biological materials.

PBL syntax, begins with raising real or simulated problems related to biology, such as cells. Next, students formulate the problem, and then select the means of collecting data related to the effort to solve the problem that has been formulated, that is related to cell material. After the data are collected, students discuss in groups about the data related to cell material, to solve the problems it formulates. Finally, the students make a conclusion, and share the results of the discussion with all the other students in the class. Such PBL work patterns need to involve the potential of students' character from various ethnic groups, namely: Kutai, Banjar, Bugis, Jawa, and other ethnicities. The involvement of each ethnic student in the work process based on the implementation of PBL syntax, designed in syllabus, lesson plan, and student activity sheet. Thus, all student activities during the learning process, allowing students to skillfully think critically, are indicated in terms of: being able to formulate problems, finding ways of collecting data, discussing the data obtained, making conclusions, and sharing with all other students.

## CONCLUSION

Based on the discussion of data analysis, it is concluded: (1) the students were from ethnics of Java, Bugis, Kutai, Banjar, and other ethnicities, (2) most of senior high school biology teacher responded that students were quite able to explain, express opinions, and make conclusions, when discussing biology problems in the classroom, (3) most of the senior high student biology teacher already understood the PBL, but there were some teachers still had not implemented PBL yet in their classrooms.

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