Analysis intrapersonal intelligence of student’s post chemistry learning based guided inquiry model on the buffer material

S Wardani*, K A Zakiyah, A T Prasetya and S Haryani
Chemistry Department, Faculty of Mathematics and Natural Sciences, Universitas Negeri Semarang, Indonesia

*Corresponding author: menuksriwardani@gmail.com

Abstract. This study aims to analyze the intrapersonal intelligence of students after the treatment of guided inquiry-based chemistry learning on buffer solution material. The type of research used is a case study with a descriptive analysis approach and the sample is taken using purposive sampling technique. The sample group used in this study is class XI IPA consisting of 32 students. The study was conducted in four meetings where each meeting used guided inquiry learning models and discussion and task learning methods. Intrapersonal intelligence is measured from individual daily tasks and supported by an intrapersonal scale to classify intrapersonal intelligence levels. The results of the analysis of the average value of individual tasks achieved by students increased during 4 consecutive meetings namely 51.11; 55.78; 70.05; 83.47. The results of the intrapersonal scale analysis were good and the data obtained from intrapersonal calcifications 0 students were very good, 27 students were good, 5 students were sufficient, and 0 students were less.

1. Introduction
Development of science and technology will have an impact on the human aspects of life changes that can cause various problems. The community is required to have a quality that is superior in knowledge, skills, and become an expert in the field in order to solve any problems and can survive in the 21st century [1]. One of the sectors of human resources quality improvement especially Indonesia can be through the education sector [2]. National education is one part of the sector of the construction quality of human resources who have the vision of the national education system, a strong and authoritative.

National education aims to develop the ability and shape of dignified national character and civilization in order to educate the life of the nation, develop the potential of students to become faithful and devoted human beings [3]. The existence of a purpose like done to empower all citizens of Indonesia in order to develop into a quality man-power and competitiveness, thus being able to answer the challenges of changing times and growing hard [4]. High and low the quality of human resources is affected by the level of education and awareness in the searching for knowledge. Awareness of evaluating yourself included in the intrapersonal intelligence.

This intrapersonal intelligence needs to be applied to the learning process as it can develop the quality of human resources and as a basis for the success of a person [5]. Intrapersonal intelligence control understanding of the internal aspects of yourself like, feeling, thinking processes, self-reflection, intuition,
and spiritual [6]. The dominant intrapersonal intelligence also has the ability to find a way or a way out to expression out their feelings and thoughts precisely when experiencing a difficult problem [7]. High intrapersonal intelligence makes a person could managed to control the situation and minimize the weaknesses in their self [8]. The role of the teacher in this case is very necessary in shaping the character of students to be more aware of themselves and able to optimize their abilities.

Based on the results of the interviews open in one of the senior high school XI grades in October 2017 it was known that from 32 students only 2 students were able to know and recognize their abilities. Students were also less active in the learning process. It caused by the learning system which is still centered on the teacher. The pattern of learning that will make the students thinking skills were less well developed. Lack of understanding one's own abilities is also still a lot happening to students. When facing a problem in learning, students have not been able to solve problems with confidence according to their own abilities. Students tend to solve the problem by means of a friend classmate. In accordance with the explanation the students haven't been able to optimize the intrapersonal intelligence. Learning that develop intrapersonal intelligence is one of the very important reflection, this time giving the opportunity to the students to assimilate the information or connect it to daily life [9].

The learning paradigm must be changed by providing students with the ability to learn throughout life, learning from various sources, learning to work together, and solving problems, because traditional learning that focuses on mastering the material cannot be used to compete in the future [10]. Education providers and managers have made the right educational design and in accordance with the current conditions namely the curriculum. The curriculum is a component of education that was reference by each unit of education. The curriculum currently implemented by 2013 curriculum. The learning approaches and models used in the 2013 curriculum are expected to make students able to learn independently because they use the student center system. One of the learning models that can be applied to develop intrapersonal intelligence students was guided inquiry [11].

Guided inquiry is a model of learning inquiry which in practice teacher provides guidance and instructions for students [12]. Inquiry learning model emphasizes on discovery process guided a concept so as to appear scientific attitude to students and can be designed according to level intellectual development of students [13]. Model of guided inquiry position students to solve problems proposed by educators through the submitting hypotheses, data collection, testing, hypothesis through collected data, so at the final stage the students can draw conclusions from the learning process that has been implemented [14]. Learning by guided inquiry also can form and develop "Self-Concept" in students, so their able to understand about the basic concepts and ideas better, help in using memory and transfer there were new learning process situation, encouraging students to think, work on their own initiative, objective, honestly and open minded, the situation becomes more active learning process, can develop individual talents or skills [15].

2. Methods
This research is a descriptive analysis of the study aimed to analyze the level of intrapersonal intelligence students after a chemistry-based learning inquiry social interaction. This type of research on research this is one shot case study class on one sample. Research on selected samples by using purposive sampling techniques or samples are selected based on the consideration of chemistry subjects teachers. This research was conducted at SMA Negeri 4 Magelang in March 2018 involving 32 students with the subject of buffer. There were 3 variables used in this study. Free variables in this study is a model of learning that were used namely model guided inquiry. Variables bound to studies that is intrapersonal intelligence and variable control of the ability of educators, the allocation of time and matter when learning research.

Data retrieval is done by the method nonetest. Instruments used on this research in the form intrapersonal scales and individual assessment sheets. The value of the task used to know intrapersonal intelligence development on students at each meeting. The instrument scale is intrapersonal given at the
end of learning. The scale is intrapersonal consisted of 22 grain statement that includes three indicators and 7 sub indicators. The indicators used in this research intrapersonal intelligence can be seen in Table 1.

| No. | Indicator          | Sub indicator                                                                 |
|-----|-------------------|-------------------------------------------------------------------------------|
| 1.  | Self-reflection   | a. Being able to know the pros and cons of self                               |
|     |                   | b. Transforming the basic concept into its own opinion                        |
| 2.  | Emotional processing | a. Describes several levels of emotional response that indicates a deeper understanding to the issue |
|     |                   | b. Express your feelings and emotions that describe personal relationships and the problem is |
| 3.  | Metacognition     | a. Utilize the books the handbook or relevant sources to find the right answer |
|     |                   | b. Understand the thinking steps to find a solution of the problem solving     |
|     |                   | c. Enthusiastic towards problem-solving process                               |

Each of sub indicators measured the percentage of sub accomplishment using the formula

\[
\text{Presentation of achievement sub indicator} = \frac{\text{sum of score}}{\text{sum of maximal score}} \times 100\% \quad (1)
\]

The scale is intrapersonal then analyzed at each of the grain and the values obtained then classified based on Table 2.

| Interval Score | Criteria |
|----------------|----------|
| 73 – 89        | Very good|
| 56 – 72        | Good     |
| 39 – 55        | Enough   |
| 22-38          | Less     |

3. Results and Discussion

Intrapersonal intelligence students were obtained from the results of the analysis of the individual tasks and intrapersonal scale that has been done by students. Each individual task analyzed according sub material that has been described at each meeting. While the intrapersonal scale was composed of indicators intrapersonal from Lazear which were reduced to three indicators, namely the self-ability, emotions processing and Metacognition which developed into 7 sub indicators as found in table 1.

Individual tasks were analyzed with a task analysis sheet consists of 6 components of the assessment were tailored to the syntax of learning guided inquiry. These components are problem identification, formulation issues, data sources, giving simple explanations, problem solving, and conclusion. The sixth component score is then accumulated and converted to the value of the individual task on a scale of 100. Tasks that were executed at each meeting students then analyzed of average and its value at any meeting. The average value of this represents development intrapersonal students in learning. The average results obtained from the analysis of individual tasks per meetings has increased. The average individual tasks more information can be seen in Figure 1.
The first meeting of the students got the task to discuss about the sense and the components of a buffer solution. The average value of duty on first meeting is the highest value of 51.11 which only reached 71.5 gained by students. The lowest indicators among 6 the components is in collecting data. Students in the stage of data collection only take internet resources in the form of web blogs without chemistry package with the book supported. Score highest on task analysis is at the stage of completion of the tasks. 11 students completing individual tasks with good although only half of the job of the given task. On the component problem identification, formulation issues, gave a simple explanation, and the conclusion students haven't been able to do well and proper settlement. Less the maximum resolution of tasks on this first meeting because students unfamiliar with learning guided inquiry were applied on chemistry subjects so that students feel confused in following the process learning.

The second meeting of the students were given the task of designing an experiment about to make and test the properties of buffer and make practical reports individually based on results of the practical work which has been done. The results of the analysis of the individual tasks at the second meeting of the obtained average value of duty reached 55.78. These values were higher than the average value for duty on the first meeting. Aspects of assessment tasks that have the highest number of is on this aspect of the resolution. Activities in the lab can build understanding of concepts, skills and Metacognition students so that suitable for developing the intrapersonal intelligence [16]. Students were also more enthusiastic to do problem solving at the second meeting of the task than the first meeting. It showed a slight increase on the sub indicator intrapersonal indicates a deeper understanding to the issue and enthusiastic towards problem solving.

At the meeting of the third task is to calculate the value of the degree of acidity of a solution a buffer. The average value for duty on the third meeting of the highest value at 70.05 invention concept of how to calculate the pH of a buffer solution is 87.5. At this third meeting of the students were able to develop his intelligence properly. Students were able to formulate problems and draw conclusions. While this aspect of the assessment tasks was still low is looking for relevant sources. Students less interested in when to use a primary source in a book or journal that is relevant. Students were more interested in looking for a source on the web blog on the internet that were not necessarily relevant because it is considered more practical. In fact, true intrapersonal intelligence, starting from the stage of collecting the basic knowledge in order to develop the mind to solve the problem in accordance with the concept itself [17].

The fourth meeting of the students were given the task to discuss the benefits of buffer in everyday life. Task analysis results at a meeting of the four obtained average value of 83.47 with the highest value of 95.83. There were 20 students who value its work already achieved an average grade. This suggests that intrapersonal intelligence students the better on the application of chemistry-based learning guided
inquiry. Students who have high intrapersonal intelligence will always conduct self-reflection and trying to get better grades in learning [18]. The high average value of individual tasks that were obtained at the fourth meeting of the show intrapersonal intelligence were increasing. This definition reveals the measurement of intrapersonal intelligence was positively correlated with the cognitive processes involved on the task content [19]. Students feel a personal connection with the depth of the problem provided by educators. The method applied to learning guided inquiry also makes it helpful to students understand and know the weaknesses and advantages in the learning process [20].

Based on the above explanation concerning the analysis of the individual tasks at the fourth meeting that experience enhancement value can be inferred that the intrapersonal intelligence students on the application of the model of learning guided inquiry were having increased. In addition to analyzed by individual tasks, intrapersonal intelligence students were also measured by the scale is intrapersonal. This intrapersonal scale given when students have completed the critical thinking test. The intrapersonal scale is based on three indicators of intrapersonal intelligence according to Lazear, was processing emotions, and Metacognition which is then divided again into 7 sub indicators. The intrapersonal scale was given to students after doing chemistry learning based guided inquiry model. Grain scale that amounted to 22 represents 7 sub indicator that is intrapersonal the intelligence of self, the processing of emotions, and Metacognition. Intrapersonal intelligence analysis results per indicator can be seen in Figure 2.

![Intrapersonal intelligence percentage per diagram sub indicator](image)

**Figure 2.** Intrapersonal intelligence percentage per diagram sub indicator

**Description:**
1. Being able to know the pros and cons on the learning process
2. Transforming the basic concept into its own opinion
3. Describes several levels of emotional response that indicates a deeper understanding with the problem
4. Express your feelings and emotions that describe personal relationships and the problem is
5. Utilize the books the handbook or relevant sources to find the right answer
6. Understand the thinking steps to find a solution of the problem solving
7. Enthusiastic towards problem-solving process

Intrapersonal intelligence analysis results for each sub indicator can be seen in Figure 2 percentage intrapersonal intelligence on each sub indicators obtained the order of analysis of intrapersonal intelligence students most high in intelligence express your feelings with a deep personal relationship was 72.66%; able to know the strengths and weaknesses of self in the learning process was 70.31%; transforming the basic concept into their own opinion was 68.36%; enthusiastic towards the process of solving the problem was 66.80%; understand the thinking steps to find a solution of the problem solving was 65.63%; and describe some of the emotion level indicates a deeper understanding with the problem...
only was 61.72%. Intrapersonal intelligence high on a sub indicator expressing the feelings and emotions that describe personal relationships and the problem. Self-ability has the highest value is also seen when discussing application buffer in daily life. At the meeting the students seemed enthusiastic to find whatever products buffer contained in daily life. While on a sub indicator describes several levels of emotional response that indicates a deeper understanding with the problem can be seen when the third meeting of the learning process when the discussion to calculate the pH of the solution buffer. Students lacking in applying the basic formula to calculate pH of buffer solution when given with bit varied questions. The score of intrapersonal intelligence scale was converted up to 100 and classified into 4 categories namely very good, good enough, and less. The results of the analysis of the intrapersonal intelligence classification of students through an intrapersonal scale can be seen in Figure 3.

Based on Figure 3, it was obtained of classification student intrapersonal intelligence. The grouping intrapersonal intelligence is divided into 4 categories that was very good, good, enough and less. On the class samples consisting of 32 students obtained the results of the classification as follows: no students including the excellent category, 27 students include both categories, including students 5 categories, and none of the student categories include less. One of the results of the scale intrapersonal students who belongs in the category simply shows that students were less enthusiastic in the process of problem solving and tend to be passive when the learning process takes place. Passive voice in students in learning due to educators and friends’ groups less gave opportunity on students to convey his opinion in the discussion group. Less maximum results increased intrapersonal intelligence on this research also is caused by several factors, namely the less learning time to apply learning guided inquiry to the study of chemistry in particular on material buffer solution so there is some material that is not discussed in depth.

The discussion above proves that learning with guided inquiry model can develop student intrapersonal intelligence. Increased intrapersonal intelligence of students can be seen from the more mature learners in knowing the feelings and emotions that exist in themselves and understanding the reasons why they have to do something that is felt good for themselves. Increased intrapersonal intelligence occurs in students because of learning with guided inquiry model at all phases of its able to develop intelligence that is inside the students [21].

**Figure 3.** Classification intrapersonal intelligence of students
4. Conclusion
Based on the research results obtained intrapersonal intelligence classification consisting of 32 students were no student including the excellent category, 27 students include both categories, including students 5 categories, and there was no student including the less category.

References
[1] Partnership for 21st Century Learning 2015 P21 Framework Definitions Online in http://www.p21.org/our-work/p21-framework.
[2] Erozkan A 2013 Educ. Sci.: Theory Prat. 13 739
[3] Lusiana, Natasha S and Margaret L 2015 J. Interact. Online Learn 13 150
[4] Visser A B, Ashton M C and Vernon P A 2006 Sci. Direct Intell. 34 507
[5] Orlich C D, Robert J H, Michael S T, Abbie H B and Darcy E. M 2007. Teaching Strategies: A Guide to Effective Instruction Ed. 11(New York: Houghton Mifflin Company)
[6] Lazear D 2004 Higher-Order Thinking the Multiple Intelligences Way(Chicago: Zephir Press)
[7] Perez M, del Mar P and Noemi R R 2014 Eur. Sci. J. 107
[8] Singh AK and Lalropuuii 2014 Int. J. Res. Manag. Bus. Stud. 130
[9] Melhem, Tareq YM and Isa Z M 2013 Int. J. Acad. Res. Progress. Educ. Dev. 2151
[10] Fitriani N R, Widyatmoko A and Khusniati M 2016 J. Int. Chem. Educ. 5 278
[11] Wardani S, Kadarohmah A, Buchari and Permanasari A 2013 Int. J. Sci. Res. (IJSR) 52
[12] Villagonzalo T C 2014 J. Int. Res. Congr.
[13] Matthew B M and Igharo O K 2013 J. Int. Res. 1 136
[14] Partono A, Susilogati Sand Wijayati N 2018 J. Innov. Sci. Educ. 7 1
[15] Putra I S, Susilaningsih E and Wardani S 2018 J. Innov. Sci. Educ. 7 1
[16] Hanafi J 2014 Aust. J. Teach. Educ. 39 4
[17] Sabriye Ş and Cokçalışkan A 2018 J. Educ. Train. Stud. 6 2
[18] Khadijah 2016 IOSR J. Res. Method Educ. (IOSR-JRME) 6 5
[19] Mkpanang JT 2016 Int. J. Educ. Learn. Dev 4 9
[20] Derakhshan A and Faribi M 2015 Int. J. Engl. Linguist. 5 4
[21] Habeeb, Tanveer K And Fatema M 2016 Int. J. Appl. Res. 2 10