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Yogyakarta, Indonesia, 6-7 May 2015

Rector,



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MESSAGE FROM THE RECTOR OF YOGYAKARTA STATE UNIVERSITY

Welcome to Yogyakarta, Indonesia!

It is a great honor and pleasure for me to welcome you all to the 3rd International Conference on Educational Research and Innovation held in Yogyakarta, Indonesia. On behalf of Yogyakarta State University and the committee, let me extend my warmest greetings and appreciation to all speakers and participants who have travelled hundreds or even thousands of miles by various transportation means to come to Yogyakarta to attend this conference. It is my strong belief that your safe journey has been due to the blessings granted by God the Almighty and the Most Merciful to Whom we without any further due have to express our gratitude and praise.

It is indeed a privilege for Yogyakarta State University to have the opportunity to organise this very important conference in which educational researchers and practitioners get together to share ideas, experiences, expectations, and research findings. This conference is held as one of the agendas of Yogyakarta State University to celebrate its 51st anniversary. The theme of this year's conference is "Ethics in High-Quality Research" .

Research is one of the activities among the academic members of a university. It is a systematic effort to solve the problems or answer the questions by collecting data, formulating the generalities based on the data, then finding and developing organized knowledge by scientific method. It is expected that from research activities valuable empirical facts can be obtained to improve and develop the theory and practice to bring a better quality of education.

Unfortunately, currently issues on ethics are regaining their popularity in various practices of research, such as inaccurate data analyses, data manipulations, and plagiarism. In response to this, in this year to support the roles of the Institute of Research and Community Services of Yogyakarta State University in encouraging researchers to conduct high-quality researches, an International Conference on Educational Research and Innovation (ICERI) is held under the umbrella theme of Ethics in High-Quality Research. It provides teachers/lecturers, education practitioners, college students, and policy makers the opportunity to share their knowledge, experiences, and research findings which are innovative and relevant to develop the educational practices focusing on the process and product.

This third conference is aimed at discussing the papers on the research findings related to research ethics, and researches on character education, teaching innovations, as well as educational policies. It is expected that this conference will reach its declared objectives successfully as a strategic forum to yield recommendations on the importance of ethics in the research to produce high-quality research for the benefits of the human' s welfare.

To conclude, let me wish you a fruitful discussion during the conference and an enjoyable stay in Yogyakarta. And finally, hopefully all materials in this conference compiled into a proceeding are useful for us to improve the quality of education and educational research.

Thank you very much for your attention.

Wassalamu' alaikum warrahmatullah wabarakatuh.
May peace and God' s blessings be upon you all

Yogyakarta, 6 May 2015

Rector,

Prof. Dr. Rochmat Wahab, M.Pd., M.A.

MESSAGE FROM THE ORGANIZING COMMITTEE

His Excellency Minister of Research and Technology and Higher Education,
Vice Rectors and Deans of all faculties,
Honourable Heads of Institutes of Research of the surrounding universities,
Distinguished all invited speakers and all other speakers,
Distinguished guests,
All participants,
Ladies and gentlemen,

Assalamu' alaikum warrahmatullah wabarakatuh
May peace and God' s blessings be upon you all
Good morning

First of all allow me to extend my warmest greetings and welcome to you all to the 3rd International Conference on Educational Research and Innovation, held by Yogyakarta State to celebrate its 51st anniversary.

Raising the theme – Ethics in High-Quality Research - this conference is designed to discuss the papers on the research findings related to research ethics, and researches on character education, teaching innovations, as well as educational policies. Hopefully, all discussions in this conference can be inspiring and useful for us to improve the quality of education and educational research.

Ladies and gentlemen

For your information, we will proudly present one keynote speech, four plenary presentation sessions and four parallel presentation sessions. Four outstanding speakers in the field of character education and educational research have been invited. They are Christopher Drake from Association for Living Values Education, Hong Kong, Dr. Elizabeth Hartnell-Young from Australian Council of Educational Research, Dr. Mohamed Bahaaeldin from Faculty of Education, Technische Universitat Dresden, Germany, and Dr. Nurul Taufiqurahman, Head of Innovation Center of the Indonesian Institute of Sciences (LIPI), Indonesia.

Ladies and gentlemen

We have done our best to prepare for this conference. So, my highest appreciation and heartfelt thanks to all committee members. As to err is human, shortcomings may

occur here and there. On behalf of the committee, I would therefore like you all to accept our apologies.

At the end of my speech, I would like to kindly request the Rector of Yogyakarta State University to officially open the conference.

To conclude, let me wish you a productive discussion and a fruitful conference. Thank you very much for your attention.

Wassalamu' alaikum warrahmatullah wabarakatuh.
May peace and God' s blessings be upon you all

Yogyakarta, 6 May, 2015
Head of Research Institute and Community
Service of Yogyakarta State University

Prof. Dr. Anik Ghufron, M.Pd.

FOREWORDS FROM THE HEAD OF COMMITTEE

Assalamu 'alaikum wa Rahmatullohi wa Barokatuh
May peace and God' s blessings be upon us all

Your Excellency The President of Yogyakarta State University Prof. Dr. Rochmat Wahab, M.Pd, M.A, ladies and gentlemen, good morning and welcome to Yogyakarta State University.

The seminar entitle International Conference on Educational Research and Innovation (ICERI) is held under the umbrella theme of Ethics in High-Quality Research. The seminar is organized by Institute of Research and Community Services, Yogyakarta State University, working together with ACER, LIPI, and University of Dresden. This seminar also dedicated to celebrate the 51st Commemoration of Yogyakarta state university.

Ladies and gentlemen, on behalf of the committee of this conference, I would like to express highest appreciation and gratitude to the keynote speakers **Prof. Drs. Muhammad Nasir, Akt, M.Si, Ph.D** (Minister of Research, Technology and Higher Education) and four inveted speaker :

- **Christopher Drake**
(Association for Living Values Education, Hong Kong)
- **Dr. Elizabeth Hatnell-Young**
(Australian Council for Educational Research, Australia)
- **Dr. Bahaaeldin Mohamed**
(Faculty of Education, Technische Universitat Dresden, Germany)
- **Dr. Nurul Taufiqu Rahman, M.Eng.**
(Head of Innovation Center, Indonesian Institute Sciences (LIPI), Indonesia)

The conference is around 200 participant with 121 orally presented article from lecture, researcher, teacher, and student from about 45 universities. The conference is aimed at discussing the papers on the research findings related to research ethics, and researches on character education, teaching innovations, as well as educational policies. It is expected that this conference yields recommendations on the importance of ethics in the research to produce high-quality research for the benefits of the human' s welfare.

This conference will be far from succes and we could not accomplish what we do without the support from various parties. So let me extend my deepest gratitude and highest appreciation to all committee members. I would also like to thank each of participants for attending our conference and bringing your expertise to our gathering. Should you find any inconveniences and shortcomings, please accept my sincere apologies. In conclusion, I hope that your discussions produce something useful and very pleasant stay in Yogyakarta.

Wassalamu' alaikum wa Rahmatullohi wa Barokatuh
Thank you

Por. Dr. Sri Atun

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Abstract

According to Act of the Republic of Indonesian government No. 20/2003 on National Education System, Indonesian government supports educational development based on regional potencies. It is supported by the Regulation of the minister of Education and Culture No. 81A/2013, that local wisdom should be integrated into learning at any subjects. Purworejo is a region in Central Java that has special local wisdoms that are potentially integrated into chemistry learning with scientific approach of learning. This research measured the difference of students' achievement at SMAN 1 Purworejo between students who learnt chemistry by applying local wisdom-based scientific approach and that without applying local wisdom, in which students' prior knowledge was controlled statistically. Two groups of students were chosen as the treatment class applying local wisdom-based scientific approach, and a control class as comparison. The treatment included experiment, presentation, article writing, traditional organization on chemistry learning. After the treatment, students' achievements of both classes were measured by pencil-paper test and compared by controlling their prior knowledge. Data were analyzed using the univariate analysis of variance of SPSS from which Chemistry achievements of students at the treatment class were significant difference from that at the control class when their prior knowledge were controlled (Sig.p < 0.000). This research concluded that chemistry achievement of students who learnt by use of local wisdom -based scientific approach was different significantly from that without integration of local wisdom when their prior knowledge was controlled statistically.

Keywords: local wisdom integration, scientific approach, chemistry learning

1. Introduction

Indonesian educational system supports the educational development based on the potencies of a region such what has been declared in Act of the Republic of Indonesia Number 20 Year 2003 on National Education System [1]:

"1. Article 36 section 2 states that the curriculum at all educational levels and types of education is developed according to principles of diversifications, adjusted to the units of education, local and learners potential.

2. Article 36 section 3 states that the curriculum development is organized in accordance with the level of education within the framework of the national unity of the Republic of

Indonesia and takes the following into account:

- a. the enhancement of faith and piety;*
- b. the enhancement of noble character;*
- c. the enhancement of learners' potential, intellect, and interests;*
- d. the diversity of the region's potential and environment.*

3. Article 38 section 2 manages that the curriculum for basic and secondary education shall be developed in accordance with its relevance by each educational cluster or unit and school/madrasah committee under the coordination and supervision of the Ministry of National Education or the Ministry of Religious Affairs at the district/city levels for basic

education, and at the provincial level for secondary education.”

One of efforts is by using local wisdom as the path of character building. This is proven by the existence of the law stated by Minister of Education and Culture Number 81 A (2013) which declares that a local knowledge is a study [2] that builds a comprehension of the students’ region potency aiming to improve a good attitude, knowledge, and skill.

Therefore, it was necessary to collaborate scientific approach and local wisdom to obtain maximum result of students’ achievement.

The research was to measure the difference of students’ achievement at SMAN 1 Purworejo between students who learnt chemistry by applying local wisdom-based scientific approach and that without applying local wisdom, in which students’ prior knowledge was controlled statistically.

2. Literature Review

2.1 Scientific Approach.

According to The Regulation of Indonesian Minister of Education and Culture, Curriculum 2013 focused on modern pedagogic dimension in learning, namely scientific approach. It included observing, asking, trying, associating, serving, concluding, and creating steps for all subject matters.

Table 1. The Steps in Scientific Approach [3]

Learning Steps	Learning Activities
Observing	Reading, listening, seeing, sensing, (without or within media)
Asking	Having a question after observing
Associating	Doing experiment, reading another source, interviewing an expert
Trying	Processing data, reporting and concluding result
Communicating	Presenting experiment result according to analyzed result in written or spoken language

2.2 Local Wisdom

Local wisdom is the knowledge to make the community and nature is balance. This wisdom can be both tangible and intangible. It comes from the real experience in life. It makes us respect to the ancestors. It gives moral value [4]. Local wisdom

can be seen in societies, communities, and individuals.

[5] have described local wisdom was heritage which become guideline for people in daily activities in communities. The students need to relate learning to daily activity in their life as it was suggested by Fensham [6].

2.3 Local Wisdom in Purworejo

a. Goa Seplawan (Seplawan Cave)

Seplawan cave is located at approximately 20 km from Purworejo’s Town Square. There are special ornaments in the cave, namely stalactite and stalagmite. The process of stalactite and stalagmite formation can be explained by the students in presentation of chemistry learning. In Indonesia, we can find some caves that have stalactite and stalagmite. They are the soil that contains calcium carbonate (CaCO_3). CO_2 in the air reacts with CaCO_3 . The water includes in this reaction to produce $\text{Ca}(\text{HCO}_3)_2$. Calcium bicarbonate that dissolves in water is absorbed by the ground (soil), and it flows on to the cave’s wall. Then it falls to the cave’s surface. When it falls drop by drop, calcium bicarbonate experiences dissociation to be CaCO_3 that forms stalactite and stalagmite [7]. There is also the water that is flown under the cave which the electricity can be investigated.

b. Pantai Jatimalang (Jatimalang Beach)

This place is located at Jatimalang Village, Subdistrict Purwodadi, Purworejo. Based on the history, this place had ever been as the place for Japanese ship disembarkation. Actually, this place is potential in exploring chemistry chapter of electrolyte and non electrolyte solution because of the existence of salt in sea water. Sea water is known as Sodium Chloride (NaCl) that is able to be dissociated to be Na^+ and Cl^- . Beside that, it is able to conduct the electricity. It will be an example of electrolyte solution that can be investigated by the students in chemistry learning.

c. Museum Tosan Aji (Tosan Aji Museum)

Museum Tosan Aji is a museum that exhibits the uniqueness of keris. As we know that keris is the weapon that is made of steel/ iron. It is like a sword that has zigzag shape.

Keris is from Hindustaan Mataram Kingdom. Since 25th of November 2005, keris has been patented as Indonesias’ weapon by UNESCO. In Java island, there is a tradition for keris washing ceremony (named Jamasan). This tradition is to wash keris on the certain month in a year by an Empu (Empu is a person that makes and looks after keris). Actually this tradition can be explained scientifically and related well to the main material of

keris (iron). Iron is corrosive. It means that this yearly tradition is necessary [8].

In chemistry learning, the students should explain the tradition of Jamasan that can be related to the corrosion of iron. The students should explain the ways in Jamasan that can prevent the corrosion in keris scientifically.

d. Mangosteen and Durian

Mangosteen and durian are fruits that can be planted in tropical region such as Indonesia. In Purworejo, mangosteen and durian are considered as the typical fruits. They were chosen as the city's icons. Fruit contained solution, including mangosteen and durian. The solution can be used as material of experiment related to conductivity of electricity topic. The experiment using fruits can be chosen as one example of local wisdom integration into chemistry learning.

e. Susu Kambing Etawa

Etawa is a goat that is widely bred by Purworejo people. The goat can produce milk that contains lactic acid. Because of its acidity, the properties can be investigated in electrolyte and non electrolyte experiment in chemistry learning.

f. Dawet Ireng

Dawet ireng is typical jelly drink that is traditionally made by Javanese and so do Purworejo people. The material on the process of preparation of dawet ireng is interesting to be used as a topic on electrolyte and non electrolyte experiments in the laboratory.

g. Air Gula Jawa

Gula jawa means Javanese sugar. It is originally from Java. It is produced by Javanese. This sugar was made from coconut fruits that are harvested from Purworejo's agricultural area. The sugar was dissolved in the water from which it conducts electricity well for chemistry learning.

h. Batu Gamping in Pituruh

Purworejo people treated limestone (CaCO_3) especially by heating them at 400°C to produce CaO and CO_2 . If CaO was dissolved in H_2O , it produced Ca(OH)_2 and heat. Then Ca(OH)_2 was used to build walls of house and other buildings. [7]

i. Coconut Water

A lot of coconut trees grow in Indonesia. Indonesians use coconut as oil on frying. But the liquid was potential to be used as the material of laboratory work, for example as electrolyte source.

j. Pasar Suronegaran

Suronegaran Market is the biggest market in Purworejo. The market produced huge waste

everyday. The waste smells bad. The substance in the waste can be decomposed by aerobic and anaerobic bacteria through oxidation and reduction reaction. Aerobic bacteria oxidized compound in the waste and anaerobic bacteria reduced [7]

If the elements of carbon, nitrogen (N), phosphor (P), and sulfur (S) are oxidized by aerobic bacteria, the smell will be decreased. In other hand, if anaerobic bacteria work, N,P,S will be reduced to be NH_3 , PH_3 , H_2S that can produce the bad smell.. To prevent the existence of the bad smell, there must be some efforts to make anaerobic bacteria can not work well by cleaning the waste in order to prevent reduction reaction and support oxidation reaction [7]. The students are asked to make a presentation about the reaction after observing to the market and searching to the reference.

k. Traditional Organization

In Purworejo, there is still an organizational structure in a village. Actually, a village chief is called lurah, a secretary is called carik, a treasurer is called kaur keuangan, etc. There is a moral value here, that we have to be able to make friend in society. We have to be in a good relation with others. This organization was made by the ancestor. Everyone lives in a suburb has the community. They live together in a peace.

"To live in a harmony with the environment, local people used the wisdom accumulated by their ancestors to manage natural resources" [5]

[5] described :

"the history and evolution of local community. The community has its own culture, is a miniature society with a production system, resource management, a health system, knowledge, and a learning system, a judicial system, self-governance, and an economic system run by each family and the community. The goals of local community are that families can be self-sufficient and the community can survive. Family members are the main source of labor. They mostly produce for their own families' consumption, but when they sell something, the profits are very small. The people in the community live together by giving and helping without expecting anything in return. They all consider themselves to be related to every other person in the community. They share what they

have with neighbors thus ensuring the survival of the families and the community.

The members of the community are all related and give utmost respect to elders. This makes them "one family" living with unconditional kindness and generosity. When conflict arises,

and a religion expert is named kaum. This group leads the other groups. They live in harmony like in a community when they join chemistry learning. Everyone that is smarter will be kind to help his/her friends to solve the problems in chemistry. They learn about governmental system, local wisdom, discussion, problem solving, and chemistry learning in this activity. They will help each other and make a very good friendship in society. Community can also build an otonomi daerah (regional autonomy). It is a freedom to manage a region to be more independent in its own way.

2.4 Developing the Local Wisdom

In this chemistry learning, students are asked to learn Purworejo's local wisdom that is integrated in chemistry learning. They are asked to plan what they like to do to develop their region by using local wisdom and relating it to chemistry learning. This activity is to make them more creative in developing their region based on chemistry learning. This is done by writing article

2.5 Students' Achievement

[9] states:

"student achievement is the basic of every aspect of education. It

the elders and various relatives are the one who decide how to settle matters"

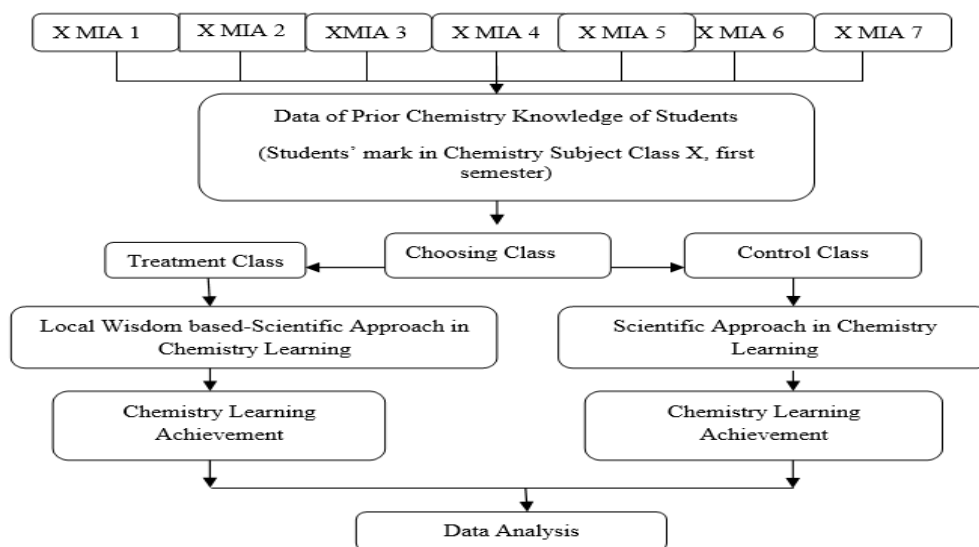
This is an example of simple life style that can be adapted in chemistry class. It is done by grouping the students into some groups. There is the special group that consists of class leader (then we call him/her as lurah), a treasurer (then we call him/her as kaur keuangan), a secretary will be named carik,

gives direction to all educational improvement, efforts. It provides the foundation for educational accountability program, and serves as the primary outcome variable in most educational research studies. The phrase student achievement is included in the titles of over 2,000 research studies and reports listed in the Education Resources Information Center (ERIC) System.

The activity done by the students will product a change in themselves and include cognitive, affective, and skill. The learning achievement gotten by the students is measured according to the students' behavior (before and after learning). One of indicators of change is able to be seen from final mark at the end of semester. "

Students' achievement is the data obtained for the objective of this study. It gives the information of the improvement in learning.

3. Diagram of Research Design



4. Data Analysis

This research used univariate analysis of variance of SPSS to measure the difference of students' achievement because of the implementation of local wisdom in chemistry learning. Prior knowledge was as statistically controlled variable. There were 22 of 28 questions that were valid collected from the validation process to 31 students. The reliability of the test was also analyzed using SPSS 16.00. Before the data were analyzed, homogeneity and normality of the data were tested.

5. Discussion

Chemistry teaching and learning process in the treatment class (X MIA 2) which applied local wisdom-based scientific approach was started by dividing the students into eight groups. Each group consisted of four students. Every group had certain name which showed the name of the village in Purworejo. There was a special group in this class. The class leader, secretary, the coordinator of religion aspect, and the treasurer were in a group. There were special The class leader was called lurah (head village), the secretary of the class was called carik (secretary), the treasurer was called kaur keuangan, and the coordinator of religion was named kaum. This special group was a group that was as a model which could lead and manage their friends. This group was to show that in Purworejo and other regions in Indonesia have local governmental organization that was organized well. It could be a model for the students to make the organization in their life. The students in the other groups were as citizens.

On the first day, the students watched a video of Purworejo's local wisdom. This video showed some local wisdoms of Purworejo. It was purposed to recall the students' awareness of their region's local wisdom. Then, they were asked to make the experiment of electrolyte and non electrolyte test. They were asked to bring some materials related to Purworejo's local wisdom such as: durian, mangosteen, Javanese sugar solution, the sea water from Jatimalang Beach, etawa's goat milk, coconut water, and dawet ireng. They also checked some chemicals, such as HCl, NaCl, NH₃, CH₃COOH, and kerosene.

Scientific approach could be done in the experiment. In experiment, the students were able to do observing, asking, associating, trying, and communicating. Actually, observation was done by seeing the bubbles in the electrodes and seeing the existence of light. The students might ask the ways in connecting the tools and materials. They could

ask the meaning of bright light, dim lamp, or, existence of bubble. In associating, the students could do the experiment, read the book, or search to the internet. Associating could be done by connecting one science to another science. Trying was done by doing the experiment, checking the electricity, analyzing data, concluding the experiment, and reporting the experiment in written report. Actually, communicating was done by students by saying/ presenting the result of experiment in front of the class.

Based on scientific approach, in "trying" step, the students were also asked to group ionic bond, polar covalent bond, and non polar covalent bond after doing experiment. It would make the students think and remember more about teaching and learning material. Then the students were facilitated to know the electricity of each bond. The teacher also gave the student's work sheet to make the experiment is easy to conclude. Every student had to do the experiment. It was done by dividing the materials. Because there were many materials which would be tested, the materials could be divided. So, one student could test one or two material(s).

After knowing the electricity of some materials in Purworejo's local wisdoms, the students were asked to make an essay/ article about what they will do to develop Purworejo by using Purworejo's local wisdom, related to chemistry learning (especially electrical solution chapter). They were also asked to write the history of the sub district where the local wisdom existed. It was purposed to make the students were responsible to develop their region. Actually, the students would be the leader in the future if the teacher directed them well. This article was as a home work.

On the second meeting, the teacher explained the material about ionization degree and ionization reaction. The teacher facilitated the students to conclude the data to make a formulation of ionization degree.

Then, the students are facilitated to know the development of oxidation and reduction reaction. After that, the students were asked to make a presentation for the fourth meeting. The presentation was made in a group of eight. The presentation discussed about the chemical reaction in Purworejo's local wisdom.

On the third meeting, the students were asked to learn about the oxidation number, agent of oxidation, and agent of reduction. The method used was discussion in group. The teacher freed the students to discuss the material first. Then the teacher asked the students to explain in front of the class. If there was any difficulty, the teacher would explain more about the material. The teacher liked to give the exercise to make the students think critically. Then, the teacher asked the students to

explain the answer in front of the class. The students were active in answering and confident in explaining.

On the fourth meeting, the students were facilitated to know the procedures in naming the chemical compounds, especially that were related to the oxidation numbers. The teacher explained the ways in naming first. Then, the students did the exercise from the teacher. Next, the teacher checked the students' cognitive level by asking the students to explain the answers in front of the class and discussing the answer together. The teacher also made the quiz. After that, the students did presentation of Purworejo's local wisdom related to chemical reaction, such as: stalagmite and stalactite in Seplawan Cave, Limestone in Pituruh, the waste in Suronegaran Market, and keris in Tosan Aji Museum. This was the effort to do scientific approach in chemistry class. The teacher freed the students to search the information. The students did the presentation in group. Each student had to speak and explain the material in presentation.

The Chemistry Teaching and Learning Process in Control Class were just the same as that were in

treatment class but they were without including local wisdom aspects.

Students' achievement could be measured by using some problems about oxidation and reduction reaction. These problems were done by the students after having chemistry learning. Before analyzing students' achievement, the researcher did prerequisite test (hypothesis test), namely normality test and homogeneity test. Normality test was done to know whether the sample was normally distributed or not while homogeneity test was done to know whether the sample had homogeneity variance or not. The results showed that the data from both sample were from homogeneous and normal data.

The hypothesis test to test the students' achievement used univariate analysis of variance test of SPSS. The value of significance was 0.000. This number was less than 0.05 [10]. It meant that there was the significant difference of students' achievement that applied and who did not apply local wisdom- based scientific approach if the prior knowledge was statistically controlled. Figure 1 showed the comparison of students' achievement in control and treatment class.

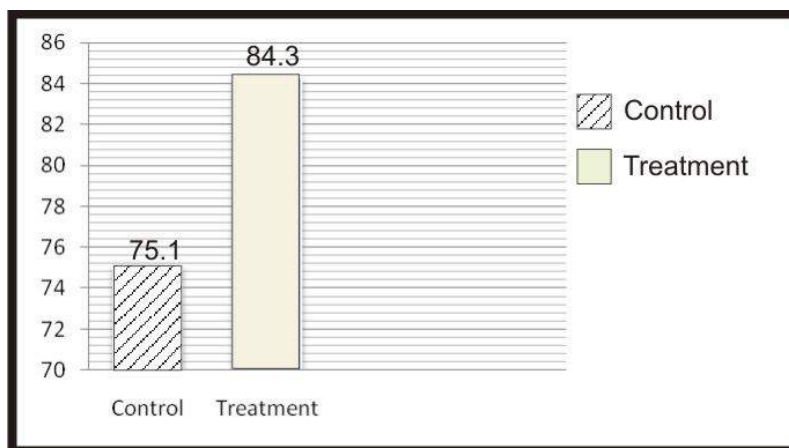


Figure 1. The Comparison of Students Achievement

The treatment class (the class that applied local wisdom- based scientific approach) had better students achievement than control class (the class that applied scientific approach). It was shown by Figure 1. This fact was affected by students' interest in joining chemistry learning using local wisdom materials. The discussion was related to the unique and new materials which made the students interested and motivated to study. It increased curiosity. [11] stated that the success of local wisdom

implementation was indicated by students' appreciation toward sciences, technology, and art. The high appreciation is indicated by the students' happiness in learning. The students also think that the learning is meaningful. Local wisdom is able to contribute in national, even international education. [12] stated that the students' achievement was significantly higher than the students that did not learn using local wisdom materials.

The other factors which were able cause the students' achievement difference between control and treatment class:

- 1.) The characteristics of oxidation and reduction reaction

[13] stated that the difficult teaching and learning material in reduction and oxidation reaction is in the concept of oxidation reaction based on catching and releasing oxygen, reduction reaction based on electron transfer, agent of oxidation, agent of reduction, and oxidation state. Beside that, redox reaction needs memory and calculation. This material is also very abstract. Sometimes the students are confused.

- 2.) The Learning Style of the Students

The learning style of the students had the effect to the students' achievement. [14] stated that learning style gives the significant effect toward students' achievement. While, [15] stated that a good learning style gives a good effect to students' achievement. Moreover, [16] stated that if the learning style of the students who have specific learning style is changed, it will affect their students' achievement.

- 3.) The other factors which affected students' achievement

[17] divided the factors which affected students' achievement into two parts, namely external factor and internal factor. External factor included the factors at home (economy, relation, affection, the way in looking after), the factors at the school (teaching method, media, curriculum, the condition of school's building), factors in the society (mass media, activity, friends, system). The internal factors included physic condition (health), psychology (intelligence, interest, attention, motivation, and readiness). Both external and internal factor were able to affect students' achievement.

6. Conclusion

his research concluded that chemistry achievement of students who learnt by use of local wisdom -based scientific approach was different significantly from that without integration of local-wisdom when their prior knowledge was controlled statistically.

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