The researcher found that no significant difference of students' achievement was found by cooperative learning model like NHT and Jigsaw in Exponentiation and Surds material. The Researcher ultimately has come to realize that this study is not reaching an optimal sphere yet, if it is in view of what is students' significant, achievement seems to grow, and acknowledging of a short time spare and the lack of co-observers ability to go through, consequently the results of this study may sound not as the expected. But further research will need to take a concrete step in order to upgrade the educational quality.

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TABLE OF CONTENTS

THE DIFFERENCE OF STUDENTS' ACHIEVEMENT BY NUMBERED HEADS TOGETHER (NHT) AND BY JIGSAW IN EXPONENTIATION AND SURDS MATERIAL

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ABSTRACT

This research was conducted to find out the significant difference of students' achievement if taught by Numbered Heads Together (NHT) and Jigsaw in manner of Exponentiation and Surds Material which took place in Senior High School students.

The observation held implementing a quasi experimental research on first semester within contemporaty academic. Sample was taken through cluster random sampling, it means that each class had the same chance to be imposed as samples. With two classifications, that is experimental class I taught by Numbered Heads Together (NHT) and experimental class II taught by Jigsaw. Reinforced instruments in collecting data were a test and an observation sheet. The test was in an assay test composed of 6 items of questions about Exponentiation and Surds material. Data analysis technique by analysis of differences with the t-test formula.

Before the research put into action, it was discovered that the mean of pre test on experimental class I with 39 students was 14.974 and it's categorized a low (poor) achievement, and the mean of pre test on experimental class II with 35 students was 15.143 and it was categorized a low achievement. After the experiment conducted using Numbered Heads Together (NHT), the mean of the post test was 37.103 and it was categorized as medium achievement, then the mean of the post test by Jigsaw was 32.686 and it was categorized as medium achievement.

By employing the t-test, it's assumed that students' achievement by Numbered Heads Together (NHT) there was no significant different in contrast to the students with Jigsaw.

Key Words: Number Head Together (NHT), Jigsaw, Exponentiation and Surds

I. INTRODUCTION

Mathematics in scientific category is considerable such formidable subject to learn. Mathematical substance its indispensable get involved in any psycho test or mathematical test in recruitment of government employment or some particular companies, its taking part of overall segments blended into educational sphere and creeping into human lives' practices. Mathematics is one of the prerequsite subject existing in all stage of academic curriculum and recognized even early age or grounds education of children as vocational or non-vocational. Susanto (http://suarasmars.blogspot.com/2009/04/artikel-ini-sudah-dimuat-di-majalah02. [2]

The score attained of any assessed test inescapble depict of students' susceptive absorbance of learnt material. In virtue of national final exam in 2011 in light of student's attainment, which terrified the coming class who will be undergoing the same season, that they are horrifed and led them being reluctant to attend mathematical class meeting. as quoted in Suara Merdeka (in http://suaramerdeka.com/v1/index.php/read/cetak/2011/06/08/148989/Siswa-Terlalu-Sedikit-Sekolah-Akan-Digabung) [19], that "subject (mathematics) is regarded as a matter of fact to cause the failure in the National Final Exam within Senior High School by the scale of Mathematics (57.44%), Bahasa Indonesia (38.43%) and English (3.27%)". Asstatedin the articleas KaltimPost (in http://www. Kaltimpost.co.id/index.php?Mib=berita.detail&id=100 828) [8], "The Ministry of National Education acknowledged, that students who got under passing grade in mathematics approximately (51.44%)." The issues of

failure consequence for that mathematics, caused approximately (50%) students shoud have put their graduation off.

The considerable number of students who got low attainment on mathematics signifies the failure on overall subjects. The students run into same bugaboo when attending mathematical class meeting, tiresome, boringness, sturdy to deal with. Susanto (in http://suarasmars.blogspot.com/2009/04/artikel-ini-sudah-dimuat-di-majalah_02.html) [27] described, by now students have perceived mathematics is unbreakable led them frightened when they are demanded to work out mathematics before the class, this scene driving them to hold back attending the class meeting, particularly when they are required to turn in mathematical assignment, in the mean time the students are feeling helpless to get an aid to carry out of mathematical solving problem, moreover that which expected an aid from parents, rather are not able to help anyway or are above just busy fighting for family sustenance.

This vexation perhaps is the very concerns that needs to find the way out to break through though. Djamarah and Zain (2002:43) [5] that, "Teachers are the grounds for making the changes in environment of studying sphere more exiting, enjoy, fascinating, and making fun. How a teacher to create or encourage the students to be interested in studying mathematics. The teacher could have prompted to embrace variational teaching as proposed by Djamarah and Zain (2002:180) [5], that "If a teacher within learning process does not work out with some variations, will induce students into boringness, inconsiderate, sleepiness." Where if the students are unhappy about learning the certain lessons will certainly cause disrupt the teaching-learning process, as stated by Djamarah and Zain

(2002:186) [5], which "the symptoms of students who are less happy to absorb the lessons suppose not to happen, because it will blur the sense of learning process". Kock (1994:72) [9], said that "The most effective teaching and high motivated students, if the difficulty of teaching tailored to students' abilities". But of course this is not an easy thing to do as Kock (1994:73) [9], responded that "Teaching at a suitable level of difficulty to the ability of all students in the classroom is difficult, mainly because of the ability of students are not equal. To achieve a suitable level of difficulty, teachers should teach by using suitable methods ". This certainly argued by Kock (1994:15) [9] that, "The most important is to apply a suitable method to students and teachers so that pupils will enjoy learning process, as well until the students as graduated".

In learning process, sometimes its easier to learn with a friend. As Djamarah and Zain (2002:29) [5] commended, "there are many times happened when a student is more receptive to information which given by the friends, so called peer tutors, and more encouraged if they are in the same age". This way could have played as a target of strategy to form a study group that one of variational studying atmosphere, yet in under controlled. Djamarah and Zain (2002:237) [5], said that "Master plan of the formation of study group its necessarily to think of, the group should be assigned with a certain topic and task, instructions of how long to take time, how to control, how about discussion and the form of reports to be turning in, and set up objective goal to be achieved.

One of the teaching models that befits to teachers should have implemented is a cooperative learning. Cooperative learning promotes a mutual help among students, applicable in a sense of peer tutor, the students

can work together in the different extent of ability, this idea was reaffirmed by Lie (2008:32) [10] with "Some students who are quite low aptitude will not feel being alienated by their counterparts, because they also have contribution into the group, conversely they who are more intelligent will not feel be undermined for having distinct contribution part."

There are many different types of cooperative learning models, they are: Student Team Achievement Divisions (STAD), Team Games Tournament (TGT), Jigsaw ,Group Investigation (KI), Numbered Heads Together (NHT), Think Pair Share (TPS), Mind Mapping (MM), Snow ball Throwing (ST), Two Lives Two Guest (DUTA-DUTI), Time Token (TITO), and others. The observer had chosen this cooperative learning for promulgating academic study skills, as well a social skills, including interpersonal communication skills, which commented by Riyanto (2009:271) [33], that" Cooperative learning is a learning model designed for making better academic study skills, as well a social skills, including interpersonal communication skills".

In manner of understanding an Exponentiation and Surds material is not too complicated to students, but when the problems are a bit tricky modified, the students will baffle in solving the problem. A trial test conducted, when the conveyed test get change the exponent to zero, in fact, 50% students were absurd and stranded. When at times an interview held over a teacher, admittedly recognized that there never work out with any kind of teaching variation, so no wonder that happened, and the observer is vehemently interested to unfold and develop the variational learning. Researcher tried to implement two types of cooperative learning model they are Numbered Heads Together (NHT) and Jigsaw. Due a Teacher Training

Practice where researcher had tried to implement Numbered Heads Together (NHT) and Jigsaw and actually took an affect in increasing student's achievement rather than when students are taught by lecturing method.

Both types of Numbered Heads Together (NHT) and Jigsaw have lightly different learning process, but they have common goal of carrying out the process of learning by working together.

II. THEORITICAL STUDY

2.1 Definition of Learning

There are many definitions of learning and also a lot of experts who elucidate the definition of learning. But from various definitions, there is a core that cannot be separated such the change behavior of people from a particular experience. As noted by Cronbach in his book Educational Psychology (in Suryabrata, 2002:231) [26] that "Learning is marked by a change of behavior as the effect of experience".

Mc Geoh (in Suryabrata, 2002:231) [26] defined "Learning is a change of performance by practice". In accordance with Burton (in Usman, 2004:5) [29] that "Learning is a change in an individual by instruction and environment, who feels a need and makes him more capable in dealing with an adequate environment".

Meanwhile, Winkel (in Riyanto, 2009:5) [34] that "learning is an activity of mental/psychic that goes in active interaction with the environment, occuring in changes in knowledges, understandings, skills, attitudes and values. That change is relatively constant and trace".

In this sense there is a word "changed" which means that somebody after undergoing a process of learning will experience changes in behavior, both aspects of knowledge, skills, and attitude aspects. So learning is a process that occurs in a person that involves interaction with the environment that produces behavioral changes, both in knowledge, skills, and attitudes.

2.2 Achievement

Achievement is something that is obtained after doing the act of learning, where achievement is a change ensued after experiencing the learning process. Dimyati (2002:3) [4], commended "At the end of a process of learning, the students gain an achievement. Achievement is the sequel of an interaction act and an act of teaching and learning ". One opinion with Sudjana (2009:220) [21] that "achievement is the ability that which students deserve after the learning experience".

The achievement can be suited to another field, proposed Makmun (2004:159) [11], "So the achievement in a particular field, according to this theory, will be transfered (transferable) into other areas".

Achievement might be distinguishable by an emerging impact, one is the impact of teaching and the second is an impact of accompaniment, as proposed by Dimyati (2002:4-5) [4], that" The achievement of proficiency level can be distinguished by an immediate impact, the impact of teaching and the impact of accompaniment. The impact of teaching is measurable, manifested with engraved number or character on a grade slip or transcript. Impact accompaniment is an applied knowledge and skills in or other fields, a transfer of learning. "

2.3 Learning Mathematics

Learning process according to the dictionary of Bahasa Indonesia (in http://syarifartikel.blogspot.com/2008/11/pembelajaran-matematika-di-sd.html)[28], "Learning is a noun defined as process, ways of making people or being learning ".

By Gagne and Briggs (in http://syarifartikel.blogspot.com/2008/11/pembelajaran-matematika-di-sd.html) [28] denoted, "learning is an endeavor to set the goal and the goal as a means to help people to learn". More specifically described by Gagne (inhttp://syarifartikel.blogspot.com/2008/11/pembelajaran-matematika-di-sd.html) [28] that," Learning is a set of external events designed to support the occurrence of multiple learning processes that are of internal."

Corey (in http://syarifartikel.blogspot.com/2008/11/pembelajaran-matematika-di-sd.html) [28] that "learning is a process where someone deliberately manage environment to allow him to participate in the special conditions. Learning is a special subset of education ". Of the four insights suggests that learning is a student-centered, not teacher-centered.

Mathematics came from the Greek word meaning the study size, structure, space, and change (in http://id.wikipedia.org/wiki/matematika) [30]. Many experts are trying to define the math. Hudojo (1998:3) [7] that "It can be said also, mathematics related to ideas, structures and relationships that are logically arranged that mathematics is related to an abstract concepts. A mathematical truth is developed based on logic reasons by using deductive evidentiary".

Learning mathematics needs teacher's participation as facilitator. Goldin (in http://hafismuaddab.wordpress.com/2010/01/13/pengertian-

belajar-matematika) [14] that, "Mathematics is founded and built by man to be fostered by students and implanted by teacher. Learning math becomes more active when teachers can help students to discover and solve problems". Heuvel-Panhuizen and Verchaffel-De Corte (in http://hafismuaddab.wordpress.com/2010/01/13/pengertian-belajar-matematika) [14], that "mathematical education should allow students the chance to reinvent by doing mathematics. Learning mathematics should be able to furnish students with an imaginable situational problem that virtually related to the real world."

Hudojo (1998:3) [7] "Studying the concept B is based on the concept A, someone needs to understand first concept A. Without understanding the concept A, nobody may understand the concept B. This means, learning mathematics should be gradual and sequential, and based on past learning experiences".

Learning mathematics is a continuous process, Hudojo (1998:4) [7] that "Because of the hierarchical math, if learning mathematics is discontinuous will disrupt the learning process. This means that the process of learning mathematics will be going on smoothly when the study itself is conducted continuously".

School of mathematics which that math is taught in primary and secondary education. School of mathematics that is selected in order to: (1) Develop abilities, (2) Mould students' personality and (3) Develop both science and technology.

2.4 Cooperative Learning Model

In light of learning process entails a learning model. In terms itself has four special characteristics which are not included a strategy nor learning method. (in http://nsant.student.fkip.uns.ac.id/files/2009/ 05/makalah-modelpembelajaran1.doc) [34]:

1. Theoretical, rational, logical, compiled by educators.
2. Learning objectives to be achieved
3. The steps necessary to teach the learning model can be implemented optimally.
4. The learning environment necessary for learning objectives can be achieved.

Another terms of learning model, Sudrajat (inhttp://akhmadsudrajat.wordpress.com/2008/09/12/ pendekatan-strategi-metode-teknik-dan-model-pembelajaran/) [22] "These terms are (1) learning approach, (2) learning strategies, (3) teaching methods, (4) learning techniques, (5) learning tactics, and (6) learning model".

These terms are explained as follows:

1. Learning approach has a sense of a perspective of a learning process. In accordance with Sudrajat (in http://akhmad sudrajat.wordpress.com/2008/09/12/pendekatan-strategi-metode-teknik-dan-model-pembelajaran/) [22], "Learning approach can be interpreted as a point of view on learning, which refers to the view of the occurrence of a process that is still very common in nature, in which enclose,

inspiration, strengthen, and the underlying learning methods with particular theoretical coverage".

2. Learning strategies according to Kemp (in http://akhmadsudrajat.wordpress.com/2008/09/12/pendekatan-strategi-metode-teknik-dan-model-pembelajaran) [22] is "an activity of learning which teachers and students to do for the purpose learning can be achieved effectively and efficiently".
3. Methods of learning referred to Antara (in http://akhmadsudrajat.wordpress.com/2008/09/12/pendekatan-strategi-metode-teknik-dan-model-pembelajaran) [22] is "the way that used to implement the plans that are constructed in the real form and practical activities to achieve learning objectives ".
4. Learning techniques by Antara (in http://akhmadsudrajat.wordpress.com/2008/09/12/pendekatan-strategi-metode-teknik-dan-model-pembelajaran) [22] "the way that person do for implementing a specific method".
5. This tactic is more related to the individual learning of each teacher. Where more precisely the style of each teacher in teaching, as defined by Sudrajat (in http://akhmadsudrajat.wordpress.com/2008/09/12/pendekatan-strategi-metode-teknik-dan-model-pembelajaran/) [22] is the "personal style in carrying out certain teaching methods or techniques that are of individual".
6. Learning model is a combination of approaches, strategies, methods, techniques, and learning tactics. Referred to Sudrajat (in http://akhmadsudrajat.wordpress.com/2008/09/12/pendekatan-strategi-metode-teknik-dan-model-pembelajaran/) [22], "If the approaches, strategies,

methods, techniques and learning tactics even been strung into a single coherent whole is formed what is called a model of learning ".

There are several types of learning model: (1) direct, (2) cooperative, and, (3) problem-based. In this case the model of cooperative learning will be explained more deeply. The model was initially used in cooperative learning in schools in the United States to instill positive elements of dependency. As stated Lie (2008:19) [10],

"One of the methods of cooperative learning, Jigsaw, initially introduced in schools where there is racial tension between students of European descendant, African, and Hispanic. These students are taught to be behind the strong sense of individualism they interact positively with other students with very different backgrounds in academic activities. Indeed, after a time of conflict racist successfully reduced drastically and became increasing academic achievement. "

There is some sense a model of cooperative learning as stated by Slavin (in http://nsant.student.fkip.uns.ac.id/files/2009/05/makalah-model-pembelajaran1.doc) [34] that, "cooperative learning, is learning model with students working in groups that have heterogeneous abilities." According to Nur and Wikandari (in http://nsant.student.fkip.uns.ac.id/files/2009/05/makalah-model-pembelajaran1.doc) [34], that "Cooperative learning refers to the teaching model, students work together in small groups of mutual help in learning". Riyanto (2009:271) [33] that, "Cooperative learning is a learning model that is designed for making learning academic skills, as well as social skills, including interpersonal skills".

Assumed that cooperative learning is a learning model that promotes cooperation among members of his group, in which cooperation is expected to develop a positive dependence. Then the cooperative learning model is expected to increase the students' academic skill, increasing students' skills in socializing and able to receive diversity in the group.

The model has a philosophy of cooperative learning, elements, and characteristics of cooperative learning. Riyanto (2009:269) [33] philosophy that became the basis for cooperative learning are:

1. Humans as social beings
2. Mutual aid
3. The collaboration is an essential requirement for human life

This is similar to the expression of Lie (2008:28) [10] that "The underlying philosophy of mutual aid in the learning model of education is the philosophy of homo hominisocius. Contrary to Darwin's theory, philosophy emphasizes that humans are social creatures. Cooperation is a very important means for survival. Without cooperation, there is no individual, family, organization, or school. Without the cooperation this book will not be published. Without cooperation, this life is full ".

Riyanto (2009:269-270) [33], elements of cooperative learning are:

1. Developing interactive successive teasers, compassion penance, penance and foster peer as an exercise of community.
2. Positive interdependence among individuals (individuals have contributed in achieving the goal).
3. Individual responsibility.
4. Meeting face in the learning process.
5. Communication between group members.

6. The evaluation process of group learning.

The statement was almost identical to that expressed by Roger and David Johnson that not all work can be considered cooperative learning groups. There are five elements that must be applied learning model (in Lie, 2008:31) [10], they are:

1. Positive interdependence
2. Individual responsibility
3. Face to face
4. Communication among members
5. Evaluate group process

Riyanto (2009:270) [33] there are five underlying principles of cooperative learning, included:

1. Positive independence of positive interdependence means that group members recognize the importance of cooperation in achieving goals.
2. Face to face means among members interact with each other.
3. Individual accountability means that each group member must learn and actively contribute to achieving the group's success.
4. Use of collaborative / social skills means must use the skills to cooperate and socialize. Those students are able collaborate needs guidance from teacher.
5. Group processing means students need to assess how effectively they work.

Riyanto (2009:270) [33] there are characteristics of cooperative learning, included:

1. The group was formed by students of high ability, medium, low.

2. Students in the group lively as dead
3. Students see all the members have similar goals
4. Dividing the same duties and responsibilities
5. Will be evaluated for all
6. Various leadership and skills to work together
7. Asked to account for material that is handled individually.

This suggests that cooperative learning was developed with three important goals, as defined by Abraham (in http://nsant.student.fkip.uns.ac.id/files/2009/05/makalah-model-pembelajaran1.doc) [34] that "cooperative learning model was developed to achieve at least three important goals of learning, called the results of academic learning, acceptance of diversity, and social skills development".

Riyanto (2009:271) [33] categorize the goals of cooperative learning:

1. Individual: a person's success is determined by the people themselves are not influenced by others.
2. Competitive: The success of a person to achieve because of the failure of others (there is a negative dependency)
3. Cooperative: a person's success because the success of others, one cannot achieve success with solitude.

General steps Cooperative Learning (Syntax) (in Riyanto, 2009:271) [33]

1. Provide information and convey the goals and learning scenarios
2. Organize students / learners in cooperative groups.
3. Lead students / learners to perform activities / cooperatively.
4. Evaluation

5. Reward

There are several examples of skills in cooperative learning (in Riyanto, 2009:271-272) [33]

1. Sharing the task
2. Take part
3. Remains in the tasks
4. Ask questions
5. Active Listening
6. Cooperate
7. Helping a friend

2.5. Cooperative Learning in Mathematics

Cooperative learning can also be applied in mathematics. Suherman (in http://dou-dena.blogspot.com/2011/03/pengaruh-penerapan-pembelajaran-melalui.html) [15] about cooperative learning in mathematics, that "students individually construct the confidence of his ability, to solve mathematical problems, which will reduce and even eliminate anxiety towards mathematics (math anxiety), which many experienced students, by emphasizing the interactions with in the group".

In the cooperative learning that emphasizes the importance of working together shows the importance of peer influence. So peer influence is very important as a partner to cooperate in improving student academic achievement. Then assumed that cooperative learning mathematics can improve better academic achievement.

2.6. Cooperative Learning Model with Numbered Head Together (NHT)

Cooperative learning model type Numbered Heads Together (NHT) developed by Spencer Kagan in 1992 (in Lie, 2008: 59) [10]. The advantages of cooperative learning model type Numbered Heads Together (NHT) according to Lie (2008:59) [10] is "This technique provides the opportunity for students to give each other ideas and consider the most appropriate answer. In addition the technique also encourages students to enhance their spirit of cooperation ".

Cooperative learning model type Numbered Heads Together (NHT) is one of the cooperative learning models that are suitable for use in math. This is consistent with that expressed by Lie (2008:59) [10] that "This technique could be used in all subjects and for all age levels", which implies that the cooperative learning model type Numbered Heads Together (NHT) matches used in mathematics courses.

Step-by-step cooperative learning model type Numbered Heads Together (NHT) is as follows (Riyanto, 2009:277) [33]:

1. Students are divided into groups, each student in each group gets a number.
2. The teacher gives the task and each group does it.
3. The group discussed the correct answers and make sure each member of the group can do / find out the answer.
4. Teacher calls one of the numbers of students with the called number report the results of their cooperation.
5. The response from another friend, then the teacher pointed to another number.

6. Conclusion

In implementation, the type of Numbered Heads Together (NHT) and the teacher assigns just students numbered is entitled to answers, it intended to prevent the domination of a particular student in answering the question.

From the steps of cooperative learning model like Numbered Heads Together (NHT) above can be determined step by step learning cooperative model like Numbered Heads Together (NHT) which will be implemented in the research, as follows:

Step 1 **Delivering the purpose of learning and motivate students**

Teacher conveys the purpose of learning, by motivating students are more expected to be focused in the learning process.

Step 2 **Informing**

Teacher informs the cooperative learning model with Numbered Heads Together (NHT). Proactively sharing each other ideas and work more actively and vibrant.

Step 3 **Numbering (Numbered)**

By this step the teacher designated a number to each students. By labeling with a number will represent identity of each students.

Step 4 **Ask questions or provide task**

Teacher turns in Student Activity Sheet (LAS) which containing some questionnaires that will be carried out in each group.

Step 5 **Thinking Together (Heads Together)**

The students within the group discuss about the material. Each group reciprocally discuss the answer from one of each other.

Step 6 **Providing Answer**

Teacher calls one by number to present of what was discussed and pointing out of another group with the same number to answer the question and students and teacher are ultimately involved to resolve the problems.

Step 7 **Awards**

Teachers give awards away to any groups that provide the best answer.

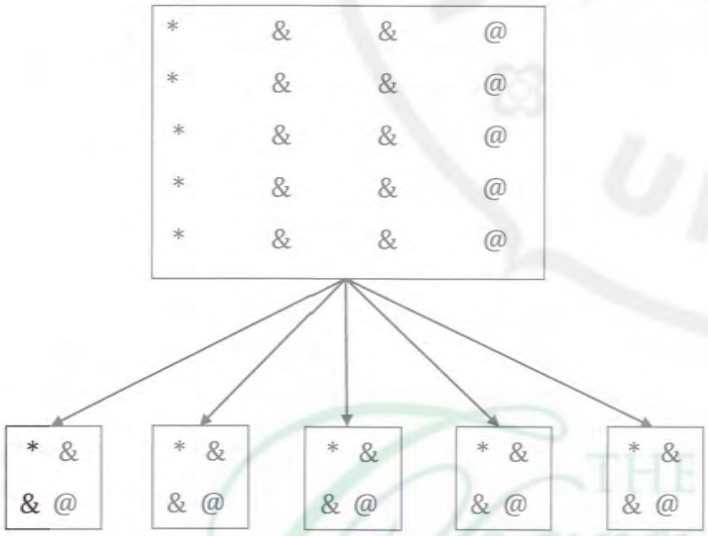

Figure 2.1.
NHT Implementation Chart

The advantages of cooperative learning model like Numbered Heads Together (NHT) (in http://blognyaadolfbastiansimbolon.blogspot.com/2011/05/model-pembelajaran-kooperatif-nht.html) [18] is

1. Each student always get ready
2. May have an earnest discussion
3. Students who are good intelligent to teach students who are lesser.

Then the disadvantages of cooperative learning model like NHT is (in http://blognyaadolfbastiansimbolon.blogspot.com/2011/05/model-pembelajaran-kooperatif-nht.html) [18]

1. The headed number may be called over and over by the teacher.
2. To yell the number may be overlooked by teacher

2.7 Cooperative Learning Model Jigsaw

Cooperative learning model with Jigsaw was developed by Aronson, Blaney, Stephen, Sikes, and Snapp in 1978 (in Riyanto, 2009:275) [33]. Cooperative learning model like Jigsaw was developed during the racial tensions in America, between the races of European descendants, African, and Hispanic also effected in racial tension between students from the descendants of that race. With Jigsaw cooperative learning model students are taught under the strong sense of individualism they interact positively with other students with very different backgrounds (Lie, 2008:19) [10].

Cooperative learning model of this like Jigsaw is a suitable model of cooperative learning in math. This is consistent with that expressed by Lie (2008:69) [10] that, "This approach could also be used in some subjects, such as natural sciences, social sciences, mathematics, religion, and

language. This technique is suitable for all classes / levels ". on the other hand Jigsaw cooperative learning model is suitable also when applied in mathematics

Steps cooperative learning model like Jigsaw are as follows (Riyanto, 2009:275) [33]:

1. Students are grouped into ± 4 team members.
2. Each person in the team is given a different part of the material.
3. Everyone on the team is given the assigned material.
4. Members from different teams who have studied part / section of the same meet in the new group (expert group) to discuss their section.
5. Having completed the discussion as a team of experts each member back to the home group and take turns teach their teammates about their section control and every other member listened intently.
6. Each team of experts presented the results of the discussion.
7. Teacher evaluation.
8. Cover.

From the steps of cooperative learning model with Jigsaw can ascertain as follows:

Step 1 **Delivering the purpose of learning and motivate students**

Teacher conveys the purpose of learning, where learning goals by conveying the students needs to recognize the goals to be achieved in the learning process. By driving students motivation are expected to become more focused in the learning process.

Step 2 **Informing**

Teacher informs the type of Jigsaw cooperative learning model. Where by using the Jigsaw is expected that students can work together well in both groups of origin and in expert groups.

Step 3 **The division of the group**

Teacher grouped students within group who has 4 or more heterogeneous, in which each student in each group have different teaching materials, but all students in the group who has same serial number of material. Then the teacher distributed the cards to each group member with the serial number from one to four.

Step 4 **Ask questions or give the task and discuss**

- The teacher distributed worksheets to each student.
- Teacher encourages students in each group (home group) to resolve the issues contained in the worksheets with the respective group members.
- The teacher asks students to discuss in a group of experts.
- Then the students return to the home group and explain the material learned in the expert group.
- The teacher asks for the work at the home group.

Step 5 **Evaluation**

Teachers guide students to summarize the subject matter.

There are several things that must be considered in the type of Jigsaw cooperative learning model, (in Riyanto, 2009:275-276) [33]:

1. Using peer tutoring strategies.
2. Organize students into groups of Origin (Home) and the Expert Group.

3. In the expert group cooperative learning students complete the same topic until they become "EXPERT".
4. Within each group of students from each other "teach" their respective expertise.

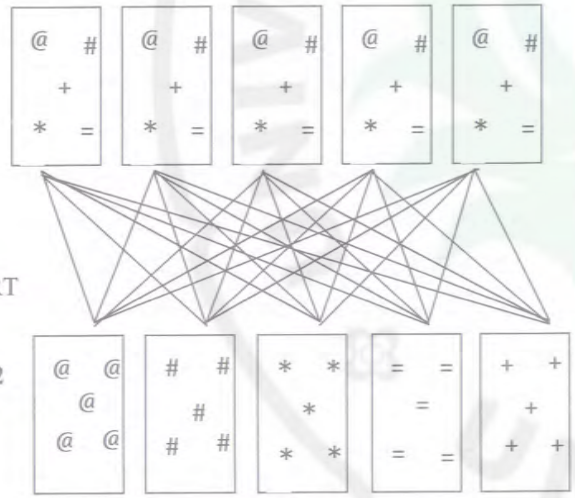

Figure 2.2 Jigsaw

Jigsaw has an outstanding according to Ibrahim, (in http://aadesanjaya. blogspot.com/2011/01/ pembelajaran-kooperatif-tipe-jigsaw.html) [16]:

1. Offered an opportunity to students to collaborate with each other
2. Students enabled to master the lessons presented
3. Each student has the right to bean expert in his group

4. In the process of learning teaching students a positive interdependence
5. Each student can complement each other

While the weakness of the cooperative learning model like Jigsaw according to Ibrahim (in http://aadesanjaya.blogspot.com/2011/01/ pembelajaran-kooperatif-tipe-jigsaw.html) [16]:

1. It will takes a long time
2. Students who are smart tend to avoid to combine with less smart.

III. RESEARCH METHOD

3.1. Population

The population in this study involved class X of Senior High School students with 280 students that divided into 7 classes.

3.2. Sample

For sampling preferred cluster random sampling which treating the same chance to be sampled, and split off into two classes that the first is Experimental Class I which taught with Numbered Heads Together (NHT) and the second is Experimental Class II taught with Jigsaw. According to Wikipedia that "Cluster sampling is a sampling technique applied when its "natural" groupings are obvious in a statistical population". Took place two classes as samples they were class X-2 consisted of 35 students and class X-3 consisted of 39 students.

3.3. Research Variables

As for the variables in this study were:

1. Independent Variable

   The independent variable is *manipulated* variable, which was hypothesized to influence the dependent variable. The independent variables with cooperative learning model like Numbered Heads Together (NHT) (X_1) and Jigsaw (X_2).

2. Dependent Variables

   The dependent variable is the variable that is simply *measured* by researcher. It reflected the influence of the independent variable. The dependent variables is the students' achievement of both classes (Y).

3.4. Research Instruments

Research instruments of the data collection in this study were test and observation sheet.

3.4.1. Test

This test composed in assay of 6 items of questions. Its about Exponentiation and Surds material. To verify the validity of the instrument relied on experts' consensus. In this regard might be sought through a consideration of the expert panelists to see the instrument that would meet the level of study by statistical analysis. If the expert's consensus was high in these considerations it is said that the validity of the contents of the instrument are adequate and can be used in research. Referred to

Guion that "content validity is dependent on the specialists' judgment".

3.4.2. Observation Sheet

Observation is a process to observe a condition systematically. According to Arifin that "Observation is a process to observe and record in a systematic, logical, objective, and rational about the various phenomena, both in the actual situation and in an artificial situation to achieve certain goals". Tools used in conducting the observation called guide lines observation then the guidelines observation is also called observation sheet. For doing an observation is needed a guidelines, so the observation is not deviated from the observation point. It is in line with Arifin that "It means that the observation does not deviate from the observation point. Therefore, in actual evaluator must use a tool called guidelines observation".

Observation is an activity that always be doing daily. It is according to Arifin that "Observation is an activity that is often done either consciously or unconsciously in daily life, where the observation is identical to look and observe". So the observation is an activity that need process to look into, observe and recording in a systematic, logical, objective and rational about various phenomena that is often done either consciously or unconsciously in daily life,

According to Arifin the main purposes of observation are

1. To collect data and information about phenomena, events and actions, both in real situations and in artificial situations
2. To measure the behavior of the class (both teacher and learners), the interaction between the teacher and learners and all factors that can be observed more especially social skills.

3.5. Mechanism and Design Research

This research mechanism carried out with quasi experimental research, which involved two classes, they were experimental class I and class experimental class II. Experimental research conveyed causal connection, Sukardi reaffirmed that "experiment research at principal can be defined as systematic method to build the relationship that consist causal effect relationship".

In education the subjects were naturally formed intact group. It is in line with Maulidina that "However, in education especially in teaching, conducting research is not always possible to conduct a random selection of subjects, because subjects were naturally formed intact group, such as groups of students in one class". These groups are also often the number of member is very definite. In these circumstances the rules is purely experimental research unfulfilled, because controlling variables related to research subjects cannot be settled so research should be resolved using intact group (class).

The study which involved two classes, experimental class I and experimental class II imposed different treatment. In experimental class I treated with Exponentiation and Surds

material employed cooperative learning model with Numbered Heads Together (NHT), while the experimental class II applied Jigsaw type. To see the students' achievement with both classes proposed pre-test, post-test, or class Randomized, pre-test post-test control group design.

Table 3.1

Randomized classes, pre-test post-test control group design

Group	Pre-test	Treatment	Post-test
Experiment I	T_1	X_1	T_2
Experiment II	T_1	X_2	T_2

Direction:

T_1 : Pre-test

T_2 : Post-test

X_1 :Cooperative learning model like Numbered Heads Together

X_2 :Cooperative learning model like Jigsaw

As for the variables in this study is

1. Independent variable
   a. Treatment variables: The type of cooperative learning models like NHT and Jigsaw.
   b. Controlled variables such as The time duration, Module, Teaching Materials, Teacher for both classes are absolutely the same.
   c. Uncontrolled variables such as students' intelligence, the environment, how to learn and parental education.

2. Dependent variable:

   The students' achievement after teaching cooperative learning model like NHT and Jigsaw.

3.6. The Procedure of Research

1. Preparation Phase
   1. Researcher served school's lessons schedule.
   2. Researcher prepared lesson plans for experimental class I with cooperative learning model of Numbered Heads Together (NHT) in Exponentiation and Surds material, in three sessions, in which one session took two times of forty-five minutes.
   3. Researcher prepare lesson plans for the experimental class II with cooperative learning model of Jigsaw in Exponentiation and Surds material, in two sessions, in which one session took two times of forty-five minutes.
   4. Researcher prepared data collective tools in the form of pretest and posttest.
2. Implementation Phase
   1. Implemented cluster random sampling for both classes (Experimental Class I and II)
   2. Initial students ability could be seen by giving a pretest (T_1) to the experimental class I and experimental class II.
   3. Researcher conducted learning for both classes with the same materials and time, but different learning model, whereas experiment I with NHT and experiment II with

   jigsaw.
   4. Provided post-test (T_2) to the both class to see the progress of students' competence after learning, and then calculated the average test.
   5. Analyzed hypothesis test using t statistics to determine whether any significant different scores, or had the difference is large enough to reject the null hypothesis.

3.7. The Technique of Analyzing Data

Data analysis technique employed t test formula. Before doing the t-test, at first follow these steps:

3.7.1. Determine Average Value and Standard Deviation

a. Determine the average score by formula.

$$\bar{x} = \frac{\sum x_i}{n}$$

b. Determine the standard deviation by formula.

$$S = \sqrt{\frac{n\sum {x_i}^2 - (\sum x_i)^2}{n(n-1)}}$$

c. Determine the variance by formula.

$$S^2 = \frac{n\sum {x_i}^2 - (\sum x_i)^2}{n(n-1)}$$

Where:

S^2 = variance

x_i = the value of class data

n = sample size

3.7.2. The Normality of The Test

Normality test intended to see the samples from the population that was normally distributed or not. To test the normality used test Liliefors

a. Observations X_1, X_2, X_3, ..., X_n were presented with new figures that Z_1, Z_2, Z_3, ..., Z_n using the formula:

$$Z = \frac{X_i - \bar{X}}{S}$$

By:

X_i =table data into-1

$\bar{X}$ = arithmetic mean

S = standard deviation

b. For each raw figures used the normal distribution list, then calculated the odds F (Zi) = P ($Z \leq Zi$)

c. Calculate the proportion of S (Z_n) with the formula:

$$S(Z_n) = \frac{number Z_1, Z_2, Z_3, \ldots, Z_n that \leq Z_i}{n}$$

d. Calculate the absolute difference in prices of F (Z_i) - S (Z_n)

e. Take the greatest absolute value among the absolute value (L_0) to accept or reject the hypothesis used significant level α = 0, 05 with the following criteria:

$L_0 < L_{table}$ then the sample is normally distributed.

$L_0 > L_{table}$ then the sample is not normally distributed.

3.7.3. The Homogeneity of The Test

If the normality test data indicateed normal distribution, we then conducted tests of homogeneity. Suppose two normal populations with variance ${\sigma_1}^2$and ${\sigma_2}^2$will be tested two tailed for testing the null hypothesis H_0 and H_i un match able.

$$\begin{cases} H_0: {\sigma_1}^2 = {\sigma_2}^2 \\ H_i: {\sigma_1}^2 \neq {\sigma_2}^2 \end{cases}$$

Based on random samples that independently drawn from the population. If a sample of the first population sized n_1 by ${S_1}^2$ as the variance and the sample of the second population sized $n_2$by ${S_2}^2$ as the variance then to test the hypothesis on the used statistical

$$F = \frac{the highest variance}{the least variance}$$

With the following criteria

- If $F_{observe} \geq F_{table}$ then H_0 is rejected
- If $F_{observe} < F_{table}$ then H_0 is accepted
- Where is F_{table} is $F_{\alpha(v_1, v_2)}$can be viewed on the F distribution list with a chance of α, where v_1 is the numerator df = (n_1-1) and v_2 is df denominator = (n_2-1) with the significant level of α = 0,05.

3.7.4 Hypothesis Test

According to Sudjana the hypothesis to be tested is:

- $H_0: \mu_A = \mu_B$ Said students' achievement that taught with a model of cooperative learning NHT types differed significantly with students who

would have been taught by Jigsaw cooperative learning model.

- $H_a: \mu_A \neq \mu_B$ Said students' achievement that taught by cooperative learning model type NHT differed significantly with students who would have been taught by Jigsaw cooperative learning model.
- the type of Jigsaw cooperative learning model.

If the analysis of data obtained by the data normally distributed and homogeneous so that the t statistic used is the t-test differences as follows:

$$t = \frac{\overline{x_1} - \overline{x_2}}{S_{1,2}\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

By:

$$\bar{x} = \frac{\sum x_i}{n}$$

$$S^2{}_{1,2} = \frac{(n_1 - 1){S_1}^2 + (n_2 - 1){S_2}^2}{n_1 + n_2 - 2}$$

$${S_1}^2 = \frac{n\sum {x_i}^2 - (\sum x_i)^2}{n_1(n_1 - 1)}$$

$${S_2}^2 = \frac{n\sum {x_i}^2 - (\sum x_i)^2}{n_2(n_2 - 1)}$$

Description:

t = The area is achieved

n_1 = number of students as the sample in experimental class I

n_2 = number of students as the sample in the experimental class II

S_1 = standard deviation in the experimental class I

S_2 = standard deviation in the experimental class II

$S_{1,2}$ = Standard deviation S_1 and S_2 combined

= average difference scores of students in the experimental class I

= average difference scores of students in the experimental class II.

Testing criteria obtained from a list of student t distribution with degrees of freedom df = $(n_1 + n_2\text{-}2)$ and α = 0,05. With the testing criteria is

Accepted H_0 if $-t_{(1-1/2\propto)} < t < t_{(1-1/2\propto)}$

For other values rejected H_0.

V. RESULTS AND DISCUSSION

4.1. Results

4.1.1. Test Instruments

The test instruments were consisting of 6 items of questions given to students that was valid and worthy to be tested into students.

4.1.2. Pretest Score of Experimental Class I and Experimental Class II

Before implementing cooperative learning like NHT in experimental class I and t Jigsaw in experimental class II, firstly performed a pre test to find out initial ability of both classes. Students in the experimental class I

consisted of 39 students. The average mean value of students in the experimental class I after the implementation of the pre test were 14, 974.

Bar chart showing the score of pre test in class experiment I

Figure 4.1. Bar Chart Frequency Score of Pre Test in Experimental Class I

From the data above exhibited experimental class I was low (poor). After taking analysis it was caused by five mistakes including:

1. In completing the form $(a-b)^2$ into a^2-b^2, the results became inappropriate.

   The number of students who did this mistake were 16 students out of 39 students

   Figure out each degrees and roots in simplest form.

   $$(\sqrt{6}-\sqrt{10})^2$$

   Then the students answered question such as the Figure below

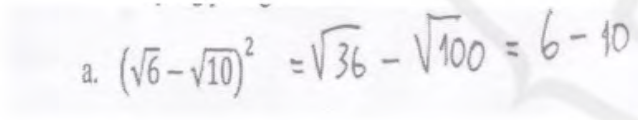

Figure 4.2
First mistake on pre test in Experimental Class I

2. Unabled to figure out the conjugate, so the process of simplifying fractions by rationalizing the denominator became wrong.

   The number of students who did this mistake was 17 students out of 39 students

Problem:

Simplify with rationalizing denominator!

$$\frac{\sqrt{5}}{\sqrt{11}+4}$$

Then the students answered question such as the Figure below

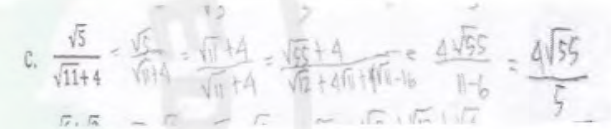

Figure 4.3
Second mistake on pre test in Experimental Class I

3. Simplifying the denominator in the fraction.

   The number of students who did this mistake were 23 students from 39 students.

   Problem:

   Simplify with rationalize denominator!

$$\frac{\sqrt{6}+\sqrt{2}}{\sqrt{6}-\sqrt{2}}$$

Then the students answered that question such as Figure below

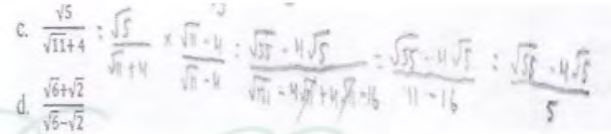

Figure 4.4
Third mistake on pre test in Experimental Class I

4. Students did not simplify the fractions in the root.

   The number of students who did this mistake were 15 students from 39 students.

   Problem:

   The period of T is worked out by formula:

$$T = 2\pi\sqrt{\frac{L}{g}}$$

   Figure out T in a simplest root, when $L = 40$ cm and $g = 980$ cm / det^2.

   Then the students answered that question such as Figure below

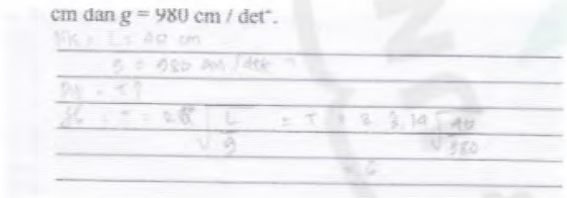

Figure 4.5
Forth mistake on pre test in Experimental Class I

5. The next other mistake that students were not able to answer the question alt all, or left it blank unanswered.

   Then in experimental class II consisted of 35 students and resulted 15, 143.

Bar chart showing the score of pre test in experimental class II

Figure 4.6 Bar Chart Frequency Score of Pre Test in Experimental Class II

From the data above its assumed that the score in experimental class II was low. After taking analysis it was found that four mistakes were:

1. In completing multiplication of exponentiation, because students directly multiplied the base, but the base were different and multiplying the exponent.

   The of students who did this mistake were 19 students out of 35 students.

   Problem:

   Simplify and write down in a form of positive degree!

$$\frac{7^{-3}.3^{-4}}{3^{-2}.7^{-5}.5^{-2}}$$

   Then the students answered questions such as the Figure below

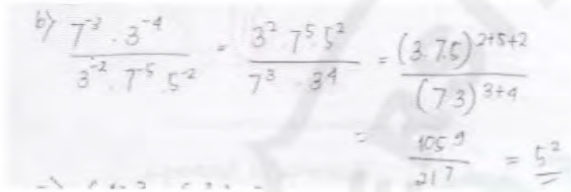

Figure 4.7
First mistake on pre test in Experimental Class II

2. In completing the form $(a-b)^2$ into a^2-b^2, resulted inappropriate.
   The number of students who did this mistake were 15 students from 35 students.
   Problem:
   Figure out each degrees and root in a simplest way.

$$(\sqrt{6}-\sqrt{10})^2$$

   Then the students answered question such as the Figure below

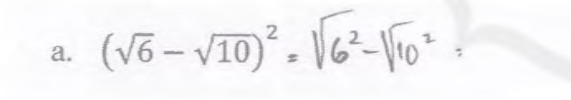

Figure 4.8
Second mistake on pre test in Experimental Class II

3. Did not write the notation root in the problem solving process.
   The number of students who did this mistake were 15 students from 35 students.

Problem:
The period of T worked out by formula:

$$T = 2\pi\sqrt{\frac{L}{g}}$$

Figure out T in a form of root which simplest way, when $L = 40$ cm and $g = 980$ cm / det^2.
Then the students answered the question such as the Figure below

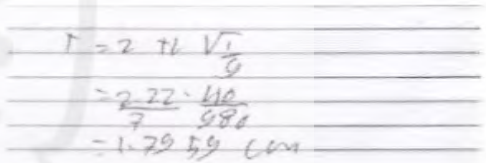

Figure 4.9
Third mistake on pre test in Experimental Class II

4. Mistake other than mentioned above was unable to fill in the answer or left it blank.

From the pre-test data in class experiment I and class experiment II demonstrated that the initial ability both classes were almost same.

4.1.3. Post Test Score Experimental Class I and Experimental Class II

Otherwise after pre-test given for both classes and seen the initial ability of students were the same, then conducted learning with cooperative learning model with NHT and Jigsaw. From the results of post test, the average mean of post test in experimental class I is 37, 103.

Bar chart showing the score of post test in experimental Class I

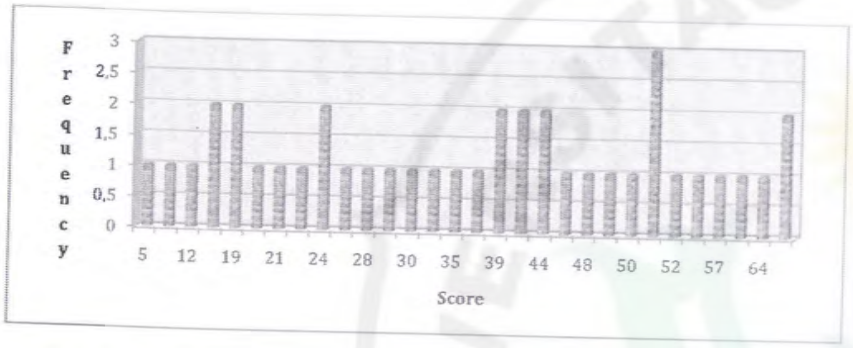

Figure 4.10 Bar Chart Frequency Score of Post Test in Experiment Class I

Swayed to students' achievement after post-test given, in fact there was a progress but still there was four mistakes incurred:

1. Did not write the negative sign on the problem solving process.

   The number of students who did this mistake were 28 students from 39 students.

   Problem:

   Figure Out

   $36^{\frac{1}{2}}.49^{-\frac{1}{2}}$

   Then the students answered question such as the Figure below

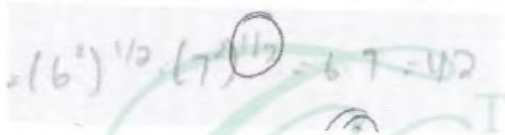

Figure 4.11
First mistake on post test in Experimental Class I

2. Did not simplify the form of root.

   Number of students who did this mistake were 29 students from 39 students.

   Problem:

   Period T worked out by formula:

$$T = 2\pi\sqrt{\frac{L}{g}}$$

   Figure Out T in a form of root which simplest way, when $L = 160$ cm and $g = 980$ cm / det^2.

   Then the students answered question such as the Figure below

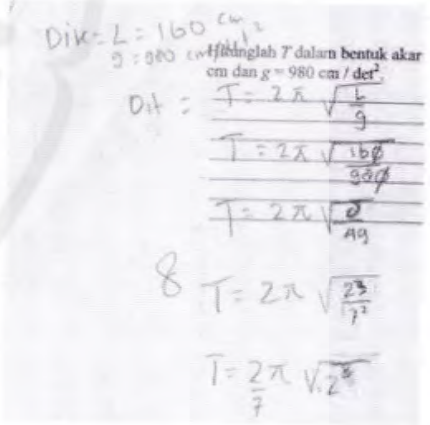

Figure 4.12
Second mistake on post test in Experimental Class I

3. Cannot simplify fractions.

   The number of students who did this mistake were 16 students from 39 students.

Problem:

Period of T worked out by formula:

$$T = 2\pi\sqrt{\frac{L}{g}}$$

Figure out T in a form of root which simplest way, when $L = 160$ cm and $g = 980$ cm / det^2.

Then the students answered question such as the Figure below

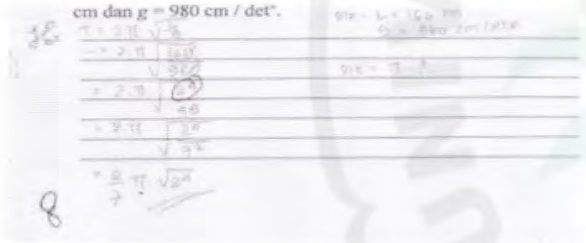

Figure 4.13
Third mistake on post test in Class Experiment I

4. Another mistake due students not are not able to answer at all.

After pre-test given for the both classes and got result that the initial ability of students were the same, then reconducted learning with cooperative learning model with NHT and Jigsaw. From the results of post test, the average mean of post test in experimental class II was 32, 686.

Bar chart showing the score of post test in experimental class II

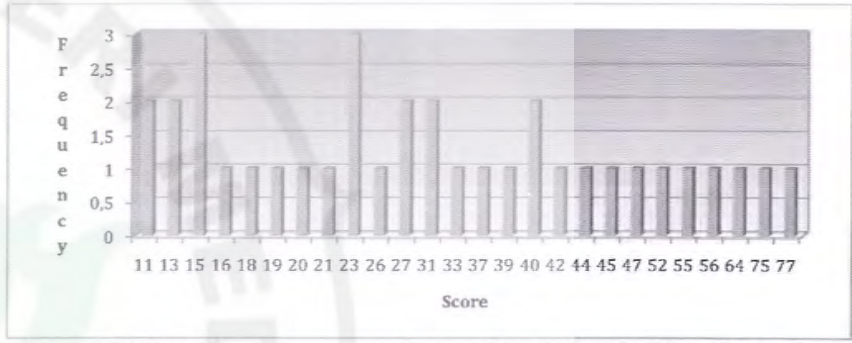

Figure 4.14 Bar Chart Frequency Score of Post Test in Experimental Class II

The mean of post test in the experimental class I which employed cooperative learning model like NHT was higher, that was 37, 103 compared to the mean post test on the experimental class II that used the cooperative learning model with Jigsaw was 32, 686.

When looking into students' achievement after being given a different treatment, that learning process with cooperative learning model of like Jigsaw, there was an increase in students' achievement. When taking analysis of mistake on post test questions, then there were three mistake such as:

1. Did not able to simplify the form of root

   The number of students who did this mistake were 18 students from 39 students.

   Problem:

   Figure out each form of degree and root in a simplest way.

   $$\left(\sqrt{5} + \sqrt{20}\right)^2$$

   Then the students answered question such as the Figure below

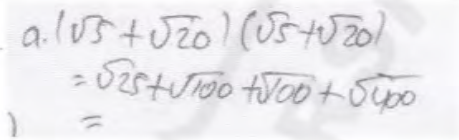

Figure 4.15
First mistake on post test in Experimental Class II

2. Did not write the negative sign in the process.

   The number of students who did this mistake were 15 students from 39 students.

   Problem:

   Figure out:

   $36^{\frac{1}{2}} . 49^{-\frac{1}{2}}$

   Then the students answered that question such as Figure below

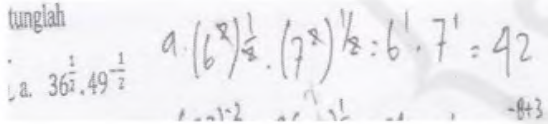

Figure 4.16
Second mistake on post test in Experimental Class II

3. The other mistakes that students were not able to fill out the answer at all.

4.2. Research Findings

4.2.1. Prerequisite Test Data

Prior to do the examined hypothesis, firstly examine prerequisite data in order to get the normality and homogeneity data.

4.2.1.1. The Normality of The Test

The major analysis requirement that must work out with parametric statistical t-test is normally distributed. In order to find that it was normal or not was applied Liliefors, it was normal if $L_{observe} < L_{table}$. The level of significance is $\alpha = 0,05$.

1. Pre Test Data

Table 4.5. The Data of Normality Test on Pre Test

Cooperative Type	N	$L_{observe}$	L_{table}	Conclusion
NHT	39	0, 108	0, 142	Normal
Jigsaw	35	0, 092	0, 150	Normal

Based on the table 4.5 can be seen $L_{observe} < L_{table}$, concluded that the data score of the pre test was normal.

2. Post Test Data

Table 4.6. The Data of Normality Test on Post Test

Cooperative Type	N	$L_{observe}$	L_{table}	Conclusion
NHT	39	0, 091	0, 142	Normal
Jigsaw	35	0,140	0, 150	Normal

Based on the table 4.6 can be seen $L_{observe} < L_{table}$, concluded that the data score of the post test was normal.

4.2.1.2. The Homogeneity of Test

The homogeneity of the test is performed to find out on the two groups as samples. To test the homogeneity of the sampling variance the common test applied if $F_{observe} < F_{table}$. The level of significance $\alpha = 0,05$ and df (38, 34). Calculation results obtained the following results:

1. Pre Test Data

Table 4.7. The Data of Homogeneity Test on Pre Test

Cooperative Type	Average	Variance	$F_{observe}$	F_{table}	Conclusion
NHT	14, 97436	69, 60459	1, 124	1, 752	Homogeny
Jigsaw	15, 14286	61, 94958			

Based on the table 4.7 can be seen $F_{observe} < F_{table}$, so it can be concluded that the data score of the pre test was homogeneous or can represent the entire population.

2. Post Test Data

Table 4.8. The Data of Homogeneity Test on Post Test

Cooperative Type	Average	Variance	$F_{observe}$	F_{table}	Conclusion
NHT	37, 10256	296, 6734	1, 082	1, 752	Homogeny
Jigsaw	32, 68571	321, 0454			

Based on the table 4.8 can be seen $F_{observe} < F_{table}$, so it can be concluded that the data score of the post test was homogeneous or can represent the entire population.

4.2.1.3 Hypothesis Test

In view of hypothesis test the post test of each sample, sothe hypothesis to be tested is

- $H_0: \mu_A = \mu_B$ Stated students' achievement that were taught with a model of cooperative learning NHT types is not differed significantly with students who were taught by the type of the Jigsaw cooperative learning model.
- $H_a: \mu_A \neq \mu_B$ Stated students' achievement that were taught by cooperative learning model like NHT differed significantly with students who taught by the type of Jigsaw cooperative learning model.

➢ **Hypothesis Test That Depicts Students' Achievement**

To ascertain the significant range existence of students' achievement by implementing cooperative learning model like NHT and Jigsaw, in Exponentiation and Surds material doing hypothesis by t-test. Appropriate testing criteria such as, H_0 is accepted if $-t_{table} < t_{observe} < t_{table}$.

Table 4.9

Hypothesis Test on Students' Achievement

Cooperative Type	Average	Variance	$t_{observe}$	t_{table}
NHT	37,103	296,6734	1, 081	1, 996
Jigsaw	32,686	321,0454		

It is typically set at 0, 05 (5 out of 100 times). This means that 5 out of 100 times an extremely low probability value will actually be observed if the null hypothesis is true.

It was found that -1,996 <1, 081 <1, 996, meant that students' achievement that were taught by cooperative learning model with NHT is not differed significantly with students who were taught by Jigsaw cooperative learning model.

V. CONCLUSION AND SUGGESTIONS

5.1. Conclusion

As being research accomplished, it can be concluded as follows:

- There was no significant difference of students' achievement by cooperative learning model like NHT and Jigsaw in Exponentiation and Surds material.
- The observer point of view, that the cooperative learning model like Jigsaw is better than the type of NHT in terms of students' activity. Students were taught by cooperative learning model like Jigsaw, is more willingly to help their friends who do not quite understand the subject and also more willingly to listen the explanation provided by their friend because the situation was more condusive or convenient among students, then students pulled in one group inclined not hesitate to ask each other within the group. If Contrast to students who were taught by NHT, who felt indifferent to ask each other within the group, especially for students who have a low ability. In Jigsaw, the ability of students present their work before the class meeting and summarize what has been learned.

5.2. Suggestion

1. For teachers
   - In applying the cooperative learning model like NHT, teachers should have been more frequently to remind students to work in teams, especially for students who have low ability that often feel less self-confident get into discussions within group. and students of high ability sometimes looked up themselves smarter than the other, so he/she does not want to share with his/her friends.
   - In applying the model of the type of Jigsaw cooperative learning, teachers must have been more creative in managing the classroom activity, especially when the students are transfered out of the expert group into the group where they were. In addition, the teachers also should have anticipated about the student's absence, which has an impact to the lack expert students in the class.
2. For Students
   - In case of pre-test, students must have improved their basic skills, related to the multiplication of two tribes, simplifying fractions, conjugate, as well as the basic concept of exponentiation with different base and the concept of fraction exponents. In addition, students also must have been conscientious about the process of construction, to avoid the minor mistake which caused wrong answer.
   - In the process of post test, students must have improved their basic skills, linked to multiply two tribes and the conjugate. In

addition the level of students' accuracy work must be turned up and the answer should be simplified, and perfect. Entailed more excercises into.

- The students' activity in learning process has been good, but must be perfected and be more disciplined in terms of cooperation among the members.

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The researcher found that no significant difference of students' achievement was found by cooperative learning model like NHT and Jigsaw in Exponentiation and Surds material. The Researcher ultimately has come to realize that this study is not reaching an optimal sphere yet, if it is in view of what is students' significant, achievement seems to grow, and acknowledging of a short time spare and the lack of co-observers ability to go through, consequently the results of this study may sound not as the expected. But further research will need to take a concrete step in order to upgrade the educational quality.

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