

**Effects of Cooperative Learning Models, Student Behavior, and Educational Level on Mathematics Achievement: Evidence from Junior and Senior High Schools in Kendari**

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**ABSTRACT**

This 3x3x2 factorial-designed experimental study aims at analysing the discrepancy of students' Maths achievement based on the combination of cooperative learning model (Jigsaw-STAD, TSTS-STAD and STAD), the students' character behaviours (low, moderate, high), and the education level (public junior and senior high schools) in Kendari, southeast Sulawesi province in 2016 with 450 students as the sample. A program package of EViews-7 is used to analyze the six types of discrepancy results as follows: (i) type 1 accepts null hypothesis, (ii) type 2 rejects null hypothesis, (iii) type 3 rejects null hypothesis, (iv) type 4 accepts null hypothesis, (v) type 5 accepts null hypothesis, and (vi) type 6 accepts null hypothesis. Accepting null hypothesis means that the average score of students' Maths achievement between experiment and control class does not have any significant difference, while rejecting null hypothesis refers to the definition that the average score between control and experiment class is significantly different.

**KEYWORDS:** discrepancy, combination of cooperative learning models, characters behaviours, education level.

**INTRODUCTION**

Discrepancy generally is defined as the characteristics differences between one community and other community in the society which can be seen from several characteristics of interaction among communities. For instance (i) the discrepancy of development between the west part of Indonesia and the east part, (ii) the discrepancy of income between one society and the others, (iii) the discrepancy between those who get permanent job and those who do not, (iv) the discrepancy of education qualities between one specific area and other areas, especially within southeast Sulawesi, (v) the discrepancy of Maths' teachers quality between one area and the others, (vi) the discrepancy between the students who are fond of Maths and those who are not, and (vii) other discrepancies. Therefore it can be concluded that discrepancy is the difference in differences.

Points out the discrepancy of students' Maths achievement based on the teaching methods and feedback. This finding affects the low quality of students' achievement which is caused by several factors [1]. The related studies about the discrepancy have been undertaken by [2], [3], [4], [5], [6] who finds out the discrepancy of students' Maths achievement of elementary, junior, and senior high schools from many kinds of characteristics with inconsistent results between one treatment and other treatments. This inconsistency among treatments is caused by the variation of respondents' characteristics and the difference of experiment time so as to make the students' achievement is different from one experiment to another.

Learning is the changing of behaviour. The behaviour itself should be seen from the wide perspectives as like observation, introduction, action, skill, interest, attitude amongst others. The changing of behaviour and ability to change is as a matter of fact the restriction and meaning of learning, because the ability to change through learning makes the students freely explore, choose, and determine every important decision for their life, and all of the changing behaviours which occur as the result of learning is their achievement. So learning is not only about intellectual aspect, but all the children personality includes cognitive, affective, and psychomotor aspects. According to learning is an effort process done by someone to obtain the new changing behaviours either from their own experiences, or their interaction with their surroundings. Based on this definition, Slameto reveals some characteristics of behaviour change because of learning as like (1) conscious change, (2) sustainable and functional change, (3) positive and active change, (4) untemporary change, (5) directed and objective change, (6) cover all behaviour aspects [7]. In line with, Zainal reveals that learning is a process of changing inside ones' selves. If after learning, none of changes occur, so he/she does not learn [8], [5], [9].

Learning based on the result of experiments is divided into three prominent types, as follows: *Connectionism, Classical Conditioning, dan Operant Conditioning* [10].

**Connectionism.** This theory was first found by Thorndike based on the experiment he did in 1890s using animals, especially cat as his object to find out the learning phenomenon. Based on his experiment, he concludes that learning is the correlation between stimuli and response. This theory is also called “S-R Bond Theory” and “S-R Psychology of Learning”. This theory is also known as “Trial and Error Learning”. This term shows the length and the quantity of errors occurred to achieve one goal [10]. In this sense, there are two main things which lead to the learning phenomenon as like (i) the condition of hungry cat which attempted to jump, crash the box, and finally was able to jump out the box. If the cat was full at that time, the cat would not try to go out the box to get food. So hunger is a response or a trigger for cat to try going out from the box to get food near the box cover and (ii) the availability of food in front of the box is the positive effect which is wanted to achieve by the response. This phenomenon became the platform of law of learning called *law of effect*. In this respect, if a response causes a satisfied effect, the relationship between stimuli and response becomes stronger. On the contrary, if the less satisfied the effect is, the relationship between stimuli and response becomes weaker. This learning law becomes the platform of a reinforce concept in operant conditioning discovered by Skinner.

**Classical Conditioning.** This theory is developed based on Pavlov experiment, a scientist from Russia, which basically is a procedure of creating new reflection by giving stimuli before the reflection occurs. Pavlov used dog to investigate the relationships between *conditioned stimulus (CS)*, *unconditioned stimulus (UCS)*, *conditioned response (CR)*, and *unconditioned response (UCR)*. CS is a stimulus which can trigger the response being learned, while the response being learned is CR. UCS means the stimulus which can trigger the response that has not been learned, and that response is UCR [10].

Cooperative learning is a student-centred learning model. In its implementation, the students will be divided into some small groups which should be heterogeneous in terms of their cognitive aspects, race, gender or sex, knowledge and many others in order that the students can share knowledge to other students and at the end all the material can be mastered by every student. The grand theory of this phenomenon is social-constructivism developed by Lev Semyonovich Vygotsky(1896-1934). He considers that the role of culture and society, language, and interaction is important to investigate how human learns. He assumes that knowledge is cultural; he uses children as his sample. This approach can be briefly explained as “cooperative” and “culture”. Vygotsky proves that the individual development included thought, language, reasoning is the culture outcomes. This ability is developed through social interaction among others (especially parents and teachers); so the ability can describe what she/he got from the culture. Vygotsky investigated the children development by paying attention to their interaction with the others, he found out that what is being given to them in their social life (dialogue, action, and activities) can facilitate the children to study, develop, grow, and enhance their skill as their nature [10].

The most well-known and important theory proposed by Vygotsky is Zone Proximal Development (ZPD). He affirms that children in any aspect have their real development level, which can be assessed individually. He then argues that there is potential and rapid development of the children in every aspect. The difference between them is called Zone Proximal Development. That zone means the gap between their actual development which is decided by problem solving and the potential development determined by problem solving which is helped by adults and cooperation with more able peers. This implies that the difficult tasks that cannot be done by them can be completed by the helps of adults or more knowledgeable person. This zone proximal development includes the cognitive skills of the children during their development process to be adults, and these skills can be enhanced by the assistance of more skilful people. Vygotsky explains that the most upper layer of zone proximal development can not be obtained without the support of social interaction from friends and teachers.

Vygotsky recommends that if there is a class, someone can be helped by the teachers or their peer, the level of support is also changed. Also, if peers and teachers adjust their support based on the needs, someone might leave her or his zone proximal development. The adjustment process is called “scaffolding”. *Scaffolding* refers to the help given to certain students to accomplish their tasks which can not be finished by themselves [10]. The example of effective scaffolding can be found in *constructivist Learning and Teaching* [11].

The cooperative learning is one of the learning models which is based on constructivism theory. Cooperative learning is one of the learning strategies by grouping students into some small groups containing different ability and knowledge of the students. In accomplishing their group task, every member should cooperate and help each other to understand the material. In cooperative learning, learning is said uncomplete if one of the group members has not mastered the material. This model is based on the idea that students as humans who have different potential, historical background, and the future expectation. Because of this difference, the people can encourage, love, and take care each other. Cooperative learning creates good atmosphere leading to the learning community. The students do not only learn from the teachers, but also from their peers. Accordingly, it can be said that cooperative learning is conscious learning and purposively develop social interaction to avoid misunderstanding leading to conflicts as social training in society.

Learning model centered on students and teachers as motivator, facilitator, and resources is called constructivist theory. Constructivism theory is one way to trigger the students to learn because learning as specific measurement can be determined by intelligence. Piaget [12] explains that intelligence is a continuous and flexible process. The mechanism of people interact with their surroundings in a certain time can form themselves. Dewey [12] points out that school is a laboratory for students to do research in order to solve their daily problems. Dewey argues that in learning process, the students should have freedom to give opinion [13] and [14] elaborate five basic elements of cooperative learning.

The learning process enabling students to interact to each other is cooperative learning model. Cooperative learning comes up with some types. Cooperative learning type which can build self-confidence and can trigger to actively participate, for example *Think-Pair-Share* (TPS), *Two Stay Two Stray* (TSTS), *Student Team Achievement Division* (STAD) and *Jigsaw*. The types of cooperative learning which is significant have been mentioned by some authors like [15], [5], [9], [16] and [17]. Elaborates some problems about the implementation of cooperative learning related to the group works leading to individual work [18].

The characters behaviour integrating on lesson plan is the new thing in education. Accordingly, the government conducted sort of training for the teachers (2011 and 2012), especially in southeast Sulawesi. On this kind of lesson plan, every meeting is identified by some certain characteristics which have not done in the previous meetings. The special characteristic is the existence of five kinds of assessment paper (LP), as follow: LP01, LP02, LP03, LP04 and LP05.

Each assessment paper has different function and aim, for example (a) LP01 is cognitive assessment of output which functions to evaluate the result of learning in a meeting done individually after they work in group to fill their worksheet under one of cooperative learning models used by certain teachers, (b) LP02 is an ongoing assessment done by the teachers while the students are working with their group in accomplishing their worksheet, the assessment covers the cooperative values, how they ask the teachers, help each other's, and the others, (c) LP03 is self-assessment which mainly functions to know whether the students are honest when working on their tasks on the worksheets or on their cognitive assessment paper, the importance of this self-assessment is that it encourages the learners not to do things which is contradict with the rules in learning process, and its implication is teaching the students about good attitudes as one of benefits in the future, (d) LP04 is social skills assessment paper which mainly focuses on triggering the students to respect their peers, respect their teachers, behave well as well as care of the environment wherever they are, (e) LP05 is a psychomotor or skill assessment to support the students in doing their worksheet or their self-assessment which function to strengthen their concept, structure to think critically [4].

**METHODOLOGY**

**Population and sample** in this experimental research is 1163 students which consists of (i) fifteen classes from senior high schools which is as many as 525 respondents, (ii) nineteen classes from junior high schools which is as many as 638 respondents. The number of sample is 450 students and 25 students in each cell which can be seen from the following table 1.

*Table 1. The number of sample in undertaking the experimental study with 3x3x2 factorial design Based on factor A*i*, B*j* and G*k* in each cell.*

Factor A/B \ Factor G		School Level		Σ
		SMAN (G1)	SMPN (G2)	
A*1(Jigsaw-STAD)	B=1 (high characters)	25	25	50
	B=2 (moderate characters)	25	25	50
	B=3 (low characters)	25	25	50

A*2(TSTS-STAD)	B=1 (high characters)	25	25	50
	B=2 (moderate characters)	25	25	50
	B=3 (low characters)	25	25	50
A3(STAD)	B=1 (high characters)	25	25	50
	B=2 (moderate characters)	25	25	50
	B=3 (low characters)	25	25	50
<b>Total (Σ) :</b>		225	225	<b>450</b>

**Description:**

The planned sample in each cell as an analysis unit is represented on table 2 with the total in each column is 225 students that consists of 25 respondents for 3x3x2 factorial treatment, thus the total sample of cooperative learning model Ai (i=1,2,3) and level Bj (J=1,2,3) and also Gk (k=1,2) is eighteen classes as many as 25 students. As a result, the total of the sample in overall is 450 students who are being selected randomly.

**Research Variables**

The variables employed in this research are three independent variables which are (i) the combination of cooperative learning models(Jigsaw-STAD (A\*1), TSTS-STAD (A\*2) and STAD(A3)); (ii) the category of students' characters behaviours high (B1), moderate (B2) and low (B3)), (iii) school or education level as like senior high schools (G1) and junior high schools (G2)) and one dependent variable which is the students' Maths achievement which is obtained randomly after treatment is done.

**The technique of Data Analysis**

**Descriptive Analysis:** is required to describe the characteristics of all variables based on the respondents' answers with the average score ( $\mu$ ) by using some syntax to classify the students' achievement and combination of factor A, B and G to be cell factor (FS) through process syntax If on SPSS/PC

**Inferential Analysis:** this type of analysis is required to test the hypothesis using an automatic program called *EViews-7* which is:  $Y_i = \sum_{k=1}^K C(k)X_k + \mu_i$  [19]

Where:

$Y_i$  is described as the score of observation of respondent -i;  $C(k)$  is the model measurement or the coefficient of independent variable  $X_k$ ;  $X_k$  describes the score of independent variables;  $\mu_i$  describes the random deviation of the model with the assumption that they have normal, identical, and independent score distribution (*NII*) with  $E(\mu) = 0$  and  $Var(\mu) = \sigma^2$  or  $\epsilon_{ij} \sim NII(0, \sigma^2)$ , as constant score for all  $i = 1, 2, 3, \dots, n$  [19], and to test the discrepancy hypothesis by using a formula (i)  $AC[(A,Y)|B=j] = \pi_{1j} - \pi_{2j}$  for every  $j = 1, 2$ ; (ii)  $AC[(A,Y)|A=i] = \pi_{i1} - \pi_{i2}$  for every  $i = 1, 2 \& 3$ ; and (iii) *Difference in Differences (DID)* =  $(\pi_{11} - \pi_{12}) - (\pi_{21} - \pi_{22})$  [20].

**Research Design:** the design of this research is *Randomize Posttest Control Group Design*:

<b>R</b>	<b>X</b>	<b>O1</b>
<b>R</b>	<b>•</b>	<b>O2</b>

**Description:** R: Random; O1: the Maths achievement test result for experiment class; X: Experimental group; •: control group; O2: the maths achievement test result for control class [21].

**Table 2. The discrepancy of the students' Maths achievement with 3x3x2 factorial design Based on factor Ai, Factor Bj and Factor Gk**

No.	Factor G		G=1 (SMAN)	G=2 (SMPN)	Range: (Column 1 – 2)
1.		B=1 (high characters)	$\mu_{111}=C(1)$	$\mu_{112}=C(2)$	C(1) – C(2)
2.	A*1	B=2 (moderate characters)	$\mu_{121}=C(3)$	$\mu_{122}=C(4)$	C(3) – C(4)
3.		B=3 (low characters)	$\mu_{131}=C(5)$	$\mu_{132}=C(6)$	C(5) – C(6)
		Range (1-3)	C(1)-C(5)	C(2)-C(6)	<b>C(1)-C(2)-C(5)+C(6)*</b>
		Range (2-3)	C(3)-C(5)	C(4)-C(6)	<b>C(3)-C(4)-C(5)+C(6)*</b>
4.		B=1 (high characters)	$\mu_{211}=C(7)$	$\mu_{212}=C(8)$	C(7)-C(8)
5.	A*2	B=2 (moderate characters)	$\mu_{221}=C(9)$	$\mu_{222}=C(10)$	C(9)-C(10)
6.		B=3 (low characters)	$\mu_{231}=C(11)$	$\mu_{232}=C(12)$	C(11)-C(12)
		Range (1-3)	C(7)-C(11)	C(8)-C(10)	<b>C(7)-C(8)-C(11)+C(12)**</b>

		Range (2-3)	C(9)-C(11)	C(10)-C(12)	<b>C(9)-C(10)-C(11)+C(12)**</b>
7.		B=1 (high characters)	$\mu_{311}=C(13)$	$\mu_{312}=C(14)$	C(13)-C(14)
8.	A3	B=2 (moderate characters)	$\mu_{321}=C(15)$	$\mu_{322}=C(16)$	C(15)-C(16)
9.		B=3 (low characters)	$\mu_{331}=C(17)$	$\mu_{332}=C(18)$	C(17)-C(18)
		Range (1-3)	C(13)-C(17)	C(14)-C(18)	<b>C(13)-C(14)-C(17)+C(18)***</b>
		Range (2-3)	C(15)-C(17)	C(16)-C(18)	<b>C(15)-C(16)-C(17)+C(18)***</b>

Description:

- **C(1), C(2), ... C(18)** is the average of univariate response in cell (interaction) which is formed by the combination of factors  $A_i, B_j$  and  $G_k$ .
- **C(1)-C(2)-C(5)+C(6)** is the discrepancy type 1 (the difference or the range of the students' Maths achievement average score between line 1 and 3).
- **C(3)-C(4)-C(5)+C(6)** is the discrepancy type 2 (the range of the students' Maths achievement average score between line 2 and 3).
- **C(7)-C(8)-C(11)+C(12)** is the discrepancy type 3 (the range of the students' Maths achievement average score between line 4 and 6).
- **C(9)-C(10)-C(11)+C(12)** is the discrepancy type 4 (the range of the students' Maths achievement average score between line 5 and 6).
- **C(13)-C(14)-C(17)+C(18)** is the discrepancy type 5 (the range of the students' Maths achievement average score between line 7 and 9).
- **C(15)-C(16)-C(17)+C(18)** is the discrepancy type 6 (the range of the students' Maths achievement average score between line 8 and 9).
- NOTE: symbol (\*): the discrepancy type 1 and 2; symbol (\*\*): the discrepancy type 3 and 4, and symbol (\*\*\*): the discrepancy type 5 and 6.

## ANALYSIS RESULT AND DISCUSSION

### Inferential analysis

Inferential analysis is required to test the six hypothesis based on the analysis on table 4, 5, 6, 7, 8, and 9 as follows:

**Hypothesis-1**, (the discrepancy type 1). The average score of senior high schools of public sector with the high characters (B1) is higher than students of junior high schools with low characters (B3), especially for those who are taught under cooperative learning model of Jigsaw-STAD (A\*1) has significant difference. The statistical hypothesis applied is  $H_0: C(1) - C(2) \leq C(5) - C(6)$  versus  $H_1: C(1) - C(2) > C(5) - C(6)$ . The analysis result as can be seen on table 4 based on t-test gained  $-t= 1.441072$   $df=432$  with the  $p\text{-value}=0.1503 > \alpha=0.05$ , therefore  $H_0$  is accepted. If  $H_0$  is accepted, it means that the average score of senior high schools of public sector with the high characters (B1) is higher than students of junior high schools with low characters (B3), especially for those who are taught under cooperative learning model of Jigsaw-STAD (A\*1) does not have significant difference.

**Hypothesis-2**, (the discrepancy type 2). The average score of senior high schools students with the moderate characters (B2) is higher than students of junior high schools with the low characters (B3), especially for those who are being taught under cooperative learning model of Jigsaw-STAD (A\*1). The statistical hypothesis applied is  $H_0: C(3) - C(4) \leq C(5) - C(6)$  versus  $H_1: C(3) - C(4) > C(5) - C(6)$ . The result of analysis on table 5 based on t-test, it is gained t value =  $-3.865200$   $df=432$  with  $p\text{-value}=0.0001 < \alpha=0.05$  so  $H_0$  is rejected. By rejecting  $H_0$ , it can be concluded that the average score of senior high schools students with the moderate characters (B2) is higher than students of junior high schools with the low characters (B3), especially for those who are being taught under cooperative learning model of Jigsaw-STAD (A\*1) has significant difference.

**Hypothesis 3**, (the discrepancy type 3). The average score of senior high schools students with high characters (B1) is higher than the junior high schools students with low characters (B3), especially for those who are taught under the combination of cooperative learning models of TSTS-STAD (A\*2) has significant difference. The statistical hypothesis applied is  $H_0: C(7) - C(8) \leq C(11) - C(12)$  versus  $H_1: C(7) - C(8) > C(11) - C(12)$ . The result of analysis on table 6 based on t-test obtains t value =  $-5.406812$   $df=432$  with  $p\text{-value}=0.0000; < \alpha=0.05$  so  $H_0$  is rejected. By rejecting  $H_0$  it can be concluded that the average score of senior high schools students with high characters (B1) is higher than the junior high schools students with low characters (B3), especially for those who are taught under the combination of cooperative learning models of TSTS-STAD (A\*2) has significant difference.

**Hypothesis-4**, (the discrepancy type 4). The average score of senior high schools students with the moderate characters (B2) is higher than the junior high schools students with low characters (B3), especially those who are taught under the combination of cooperative learning model type TSTS-STAD (A\*2) has significant difference. The statistical hypothesis applied is  $H_0: C(9) - C(10) \leq C(11) - C(12)$  versus  $H_1: C(9) - C(10) > C(11) - C(12)$ . The analysis result on table 7 based on t-test obtains t value = 0.424502 with df=432 with p value=0.6714 >  $\alpha=0.05$  so  $H_0$  is accepted. By accepting  $H_0$  it can be concluded that the average score of senior high schools students with the moderate characters (B2) is higher than the junior high schools students with low characters (B3), especially those who are taught under the combination of cooperative learning model type TSTS-STAD (A\*2) does not have significant difference.

**Hypothesis-5**, (the discrepancy type 5). The average score of senior high schools students with high characters (B1) is higher than the students of junior high schools with low characters (B3), especially those who are taught under the combination of cooperative learning type STAD (A3) has significant difference. The statistical hypothesis applied is  $H_0: C(13) - C(14) \leq C(17) - C(18)$  versus  $H_1: C(13) - C(14) > C(17) - C(18)$ . The analysis result on table 8 based on t-test obtains t value = 0.268106 df=432 with p-value =0.7887 >  $\alpha=0.05$  so  $H_0$  is accepted. By accepting  $H_0$  it can be concluded that the average score of senior high schools students with high characters (B1) is higher than the students of junior high schools with low characters (B3), especially those who are taught under the combination of cooperative learning type STAD (A3) does not have significant difference.

**Table4** The analysis result of discrepancy type-1  
Wald Test: Equation 01

Test Statistic	Value	df	Probability
t-statistic	1.441072	432	0.1503
F-statistic	2.076688	(1, 432)	0.1503
Chi-square	2.076688	1	0.1496

Null Hypothesis:  $C(1)-C(2)=C(5)-C(6)$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
$C(1) - C(2) - C(5) + C(6)$	0.258000	0.179033

Restrictions are linear in coefficients.

**Table5.** The analysis result of discrepancy type 2  
Wald Test: Equation 02

Test Statistic	Value	df	Probability
t-statistic	-3.865200	432	0.0001
F-statistic	14.93977	(1, 432)	0.0001
Chi-square	14.93977	1	0.0001

Null Hypothesis:  $C(3)-C(4)=C(5)-C(6)$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
$C(3) - C(4) - C(5) + C(6)$	-0.692000	0.179033

Restrictions are linear in coefficients.

**Hypothesis -6**, (the discrepancy type 6). The average score of senior high schools students with moderate characters (B2) is higher than the students of junior high schools with low characters (B3), especially for those who are taught under the combination of cooperative learning model type STAD (A3) has significant difference. The statistical hypothesis applied is  $H_0: C(15) - C(16) \leq C(17) - C(18)$  versus  $H_1: C(15) - C(16) > C(17) - C(18)$ . The analysis result on table 9 based on t-test obtains t-value= -0.089369 df=432 with p-value 0.9288 >  $\alpha=0.05$  so  $H_0$  is accepted. By accepting  $H_0$  it can be concluded that the average score of senior high schools students with moderate characters (B2) is higher than the students of junior high schools with low characters (B3), especially for those who are taught under the combination of cooperative learning model type STAD (A3) does not have significant difference.

**Table 6.** The analysis result of discrepancy type 3  
Wald Test: Equation 03

Test Statistic	Value	df	Probability
t-statistic	-5.406812	432	0.0000
F-statistic	29.23362	(1, 432)	0.0000
Chi-square	29.23362	1	0.0000

Null Hypothesis:  $C(7)-C(8)=C(11)-C(12)$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
$C(7) - C(8) - C(11) + C(12)$	-0.968000	0.179033

Restrictions are linear in coefficients.

**Table7.** The analysis result of discrepancy type 4  
Wald Test: Equation 04

Test Statistic	Value	df	Probability
t-statistic	0.424502	432	0.6714
F-statistic	0.180202	(1, 432)	0.6714
Chi-square	0.180202	1	0.6712

Null Hypothesis:  $C(9)-C(10)=C(11)-C(12)$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
$C(9) - C(10) - C(11) + C(12)$	0.076000	0.179033

Restrictions are linear in coefficients.

**Table8** the analysis result of discrepancy type 5  
Wald Test: Equation 05

Test Statistic	Value	df	Probability
t-statistic	0.268106	432	0.7887
F-statistic	0.071881	(1, 432)	0.7887
Chi-square	0.071881	1	0.7886

Null Hypothesis:  $C(13)-C(14)=C(17)-C(18)$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
$C(13) - C(14) - C(17) + C(18)$	0.048000	0.179033

Restrictions are linear in coefficients.

**Table9.** The analysis result of discrepancy type 6  
Wald Test: Equation 06

Test Statistic	Value	df	Probability
t-statistic	-0.089369	432	0.9288
F-statistic	0.007987	(1, 432)	0.9288
Chi-square	0.007987	1	0.9288

Null Hypothesis:  $C(15)-C(16)=C(17)-C(18)$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
$C(15) - C(16) - C(17) + C(18)$	-0.016000	0.179033

Restrictions are linear in coefficients.

## DISCUSSION

The discrepancy in this research refers to the the difference of score average of students' Maths achievement based on the combination of cooperative learning model, the students' characters behaviour, and the education level between senior and junior high schools in Kendari, southeast Sulawesi by using experiment and control group. By applying the contrastive analysis through 3x3x2 factorial design, the researcher obtains six types of discrepancies which are (i) the discrepancy type 1 which is the difference of score average of senior high schools students (G1) with high characters (B1) compared with the junior high school students (G2) with low characters (B3) taught under the combination of cooperative models type Jigsaw-STAD (A\*1), (ii) the discrepancy type 2 which is the difference of score average between senior high schools students (G1) with moderate characters (B2) compared with the junior high schools students(G2) with low characters (B3) taught under the combination of cooperative learning models type Jigsaw-STAD (A\*1), (iii) the discrepancy type 3 which is the difference of score average between senior high schools students (G1) with high characters (B1) compared with junior high schools students (G2) with low characters (B3) taught under the combination of cooperative learning models type TSTS-STAD (A\*2), (iv) the discrepancy type 4 which is the difference of score average between senior high schools students(G1) with moderate characters(B2) compared with the junior high schools students (G2) with low characters (B3) taught under the combination of cooperative learning models type TSTS-STAD (A\*1), (v) the discrepancy type 5 which is the difference of score average between senior high schools students (G1) with high characters (B1) compared with junior high schools students (G2) with low characters (B3) taught under the combination of cooperative learning models type STAD (A3), (vi) the discrepancy type 6 which is the difference of score average between senior high schools students (G1) with moderate characters (B2) compared with the junior high schools students (G2) with low characters (B3) taught under the combination of cooperative learning type STAD (A3).

The analysis result using statistical tools called *Eviews-7* points out that the discrepancy type 1 has no significant difference, discrepancy type 2 has significant difference, discrepancy type 3 has significant difference, discrepancy type 4 has no significant difference, discrepancy type 5 has no significant difference, and discrepancy type 6 has no significant difference which means that all the results show inconsistency among all types. The gap of this present research in 2016 is not consistent from one discrepancy type to another type because among six types of discrepancies, there are only two types which are different significantly (type 2 and type 3) while the rest four are not different towards the students' Maths achievement for senior and junior high schools (type 1, type 4, type 5, and type 6). The result of this research is supported by [3]; [4]; [5].

## CONCLUSION AND RECOMMENDATION

### Conclusion

- Empirically, the average score of students' Maths achievement of senior and junior high schools after going through the experiment of the combination of cooperative learning models of Jigsaw-STAD, TSTS-STAD and STAD, the students' characters behaviour (high, moderate, and low) has certain difference which supports the proposed hypothesis.
- The discrepancy type 1, especially the students who are taught under cooperative learning models of Jigsaw-STAD (A\*1), the average score of senior high schools of public sector with the high characters (B1) is higher than students of junior high schools with low characters (B3) **does not have significant difference**.
- The discrepancy type 2, especially for the students who are taught under the combination of cooperative learning models of Jigsaw-STAD (A\*1), that the average score of senior high schools students with the moderate characters (B2) is higher than students of junior high schools with the low characters (B3) **has significant difference**.
- The discrepancy type 3, especially for the students who are taught under the combination of cooperative learning models TSTS-STAD (A\*2), the average score of senior high schools students with high characters (B1) is higher than the junior high schools students with low characters (B3) **has significant difference**.
- The discrepancy type 4, especially for those who are taught under the combination of cooperative learning models TSTS-STAD (A\*2), the average score of senior high schools students with the moderate characters (B2) is higher than the junior high schools students with low characters (B3) **does not have significant difference**.
- The discrepancy type 5, the average score of senior high schools students with high characters (B1) is higher than the students of junior high schools with low characters (B3), especially those who are taught under the combination of cooperative learning type STAD (A3) **does not have significant difference**.
- The discrepancy type 6, the average score of senior high schools students with moderate characters (B2) is higher than the students of junior high schools with low characters (B3), especially for those who are taught under the combination of cooperative learning model type STAD (A3) **does not have significant difference**.

### Recommendation

- To prevent boredom during teaching and learning process in the class, the cooperative learning models should be combined in accordance of the material, or main themes taught at that time, because the analysis result shows who like Maths or not. However, by the implementation of cooperative learning models, the students will be more active to accomplish the assignments from the teachers.

## REFERENCES

- [1] Maonde, F. (2012a). "The discrepancy of students' Maths achievement based on the implementation of teaching methods and feedback assessment". *Journal of Mathematics Education*. 3(1):01-14.
- [2] Maonde, F. (2012b). "The discrepancy of students' Maths achievement based on the students' parents job". *Journal of Mathematics Education*. 3(2): 114-115.
- [3] Maonde, F. (2013). "The discrepancy of junior high schools students based on cooperative learning model, the language (Indonesian and English) and science mastery through characters lesson plan. *Journal of Mathematics Education*, 4(1):101-126.
- [4] Maonde, F. (2014a). "The discrepancy of elementary schools students based on cooperative learning, language and science mastery through characters lesson plan". *Journal of Mathematics Education*. 5(1):01-12.
- [5] Maonde, F. (2014b). *The discrepancy of senior high schools students' Maths achievement based on cooperative learning model, language and science mastery through characters lesson plan*. Kendari: Lembaga Penelitian UHO.

- [6] Maonde, F. et. al. (2005a). “The Discrepancy of Students’ Mathematic Achievement through Cooperative Learning Model, and the ability in mastering Languages and Science”. *International Journal of Education and Research*, 3(1): 141-159. Jan 2015 ISSN: 2201-6333. <http://www.ijern.com>.
- [7] Slameto. (2003). *Learning and the factors influencing it*. (Jakarta: Rineka Cipta).
- [8] Aqib, Z. (2002). *Teachers’ Professionalism in Teaching Learning Process*. (Surabaya: Insan Cendekia)
- [9] Maonde, F. (2015b). “The Effect of Cooperative Learning Model, Language and Natural Science Ability on Students’ Mathematic Achievement (An Experimental Study on Senior High School Students of Kendari in Southeast Sulawesi Province)” *International Journal of Education and Research*. 3(3): 261-274. Maret 2015 ISSN: 2201-6333. <http://www.ijern.com>.
- [10] Syah, M. (2004). *Psychology of Learning third edition*. (Jakarta: PT RadjaGrafindo Persada).
- [11] Johnson, E.B. (2006). *Contextual Teaching & Learning Teaching-Learning Making Exciting and Meaningful Activities*. (Bandung: Mizan Learning Center).
- [12] Yamin, M. (2012). *New Design of Constructivistic Learning* (Jambi: Reference)
- [13] Brown, H., & Ciuffetelli, D.C. (Eds.). (2009). *Foundational methods: Understanding teaching and learning*. (Toronto: Pearson Education).
- [14] Siltala, R. (2010). *Innovativity and cooperative learning in business life and teaching*. (University of Turku).
- [15] Lasingga. (2011). “The Effect of Cooperative Learning Model of Jigsaw and TSTS towards Mathematics Achievement”. *Journal of Mathematics Education*. 2 (2): 55-64.
- [16] Maonde, F., Waode Ekadayanti & Zamsir. (2016a). The Effect of Combination of Cooperative Learning Models and Prior Knowledge of Mathematics on Students’ Achievement. *International Journal of Contemporary Applied Sciences*. 3(5):8-27 May 2016 ISSN:2308-1365. <http://www.ijcas.net>.
- [17] Maonde, F., Ita Nurmuiza & Asrul Sani. (2016b). The Effect of Motivation on Mathematics’ Achievement through Combination of Cooperative Learning Model. *International Journal of Contemporary Applied Sciences*. 3(6): 78-97 June 2016 ISSN:2308-1365. <http://www.ijcas.net>.
- [18] Slavin. (2005). *Cooperative Learning Theory. Research and Practices Translated by Nurlita Yusron* (Ujungberung Bandung: Nusa Media).
- [19] Agung I.G.N.(2007). *Financial Econometrics Analysis Using EVIEWS (basic)*. (Jakarta: PPs Ilmu Manajemen FEKON Universitas Indonesia).
- [20] Agung I.G.N. (2010). *Cross Section And Experimental Data Analysis Using EViews*. (Singapur: John Wiley & Sons (Asia) Pte. Ltd.).
- [21] Sugiyono. (2013). *Qualitative and Quantitative Research Methods R&D*. (Bandung: Alfabeta)