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Learning Model and Form of Assesment toward The Inferensial Statistical Achievement by Controlling Numeric Thingking Skills

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ABSTRACT

This study aimed to find out the effect of learning model and form of assessment toward inferential statistical achievement after controlling numeric thinking skills. This study was quasi experimental study with 130 students as the sample. The data analysis used ANCOVA. After controlling numeric thinking skills, the result of this study show that: (1) the inferential statistical achievement of the students group which follow SCSS learning model is higher than the group which follow conventional leare inferential statistical achievement of students group which got performance assessment is higher than conventional assessment, (3) there is interaction effect between learning model and form of assessment toward the students' statistical achievement, (4) in SCSS learning model, the students' inferential statistical achievement which got performance assessment is higher than the group which got conventional assessment, (5) in conventional learning model, the students' inferential statistical achievement which got performance assessment are lower than the group which got conventional assessment, (6) in performance assessment, the students' inferential statistical achievement which follow the study with SCSS learning model is higher than those which follow conventional learning model, and (7) in conventional assessment, the students' inferential statistical achievement which follow SCSS learning model is lower than the group which follow conventional learning model.

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1. INTRODUCTION

Statistic learning is one of the learning activities which is obligatorily provided in tertiary education. It is provided to the undergraduate and postgraduate students through the courses Descriptive Statistics and Inferential Statistics. It is expected that such courses can help students cope with the quantitative information. As prospective scientists, it is expected that the students are able to apply the scientific approach to coping with the problems they may have. In writing a mini thesis, for example, as one of the scientific activities and academic research, the problems of the study should be answered using the scientific approach. In this case, statistics plays a role as the supporting instrument which can be used to cope with the quantitative data obtained in the study. In other words, the situation, condition, or the fact which are explored can be described through the statistical analysis; in addition, logical conclusions can also be drawn. This supported by what is stated by Sudijono [1], "that if the statistic approach is used as the supporting instrument, then logical conclusions can be drawn based on the exact data. As a result, decisions can be accurately made, what may

happen in the future can be predicted, and what concrete steps should be taken by a teaching staff can be predicted".

The course Inferential Statistics is one of the obligatory courses provided to the students of the Department of PG PAUD (the Department of Pre-school Teachers' Training), Faculty of Education, Ganesha University of Education. After taking this course, it is expected that the students will be able and competent to explain the meaning and significance of the Inferential Statistics as a pattern of the quantitative way of thinking required to develop sciences and to solve the pre-school educational problems, and to give meaning to any information and data through the statistical inferential methods. This course is intended to provide (1) the concept of what statistics is, how it is used and what its role and position in the scientific study are; (2) the concept of what Inferential Statistics is, and how it is functioned and used; (3) the concepts of problems, variables, operating definitions, and hypothesis; (4) the concept of the data required in research, and the skill required for formulating the data collecting instrument; (5) the skill required for collecting and processing data; (6) the ability to examine the correlations among variables (correlation) and the differences among variables which are identified manually and using the assistance of the SPSS application; and (7) the skill required for interpreting the data revealed from the result of the study.

The concept of statistics is so important in the development of sciences and daily life that it should be one of the favorite courses, and that the students should be fond of it. To this end, the government has issued the Act Number 19of 2005 concerning the National Standard of Education which is intended to guarantee the quality of the national education as an attempt to develop the intellectual life of the nation and to form the civilized characteristic of the nation. However, the inferential statistic learning has not shown any satisfactory outcome. That can be seen from the result of the evaluation made in the academic years 1012/1013 and 2013/2014 by the Department of Pre-school Teachers' Training, Faculty of Education, Ganesha University of Education. The result was that in the last two years the scores obtained by the students for Inferential Statistics averaged 2.14. The evaluation was made using the scale of five (ranging from 0 to 4). That indicates that the quality of the students' mastery of the concepts which Inferential Statistics contains was still relatively low. If such a fact is not immediately coped with, then it will be difficult to develop the courses which require the good mastery of the inferential statistical concepts, especially in the mini thesis writing.

From what was initially observed from the answers given by the students when the evaluation was made for Inferential Statistics, it was identified that the students' weaknesses were in 1) the mathematic/statistic model which was made for the problem provided; 2) the strategy chosen and determined to answer the problem completely; 3) the ability to explain or interpret the result; the students were only able to make mechanical calculation; 4) the ability to explain graphs using the written variety of language; and 5) the ability to read using the concept of a representation provided. Such facts show that the students were not good at solving the mathematical communication and problem.

The result of the interview, in which the interviewees were the students who had programmed and taken Inferential Statistics, shows that they had some problems when attending the course. Such problems are as follows: the learning activity was less processed and tended to be passive; the structured exercises through which the students were trained to answer the inferential statistics-related problems were insufficient; the achievement achieved by the students and the assignments provided to them were only intended to fulfill the academic assignments; the feedback given by the lecturer for what the students had done was insufficient; and the system implemented by the lecturer to evaluate the learning activity was only intended to measure whether the students could pass Inferential Statistics or not.

It is in this case that the lecturer is required to reform the learning activity creatively. The roles of the lecturer in the learning activity are designing, managing, evaluating and deciding what to add to follow up the learning activity. The lecturer, as the teaching staff who is most importantly responsible for and directly involved in the learning process is required to make every attempt he/she can to improve the learning process, which is essentially expected to improve the students' learning achievement. Such a learning process can be improved through the innovative strategies, approaches, models or learning methods.

One of the learning models which was once implemented to improve the students' learning achievement was the Search, Solve, Create and Share (SSCS) learning model. Such a learning model is one of the innovative learning models which can be effectively used in Statistics as it is oriented towards the problem-solving. The SSCS learning model is made up of four steps through which the problem can be solved; they are the problem identification (search), what is planned to do to solve the problem (solve), solving the problem (create), and socializing the problem already solved (share) [2]. The philosophy of the SCSS learning model is constructivist, meaning that in the SSCS learning model knowledge is constructed by the students themselves. Pizzini stated "The SSCS Problem Solving Model is designed to expand and apply scientific concepts and critical thinking skills", meaning that the SSCS learning model is oriented towards the

problem solving and is designed to develop the skill to think critically in order to improve the students' understanding of concepts [2].

The syntax of the SSCS learning model includes four stages; they are (1) the search stage, in which there are four activities which should be done; they are the identification of facts, the analysis of facts, the identification of problems, and brainstorm. (2) The solve stage, in which there are four activities which should be done; they are determining the criteria; evaluating the solution, the procedure through which the solution is explored, and determining what is planned. (3) the create stage, in which there are several activities done by the students; they are implementing the plan, identifying the concepts, representing the data and analysis, determining the participants as part of the share stage, determining where presentation is performed, and preparing the create stage. And (4) the share stage, in which the students present their findings, results and conclusions of what they have obtained from their groups in front of the class, and evaluate the solution to the problem solving already implemented.

In accordance with Degeng [3], "the conventional learning model is a learning term which is commonly implemented in the daily learning activities". Sutikno stated that the conventional learning model is the learning model which is commonly implemented by an educator in the class room learning process. In this present study, the conventional learning model refers to the learning model which has been so far commonly implemented in the inferential statistic learning in the Department of the Pre-school Teachers' Training, Faculty of Education, Ganesha University of Education [4]. From what was observed, such a learning model tended to be focused on the memorization learning and tolerate the convergent responses, emphasize the information on concepts, and drill the exercises in texts. Apart from that, the assessment made in such a learning model was traditional in nature with a paper and pencil test, which only required one correct answer. Memorization learning refers to the memorization of facts, correlations, principles, and concepts. If viewed from the methodical philosophy, it can be stated that the conventional learning method can be classified as the behavioristic learning model. Such a theory is based on the assumption that the learners are the passive human beings who are supposed to listen to, record, memorize what is learned and only respond to the stimulus coming from outside (stimulus-response). The steps taken in the conventional learning model generally start from explaining the material given by the lecturer, doing the exercises given, and end with the homework assignment.

In addition, a good class cannot be stated to be good if it is only supported by the innovative learning model without being completed with the ability to assess the competence already acquired by the learners. There are many types of alternative assessments which can be used in the inferential statistic learning, one of which is the performance assessment. It can be used to assess the work performance, behavior and the interaction made by the students in the classroom. Such an interaction can be the interaction among the students, between the students and the lecturer, and the interaction between the students and the learning material. Therefore, the performance assessment is the assessment in which the process is a priority without ignoring the achievement. That is supported by [5] who stated that the performance assignment is focused on the process, product, or the combination of the two.

According to Stiggins [6], "the performance assessment is a form of assessment which allows the learners to demonstrate a particular set of skills or behaviors, products and contexts". Furthermore, Majid stated that the performance assessment is an assessment with various types of tasks and situations in which the learners who take the test are requested to demonstrate in depth and apply what they know of something within various types of contexts [7]. Besides, Asmawi stated that the performance assessment is an assessment which obliges the learners to demonstrate their performance not to answer or choose the alternative answers already prepared [8]. Campbell and Stanley [9] divided , "the performance assessment into two; they are the performance assessment project and the performance assessment task. From what was described above, it can be synthesized that the performance assessment is an assessment which requires the learners to demonstrate and apply in depth what they know within various types of contexts, depending on the criteria desired".

The written assessment (the paper and pencil test) is an assessment which is generally conducted by the lecturer to measure the students' abilities through the written test which is combined with the scores obtained from the tasks given which are processed using particular formulas in order to obtain the final score. The written test is also better known as the conventional or traditional assessment as it refers to the forced measurements such as the multiple choice test, filling in test, right or wrong test, matching test, and the like which are commonly used in education. The learners usually choose one of the answers or complete information. The written test is conducted separately from the learning process. It is conducted after the learning process is finished or in the end of the learning process. It is only used to measure the learners' cognitive ability; it cannot measure the learner's learning achievement holistically.

Dimyati and Mudjiono stated that the learning result is the peak of the learning process. Such a learning result mainly follows from the evaluation made by the lecturer, and also constitutes the result of the

interaction between the learning act and teaching act [10]. Woodworth and Marquis stated that the learning result is the actual ability which can be directly measured from a test [11]. Nasution stated that the learning achievement refers to someone's mastery of what he/she knows or a particular skill in a lesson, which is commonly obtained from the test-based mark or score provided by the lecturer [12]. Bloom, as quoted by [13], "classified the learning achievement into three better-known as the Bloom's taxonomy, which is made up of the cognitive domain, the affective domain, and the psychomotoric domain". The cognitive domain is concerned with the student's intellectual learning achievement which covers six aspects; they are knowledge, concept, application, analysis, synthesis, and evaluation. The cognitive domain was revised by [13] better known as the Bloom's Revised Taxonomy. Thus, the inferential statistic learning achivement is the cognitive ability which the students of the Department of the Pre-school Teachers' Training, Faculty of Education, Ganesha University of Education, have after attending the inferential statistic learning within a period of time. Such ability includes the ability to understand, analyze, and apply what is learned.

Syah stated that the factors which contribute to the learning achievement can be classified into two; they are the internal and external factors [14]. The learning model and assessment are the internal factors which contribute to the student's learning achivement, and the internal factors include the numeric ability, intelligence, talent, interest, attitude, and so forth. The numeric ability is one of the basic elements required to study Mathematics. The numeric ability gives the strong foundation required to answer the statistic questions which are related to the arithmetic operation such as addition, deduction, multiplication, and division. In relation to the mathematic mastery, the numeric ability seems to be reasonable enough to explore, as, as already known that the numeric system is part of Mathematics and facilitates the development of Mathematics as a whole.

According to Fudyartanta [15], "the numeric ability is the ability which is specifically needed to count, and includes addition, deduction, multiplication, and division. It can also be defined as an ability to understand the correlation among numbers and to solve the problems which are concerned with numeral concepts". Prasetyo stated that the numeric ability is the ability to count, reason numbers, use or manipulate the correlation among numbers, and describe things logically [16]. In addition, Carter stated that the numeric ability test is frequently designed to examine the logic strength and the ability to cope with problems structurally and analytically [17].

There are several relevant studies which show that the SSCS learning model and the performance assessment positively affect the student's learning achivement; such studies were conducted in different times and places and the objects explored were also different. The first study was conducted by Warmini who found that the learning achievement achieved by the students who learned in group using the conventional learning model was significantly lower than that achieved by the students who also learned in group but they used the SSCS learning model supported with the visual media. The second study was conducted by Yuni Pantiwati who found that the cognitive ability of the students who were assessed authentically was different from that achieved by those who were assessed using the written assessment in TPS (Think Pair Share) cooperative learning. The impact of the use of the authentic assessment on the cognitive ability was greater than and significantly different from the impact of the use of the written assessment. The cognitive ability which is intended in the present study is the learning achievement. Al-sadaawi found that the learning achievement for sciences achieved by the experimental group of students, namely, the students who were assessed using the performance assessment was higher than that achieved by the control group, namely, the group of students who were assessed using the common assessment.

Based on the background described above, in this present study seven hypotheses are tested; they are (1) the inferential statistic learning achievement which is achieved by the students with the SSCS learning model is higher than that which is achieved by the students with the conventional learning model, after their numeric ability is controlled; (2) the inferential statistic learning achievement which is achieved by the students with the performance assessment is higher than that achieved by the students with the written assessment, after their numeric ability is controlled; (3) the interaction between the learning model and the type of assessment contributes to the students' inferential statistic learning achievement, after their numeric ability is controlled; (4) as far as the group of the students with the performance assessment are concerned, the inferential statistic learning result achieved by the students with the SSCS learning model is higher than that achieved by the students with the conventional learning model, after their numeric ability is controlled; (5) as far as the group of the students with the written assessment are concerned, the inferential statistic learning achievement achieved by the students with the SSCS learning model is lower than that achieved by the students with the conventional learning model, after their numeric ability is controlled; (6) as far as the group of the students with the SSCS learning model are concerned, the inferential statistic learning achievement achieved by the students with the performance assessment is higher than that achieved by the students with the written assessment, after their numeric ability is controlled; and (7) as far as the group of the students with the conventional learning model are concerned, the inferential statistic learning

achievement achieved by the students with the performance assessment is lower than that achieved by the students with the written assessment, after their numeric ability is controlled.

It is expected that the result of the present study may positively contribute to the theoretical development of models and the learning assessment, and may be used as a reference which is taken into consideration in the attempt made to improve the students' inferential statistic learning achievement. The reason is that the result of the present study explains in detail the superiority of the SSCS model learning and the form of assessment as part of the attempt made to improve the inferential statistic learning achievement. In addition, this present study also pictures the correlation between the numeric ability and the inferential statistic learning achievement. The implementation of the accurate learning model and the accurate type of assessment in the learning process will contribute to the students' learning process and motivate the students to learn in order to achieve the maximum learning achivement. It is also expected that the present study may give a picture to the lecturers whose responsibility is teaching Inferential Statistics that it is important to use the accurate learning model and assessment model, and to pay attention to the students' numeric ability in the learning process. Such a picture will significantly contribute to the learning quality and the quality of the students' learning achievement. Apart from that, it is expected that the result of the present study can be used as a reference by the other researchers who are interested in conducting similar research

2. RESEARCH METHOD

This present study was conducted at the Department of the Pre-school Teachers' Training, Faculty of Education, Ganesha University of Education in the odd semester of the academic year 2015/2016, from August to November 2015. It is a quasi-experimental study with a 2x2 factorial design. The chart of the design is presented in Table 1.

Tabel 1. Factorial Design 2 × 2

A (Learning Model) / **B (Form of Assessment)**	**SSCS (A_1)**	**Conventional (A_2)**
Performance (B_1)	$(X,Y)_{11k}$ $_{k=1,2.....}n_{11}$ (A_1B_1)	$(X,Y)_{21k}$ $_{k=1,2.....}n_{21}$ (A_2B_1)
Written (B_2)	$(X,Y)_{12k}$ $_{k=1,2.....}n_{12}$ (A_1B_2)	$(X,Y)_{22k}$ $_{k=1,2.....}n_{22}$ (A_2B_2)

The population of the present study included the students of the Department of the Pre-school Teachers' Training, Faculty of Education, Ganesha University of Education who were in the even semester of the academic year 2014/2015 and had programmed and attended the course of Inferential Statistics, totaling 228 who were divided into six classes. In the present study, the sample was determined using the random sampling technique. Based on the random result, it was found that the sample included 130 students who were divided into four classes.

The data collected in this present study were the data on the inferential learning achievement and the students' numeric ability. Such data were obtained through the test which was designed to measure the inferential statistic learning achievement based on the curriculum issued by Ganesha University of Education. The test was designed in the form of an essay test made up of 8 items. A rubric was used as the criteria of the inferential statistic learning achievement with the scores ranging from 0 to l0. The data on the students' numeric ability was obtained from the result of the objective multiple-choice test. It was used to test the counting operations such as such as addition, deduction, multiplication, division, and the mixed counting operations totaling 30 items with the criteria that score 1 was for the item which was correctly answered and score 0 was for the item which was wrongly answered.

The data were analyzed using the descriptive and inferential techniques. The descriptive analysis used the mean formula and standard of deviation. The formula of covariance (ANACOVA) analysis was used as the technique of inferential analysis with the assistance of SPSS-PC for Windows version 16.0.

3. RESULTS AND ANALYSIS

3.1. The description of the data on the numeric ability and inferential statistic

The description of the data on the numeric ability and inferential statistic learning achivement of each group of the students is presented in Table 2.

Table 2. Summary of the Data Obtained from the Result of the Study

A / B		A_1		A_2		Total	
		X	Y	X	Y	X	Y
	N	N	33	33	33	66	66
B_1	$\bar{X}/\bar{Y}$	$\bar{X}/\bar{Y}$	70.55	16.58	62.52	18.05	66.53
	S	S	3.48	1.77	4.32	2.59	5.61
	N	32	32	32	32	64	64
B_2	$\bar{X}/\bar{Y}$	18.41	63.75	18.69	66.81	18.55	65.28
	S	2.9	4.14	2.16	4.54	2.43	4.58
	N	65	65	65	65	130	130
Total	$\bar{X}/\bar{Y}$	18.97	67.2	17.62	64.63	18.29	65.92
	S	2.62	5.11	2.23	4.9	2.51	5.15

3.2. Prerequisite Test of Analysis Test of Data Normality

The Kolmogorov-Smirnov[a] or Shapiro-Wilk test was used to test the normality of the data assisted with the SPSS statistic program for Window version 16.0. The result of the calculation is presented in Table 3 as follows. It can be identified from Table 3 that all the significant scores, which are presented, are higher than 0.05; therefore, it can be concluded that all the data on the students' inferential statistic learning achievement obtained from the sub population were with normal distribution.

Table 3. Summary of the Result of the Test of the Data on the Inferential Statistic Learning Achievement (Y)

Group	N	Sig	Distribution
A_1	65	0.170	Normal
A_2	65	0.168	Normal
B_1	66	0.122	Normal
B_2	64	0.195	Normal
A_1B_1	33	0.059	Normal
A_1B_2	32	0.711	Normal
A_2B_1	33	0.641	Normal
A_2B_2	32	0.140	Normal

3.2.1. The Test of the Homogeneity of Variances

The Bartlett test was used to test the homogeneity of variances. Based on the result of the calculation, it is identified that the value of X^2_{count} is equal to 2.3707, and that the value of X^2_{table} is equal to 7.85 for α which is equal to 0.05 and *dk* which is equal to 3, meaning that H_o is accepted. Therefore, it can be concluded that the learning model and the assessment form contribute to the variance of the data on the inferential statistic learning achievement achieved by sub population, meaning that A_1B_1, A_2B_1, A1B2 are homogenous.

3.2.2. The Test of Regression Linearity

SPSS for Windows 16.0 with *compare means* procedure was used to test the regression linearity with a criterion that the number should be significantly higher than 0.095. The result of calculation is presented in Table 4. As can be identified from Table 4, the result of the linearity test shows that the numbers are significantly higher than 0.05, meaning that the students' numeric ability is linearly correlated with the inferential statistic learning achievement.

Table 4. The Statistics of F-test of AB, A*B on the Inferential Statistic Learning Achievement after the Students' Numeric Ability Was Controlled

Group of Sample	Sig.	Conclusion
A_1	0.304	Linier
A_2	0.678	Linier
B_1	0.221	Linier
B_2	0.543	Linier
A_1B_1	0.847	Linier
A_1B_2	0.425	Linier
A_2B_1	0.499	Linier
A_2B_2	0.417	Linier

As all the prerequisites of the Covariance Analysis (ANAKOVA) were all satisfied, the ANAKOVA analysis could be continued to test the hypotheses of the study.

3.3. Hypothesis Trial

Priority was given to the trials of the main effect hypotheses, namely, the trial of hypothesis 1, the trial of hypothesis 2, and the trial of hypothesis 3. The result of the analysis using the statistical program of SPSS for Windows version 16.00 is presented in the following table.

Table 5. The F-test Statistics for AB, A*B on the Students' Inferential Statistic Learning Achievement after their Numeric Ability Was Controlled

Source of Variance	JK	Db	RJK	F	Sig.
Corrected Model	1750.284	4	437.571	32.757	0.000
Intercept	4924.830	1	4924.830	368.672	0.000
X	485.514	1	485.514	36.346	0.000
A	54.214	1	54.214	4.058	0.046
B	90.393	1	90.393	6.767	0.010
A * B	500.874	1	500.874	37.495	0.000
Errors	1669.785	125	13.358		
Total	568249.000	130			
Total corrected	3420.069	129			

F table = 3.92

Based on what is presented in Table 5, it can be intepreted as follows:

First, it can be seen from line A of Table 5 that the value of F_{count} is equal to 4.058, and that the value of F_{table} is equal to 3.9, meaning that the value of F_{count} > the value of $F_{table.}$ Therefore, H_o was not accepted, meaning that the inferential statistic learning achivement achieved by the students with the SSCS learning model was different from that achieved by those with the conventional learning model, after their numeric ability was controlled. Based on the corrected mean, it can be stated that the corrected mean of the inferential statistic learning achievement achieved by the students with the SSCS learning model was 66.576 higher than that of the inferential statistic learning achievement achieved by the students with the conventional learning model, which is equal to 65.229.

Second, from line B of Table 5, it can be seen that the value of F_{count} is equal to 6.767, and that the value of F_{table} is equal to 3.92 which is meaning that the value of F_{count} > the value of $F_{table.}$ Therefore, H_O was acccepted, meaning that the inferential statistic learning achievement achieved by the students with the performance assessement was different from the inferential statistic learning achievement achieved by the students with the written assessement, after their numeric ability was controlled. Based on the corrected mean, it can be stated that the corrected mean of the inferential learning achievement achieved by the students with the performance assessement was 66.742 higher than the corrected mean of the inferential learning achievement achieved by the students with the written assessement, which is equal to 65.063.

Third, from line A*B of Table 5, it can be seen that the value of F_{count} is equal to 37.495, and that the value of F_{table} is equal to 3.92, meaning that the value of F_{count} > the value of $F_{table.}$ Therefore, H_o was not accepted, meaning that the interaction between the learning model and the assessment form contributed to the students'inferential statistic learning achievement after their numeric ability was controlled.

It can be concluded that the interaction between the learning model and the assessment form convincingly contributed to the inferential statistic learning achievement achieved by the students; therefore, the simple effect test was continued. The GLM Univariate procedure with the design X B A*B assisted with the SPSS statistical program for Windows version 16.00 was used to test hypothesis 4 and hypothesis 5. The result of analysis is presented in Table 6.

Table 6. The Test-t Statistics of the Paramater of the Mean of the Interferential Statistic Learning Achievement among All Levels of the Learning Factors for Every Level of the Assessment Form Factor by Controlling the Students' Numeric Ability

Parameter	B	Std. Error	T	Sig.
Intercept	50.820	2.730	18.613	0.000
[B=B1]	-2.490	0.955	-2.607	0.010
[B=B2]	0[a]	-	-	-
[A=A1] * [B=B1]	5.515	0.992	5.560	0.000
[A=A1] * [B=B2]	-2.822	0.915	-3.085	0.003
[A=A2] * [B=B1]	0[a]	-	-	-
[A=A2] * [B=B2]	0[a]	-	-	-
X	0.856	0.142	6.029	0.000

Based on the result of analysis presented in Table 6, it can be interpreted that:

First, from line [(A=1)*(B=1) of Table 6, it can be seen that the value of t_{count} is equal to 5.560, and that the value of t_{table} is equal to 1.1980, meaning that the value of t_{count} > the value of $t_{table.}$ Therefore, H_o was not accepted, meaning that, as far as the students with the performance assessment are concerned, the inferential statistic learning achievement achieved by the students with the SSCS learning model was different from that achieved by the students with the Conventional Learning model. Based on the corrected mean, it can be identified that the corrected mean of the inferential statistic learning achievement achieved by the students with the performance assessment is 69.499 higher than that of the inferential statistic learning achievement achieved by the students with the Conventional Learning Model, which is equal to 63.984.

Second, from line [(A=1)*(B=2)] of Table 6, it can be seen that the value of t_{count} is equal to -3.085, and that the value of t_{table} is equal to 1.980, meaning that the value of t_{count} > the value of $t_{table.}$ Therefore, H_o was not accepted, meaning that, as far as the students with the written assessment are concerned, the inferential statistic learning achievement achieved by the students with the SSCS learning model was different from that achieved by the students with the conventional learning model. Based on the corrected mean, as far as the students with the written assessment are concerned, it can be identified that the corrected mean of the inferential statistic learning achievement achieved by the students with the SSCS learning model is 63.652 lower than that of the learning achievement achieved by the students with the Conventional Learning model, which is equal to 66.474.

The GLM Univariat procedure with the design: X A A*B the statistical program of SPSS for Windows version 16.00 was used to test hypothesis 6 and hypothesis 7. The result is presented in Table 7.

Table 7. The T-test Statistics of the Parameter of the Mean of the Inferential Statistic Learning Achievement among All the Assessment Form Factors for Every Level of the Learning Factor by Controlling the Students' Numeric Ability

Parameter	B	Std. Error	t	Sig.
Intercept	50,820	2,730	18,613	0,000
[A=A1]	-2,822	0,915	-3,085	0,003
[A=A2]	0[a]	-	-	-
[A=A1] * [B=B1]	5,846	0,920	6,352	0,000
[A=A1] * [B=B2]	0[a]	-	-	-
[A=A2] * [B=B1]	-2,490	0,955	-2,607	0,010
[A=A2] * [B=B2]	0[a]	-	-	-
X	0,856	0,142	6,029	.0,00

Based on the result of the analysis in Table 7, it can be interpreted that:

First, from line [(A=1)*(B=1) it can be seen that the value of t_{count} is equal to 6.352, and that the value of t_{table} is equal to 1.980, meaning that the value of t_{count} > the value of $t_{table.}$ Therefore, H_o was not accepted, meaning that the inferential statistic learning achievement achieved by the students with the performance assessment was different from that achieved by the students with the written assessment. As far as the students with the SSCS learning method are concerned, it can be seen that the corrected mean of the inferential statistic learning achievement achieved by the students with the performance assessment is 69.499

higher than that of the inferential statistic learning achievement achieved by the students with the written test, which is equal to 63.652.

Second, from line [(A=2)*(B=1) of Table 7, it can be seen that the value of t_{count} is equal to -2.607, and that the value of t_{table} is equal to 1.980, meaning that the value of $t_{count} >$ the value of $_{table}$. Therefore, H_o was accepted, meaning that, as far as the students with the Conventional Learning model are concerned, the inferential statistic learning achievement achieved by the students with the performance test was different from that of the inferential statistic learning achievement achieved by the students with the written test. Based on the corrected mean, as far as the students with the conventional learning model are concerned, it can be identified that the corrected mean of the inferential statistic learning achievement achieved by the students with the performance test is 63.9845 lower than that achieved by the students with the written test, which is equal to 66.474.

3.4. Discussion

The result of the present study shows that the hypothesis which stated that the learning model and the assessment form significantly positively contributed to the inferential statistic learning achievement after the students' numeric ability was controlled can be empirically and statistically proved and tested, meaning that the SSCS learning model and the performance assessment, which were viewed to be superior in this present study were proved to improve the inferential statistic achievement achieved by the students of the Department of the Pre-school Teachers' Training, Faculty of Education, Ganesha University more effectively, after their numeric ability was controlled.

Such a result is made to be clearer with the result of calculation in which it was obtained that the value of F_{count} for variation A is equal to 4.058, the value of F_{count} for variation B is equal to 6.767, and that the value of F_{count} for variation A*B is equal to 37.495, and that the value of F_{count} for the corrected model is equal to 32.757, meaning that the effect of the learning model on the inferential statistic learning achievement achieved by the students before their numeric ability was controlled was significantly different from the effect of the learning model on the inferential statistic learning achievement achieved by the students after their numeric ability was controlled. In general, the effect of the numeric ability on the inferential statistic learning achievement is 51.20%, which can be partially explained as follows.

First, the result of the hypothesis examination which shows that the inferential statistic learning achievement achieved by the students with the SSCS learning model is higher than that achieved by the students with the Conventional Learning model can be accepted. Therefore, it can be concluded that statistically, as far as the inferential statistic learning provided at the Department of the Pre-school Teachers' Training, Faculty of Education, Ganesha University of Education is concerned, the inferential statistic learning achievement achieved by the students with the SSCS model learning was higher than that obtained by the students with the Conventional Learning model; the difference is 2.99%.

Such a conclusion is empirically supported by the information obtained through observation and interview after the SSCS learning model and the conventional learning model were attended. Unlike the conventional learning model in which the students tended to be passive, listen to and make a note of what was explained, the SSCS learning model made the students feel that they were asked to think about and plan the real world's problems closely related to statistics and their solutions through structured exercises. The students also stated that learning the inferential statistics was not difficult any longer but interesting. Viewed from the patterns of the answers given by the students, it can be stated that they were able to 1) create mathematical/statistical models for the problems provided; 2) choose and determine the strategy used to answer the problems; 3) explain or interpret the result of analysis; and 4) explain pictures/graphs in writing.

Second, the result of the hypothesis examination shows that the inferential statistic learning achievement achieved by the students with the performance assessment was higher than that obtained by the students with the written assessment after their numeric ability was controlled could be accepted. Therefore, it can be concluded that statistically, as far as the inferential statistic learning at the Department of the Pre-school Teachers' Training, Faculty of Education, Ganesha University of Education is concerned, the inferential statistic learning achievement achieved by the students with the performance test was higher than that achieved by the students with the written test after their numeric ability was controlled; the difference is 0.36&.

Such a conclusion is empirically supported by the information obtained through observation and interview after the learning process with the performance assessment was attended. The students felt that during the learning activity, what they did and performed was appreciated through the feedback provided by the lecturer. From what was observed from the development of the students' performance when they were answering the statistical problems, it can be stated that they were getting motivated to study.

Third, the result of the hypothesis examination which shows that the interaction between the learning model and the assessment form contributed to the students' inferential statistic learning achievement

after their numeric ability was controlled can be accepted. Therefore, it can be concluded that**, statistically,** as far as the inferential statistic learning at the Department of the Pre-school Teachers' Training, Faculty of Education, Ganesha University of Education is concerned, the learning achievement achieved by the students with the SSCS learning model was not always higher than that obtained by the students with the conventional learning model if viewed from the integrated assessment form (the performance assessment and written assessment).

Such a conclusion is empirically supported by the information obtained through observation and interview after the learning process with the learning model which was integrated with the assessment form was attended. Many students stated that they felt that they were appreciated as they were asked to be involved in the process; however, many others also stated that they felt more comfortable when the learned under the previous learning atmosphere. The learning innovation made by the lecturer made the students feel that they had too many activities to do, and that they found that it was impossible and difficult for them to adapt to the new learning atmosphere and way.

Fourth, the result of the hypothesis examination which shows that the inferential statistic learning achievement achieved by the students with the SSCS learning model which was integrated with the performance assessment was higher than that obtained by the students with the conventional learning model which was integrated with the performance assessment can be accepted. Therefore, it can be concluded that, statistically, as far as the inferential statistic learning taking place at the Department of the Pre-school Teachers' Training, Faculty of Education, Ganesha University of Education is concerned, the learning achievement achieved by the students with the SSCS learning model which was integrated with the performance assessment was higher than that obtained by the students with the conventional learning model which was integrated with the performance assessment after their numeric ability was controlled; the difference is 20.52%.

Such a conclusion is empirically supported by the information obtained through observation and interview after the learning process with the SSCS learning model and the conventional learning model were attended. As opposed to the conventional learning model in which the students tended to be passive, made a note of and listened to what was explained by the lecturer, the students with the SSCS learning model stated that during the learning process they were asked to think about what is planned to do to answer the real world's problems which are closely related to statistics through structured exercises. The students felt that they were appreciated and motivated to learn. They felt that they were comfortable in the learning process which was adjusted to the time and when and the process during which the assessment was administered.

Fifth, the result of the hypothesis examination which shows that the inferential statistic learning achievement achieved by the students with the SSCS learning model which was integrated with the conventional learning model was lower than that obtained by the students with the conventional learning model which was integrated with the written test can be accepted. Therefore, statistically, as far as the inferential statistic learning at the Department of the Pre-school Teachers' Training, Faculty of Education, Ganesha University of Education is concerned, the learning achievement achieved by the students with the SSCS learning model which was integrated with the conventional assessment was lower than that obtained by the students with the conventional learning which was integrated with the conventional assessment after their numeric ability was controlled; the difference is 3.92%.

Such a conclusion is empirically supported by the information obtained through observation and interview after the learning process with the SSCS learning model and the conventional learning model were attended. The students had their own characteristics and comfort during the learning process. Many students needed the presentation of concepts in the beginning as what was presented in the conventional learning process before they were supposed to do the inferential statistic assignments. Such an initial presentation of concepts turned out to motivate the students to learn. After they acquired the initial concepts, they were supposed to do the assignments provided the lecturer. Then, they were supposed to join the written test or the paper and pencil test which required one correct answer for one item.

Sixth, the result of the hypothesis examination which shows that the inferential statistic learning achievement achieved by the students with the SSCS learning model and the performance test was higher than that obtained by the students with the SSCS learning model with the written test after their numeric ability was controlled can be accepted. Therefore, statistically, as far as the inferential statistic learning provided at the Department of Pre-school Teachers' Training, Faculty of Education, Ganesha University of Education is concerned, the learning achievement achieved by the students with the SSCS learning model which was integrated with the performance assessment is higher than that obtained by the students with the conventional learning model which was integrated with the performance assessment after their numeric ability was controlled; the difference is 5.24%.

Such a conclusion is empirically supported by the information obtained through observation and interview after the learning process with the SSCS learning model and the conventional learning model were

attended. The students who were accustomed to the learning process with the conventional learning model found it difficult to attend the learning process with the performance assessment. The reason was that in the learning process with the performance assessment the students were required to learn in a structured and processed way when answering the inferential statistic questions. They were required to keep being able to work through the stages already provided. When they were not able to answer the questions, they were directly corrected for which feedback was provided. However, the characteristic of the learning process with the SSCS learning model highly matches the performance assessment. This will positively contribute to the learning result obtained by the students. Both the SSCS learning model and the performance assessment require the students to be active in the statistic learning; they should take part in making the lesson plan, implementing the learning process, and evaluating the process. The implementation of the SSCS learning model causes the learning process to be more meaningful and concrete, meaning that the students are required to be able to catch the correlation between the learning experiences in the classroom with the real life. This is highly important as being able to correlate the material found with the real life making such a material not only be functional to the students but it will also be tightly implanted in their memories; as a result, such a material will not be easily forgotten.

Seventh, the result of the hypothesis examination which shows that the inferential statistic learning achievement achieved by the students with the conventional learning model and the performance assessment was lower than that achieved by those with the written test after their numeric ability was controlled can be accepted. Therefore, it can concluded that, statistically, as far as the inferential statistic learning provided at the Department of the Pre-school Teachers' Training, Faculty of Education, Ganesha University of Education is concerned, the learning achievement achieved by the students with the conventional learning model which was integrated with the performance assessment was lower than that obtained by the student with the conventional learning model which was integrated with the performance assessment after their numeric ability was controlled; the difference is 9.49%.

Such a conclusion is empirically supported by the information obtained through observation and interview after the learning process with the SSCS learning model and the conventional learning model were attended. The students who were accustomed to learning using the conventional learning model felt that they could learn comfortably with the written assessment. The reason was that during the learning process, the students did not undergo any direct pressure when they were answering the statistic questions provided by the lecturer. The conventional learning model which was initiated with the conceptual explanation given by the lecturer made the students motivated to learn. The reason was that it was not difficult for them to find the new inferential statistical concepts. They were left to learn such concepts; then they were drilled and were made to develop such concepts using new questions. While the students were doing such exercises, they would feel comfortable if there was neither pressure nor request while they were doing such exercises, meaning that the students with the conventional learning model would be better if they were provided with the written test as they tended to be more interested in the guided learning from the beginning to the end than being obliged to learn independently which would change their learning habit.

As a whole, the result of the present study supports the results of the studies previously conducted by several experts. Agung Saputra, Sumarjono and Endang Purwaningsih [18], Darmadi Sarastini et al. [19], found that the learning model positively contributed to the learning achievement although it was implemented by different learners, in different places and times. Saefurrohman and Elvira S. Balinas found that both Filipino and Indonesian junior high school English teachers used assessment for learning as the main purpose of assessment [20]. The majority of Filipino Junior High school English teachers prepared and made their own assessment, while Indonesian junior high school English teachers used items from published textbooks as their primary sources for constructing assessment items. Both Filipino and Indonesian junior high school English teachers used written comments as their primary method for providing feedback. Total score test and a letter grade were the highest percentage methods for providing a final report for both Filipino and Indonesian junior high school English teachers. Kusumaningtyas Setyawati found the results of researh indicated that: Competence and compensation significantly influential on teacher job satisfaction; Competence and compensation significantly influential on teacher performance; Job satisfaction signifiacntly influential on the performance of the State Vocational High School Teachers in Surabaya [21]. Adeyemo and Chukwudi found demonstrated that emotional intelligence and teacher efficacy had predictive influence on teacher effectiveness [22]. Based on these findings, it is suggested that appropriate strategies and policies for fostering teacher efficacy and emotional intelligence would go a long way in enhancing effective teaching among pre-service teachers".

The result of the present study also supports the SSCS learning theoretical framework revealed by several experts. Pizzine [2] and Owens [23] stated that, in practice, the SSCS learning model can optimistically motivate the learners to be interested in learning from different backgrounds, and improve their participation by giving opportunities to them to connect and apply the knowledge which they have obtained.

The result of the present study also supports what is stated by several experts in regard to the learning process. R. J. Sttigin stated that the learning model and assessment are two things which cannot be separated from each other [6]. The reason is that assessment can describe the progress made by the learners and how effective the learning process is. L. Fidrani and S. Pujiastuti stated that the assessing activity is an activity which cannot be separated from the learning process as it is the process of documenting the learners' skills and development [24]. Lynn S. Fuchs, as quoted by Zainul Asmawi stated that the performance assessment can improve the learning process as it can help teachers/lecturers make decisions during the learning process [8]. Buana stated that an assessment is an activity in which the value of an object is determined whether it is good or bad, effective or ineffective, successful or unsuccessful and so forth, based on the criteria or measurements determined before [25]. Sudijono stated that assessing means evaluating something, and evaluating means making a decision of something based on either bad or good, healthy o unhealthy, good or stupid measurements, and so forth [1]. Norman E. Gronlund stated that evaluation is a systematic process determining the extent to which instructional objectives are achieved by pupils [5].

4. CONCLUSION

Based on the result of the hypothesis examination and the discussion above, it can be concluded that (1) the inferential statistic learning achievement achieved by the group of the students with the SSCS learning model was better than that achieved by the students with the conventional learning model after their numeric ability was controlled; (2) the inferential statistic learning achievement achieved by the group of the students with the performance assessment was better than that achieved by the students with the conventional learning model after their numeric ability was controlled; (3) the interaction between the learning model and the assessment form contributed to the students' inferential statistic learning achievement after their numeric ability was controlled; (4) as far as the group of the students with the SSCS learning model are concerned, the inferential statistic learning achievement achieved by those with the performance assessment was better than that obtained by the students with the conventional assessment; (5) as far as the group of the students with the conventional learning model are concerned, the inferential statistic learning achievement achieved by the students with the performance assessment was lower than that achieved by the students with the conventional assessment after their numeric ability was controlled; (6) as far as the group of the students with the performance assessment are concerned, the inferential statistic learning achievement achieved by the students with the SSCS learning model was better than that achieved by the students with the conventional learning model after their numeric ability was controlled; (7) as far as the group of the students with the conventional assessment are concerned, the inferential statistic learning achievement achieved by the students with the SSCS learning model was lower than that achieved by the students with the conventional learning model after their numeric ability was controlled.

Based on the result of the study described above, it can be suggested to the lecturer who is supposed to teach Statistics that in the learning process in general and in the statistic learning process in particular, he should implement the SSCS learning model, as the learning process will take place naturally through it. The learners feel that the learning achievement is useful when it is used to solve problems, think critically, make observation and draw conclusions in the long term. In this context, the learners will be aware that what they learn is meaningful and useful, and they will know how to achieve it. Being aware that what is learned is meaningful and useful, they will position themselves as the parties that need something for their future.

It is suggested to other researchers, as this present study is far from being perfect, that they should explore the matters pertaining to the SSCS learning model and the performance assessment in their contributions to the inferential statistic learning achievement achieved by the students of the other departments in Ganesha University of Education as Statistics is one of the courses which is obligatorily taken by the students. It is expected that the research conducted in the future will complete the findings of the present study.

REFERENCES

[1] A. Sudijono, "Pengantar Statistik Pendidikan," Jakarta, PT Raja Grafindo Persada, 2012.
[2] E. L. Pizzini, "SSCS Implementation Handbook," Iowa, The University of Iowa, 1991.
[3] I. N. S. Degeng, "Landasan dan Wawasan Kependidikan," Malang, Lembaga Pengembangan dan Pendidikan (LP3) Universitas Negeri Malang, 2001.
[4] S. M. Sutikno, "Pendidikan Sekarang dan Masa Depan," Mataram, NTP Press, 2006.
[5] N. E. Gronlund, "Constructing Achievement Test," New York, Prentice-Hall Inc, 1998.
[6] R. J. Stiggins, "Student Centered Classroom Assessment," New York, Maxwell Macmillan International, 1994.
[7] A. Majid, "Perencanaan Pembelajaran," Bandung, PT Remaja Rosdakary, 2006.
[8] Z. Asmawi, "Alternative Assessment," Jakarta, UT, 2001.

[9] D. T. Campbell, & J. C. Stanley, "Experimental and Quasi-Experimental Designs for Research," Chicago, Rand Menally dan Company, 1996.
[10] M. Dimyati, "Belajar dan Pembelajaran," Jakarta, Rineka Cipta, 2006.
[11] E. Mahendra, "Pengaruh Pendekatan Kontekstual dan Gaya Berpikir," *Jurnal Ilmiah Pendidikan dan Pembelajaran*, 2007.
[12] Nasution, "Berbagai Pendekatan dalam Proses Belajar Mengajar," Jakarta, Bina Aksara, 2001.
[13] L. W. Anderson, & D. W. Krathwohl, "A Taxonomy For Learning Teaching and Assesing, A Revision of Blomm's Taxonomy of Educational Objectives," New York, Adison Weasley Longman, 2011.
[14] M. Syah, "Psikologi Pendidikan: Suatu Pendekatan Baru," Bandung, Remaja Rosda Karya, 2010.
[15] K. Fudyartanta, "Tes Bakat dan Perskalaan Kecerdasan," Yogyakarta, Pustaka Pelajar, 2004.
[16] D. S. Prasetyono, "Kiat-kiat dan Latihan-latihan Lengkap Psikotes Khusus Angka dan Matematika," Yogyakarta, Flash Books, 2010.
[17] P. Carter, "IQ and Aptitude Tests," London, Kogan Page Limited, 2007.
[18] A. Saputra, *et al.*, "Pengaruh Model Pembelajaran Search, Solve, Create, and Share (SSCS) dengan Metode Resitasi Terhadap Kemampuan Penguasaan Konsep Fisika Siswa Kelas XI SMAN 9 Malang," 2016. Retrieved from http://jurnal-online.um.ac.id/data/artikel/artikel307EDC189E7AC9069F723D361B6D3C8F.pdf.
[19] S. Darmadi, *et al.*, "Pengaruh Model Pembelajaran SSCS Terhadap Pemahaman Konsep IPA Siswa Kelas V SD di Gugus I Kecamatan Buleleng," *Jurnal Mimbar PGSD Universitas Pendidikan Ganesha Jurusan PGSD*, 2014.
[20] D. A. Adeyemo & R. C. Agokel, "Emotional Intelligence and Teacher Efficacy as Predictors of Teacher Effectiveness among Pre-Service Teachers in Some Nigerian Universities," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 3, pp. 85-90, 2014.
[21] A. Kusumaningtyas & E. Setyawati, "Teacher Performance of The State vocational High School Teachers in Surabaya," *International Journal of Evaluation and Research in Education (IJERE),* vol. 4, pp. 76-83, 2015.
[22] Saefurrohman & S. B. Elvira, "English Teachers Classroom Assessment Practices," *International Journal of Evaluation and Research in Education (IJERE),* vol. 5, pp. 82-92, 2016.
[23] Owens, "Teacher Preparation for Contextual Teaching and Learning: A Statewide Consortium Model," Oregon, Northwest Regional Educational Laboratory, 2001.
[24] L. Fidrani & Pujiastuti S., "Evaluasi Perkembangan Anak Usia Dini," Jakarta: Universitas Terbuka, 2010.
[25] Buana, "Ujian Nasional: Penilaian atau Evaluasi," 2005. Retrieved from www.fajar.co.id/news.php?.

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