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The Effect of Learning Model and the Type of Formative Assessment Toward the Natural Science Achievement after Controlling the Prior Knowledge Students

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Abstract: This study aimed at finding out the effect of learning model and the type of formative assessment toward the natural science achievement after controlling the prior knowledge. This study used a quasi-experimental method with 2×2 factorial design. The population was grade 4 students of state junior high schools in Singaraja consisting of 1,164 students. The sample consisting of 136 students was drawn by using the multi-stage sampling technique. Sample was 136 students. The instrument of prior knowledge used an essay test with test reability = 0.8238 while the instrument of learning outcome used an objective test with the test reability = 0.8770. Data were calculated by using Analysis of Covariance (ANCOVA). The results of the study after controlling the prior knowledge shows that: the students who followed the inquiry learning model has a higher the natural science achievement than the students who followed the conventional learning models, the students who followed the learning process with classroom-based assessment has higher the natural science achievement than those who followed the learning of conventional assessment and there is an interaction effectovarian between learning model and formative assessment toward the student's the natural science achievement.

Key words: Learning model, type of formative assessment, prior knowledge, natural science achievement, conventional, achievement

INTRODUCTION

Science has a very strategy role in developing the technology. Therefore, the process of siences learning needs a better attension. According to Mochtar (2001), human with knowledge illiteracy will not understand what happens at his surroundings. Edgar *et al.* (1982) say that, learning is not a dream for the future but it is as a fact, so that, the education system has always to be improved continuesly. Learning is a factor that can determine the student's learning outcome (Lim and Morris, 2009). Parallel with Faure's opinion, many efforts to increase the quality of education in Indonesia has been done by the government but the quality of graduate is still not optimal.

According to Anonymous (2011), the low of quality of Indonesian's human resources in global competition, especially in science field can bee seen from the result of qualitative descriptive analysis for exploring the science capability of junior high school students in Indonesia. The average achievement of science capability of Junior high school students in Indonesia, generally is at the low level (54%), still below the international median of low international benchmark 79%. Another fact can also be seen from not yet achieved the 100% graduation rates of National exam at the latest 3 years (Anonymous, 2015). Based on the fact, it can be concluded that the student's learning outcome is not optimal yet.

According to David *et al.* (1973), taxonomy domain consists of cognitive domain, affective domain and psychomotor domain. Keller (2005) proposes that there are five capabilities as learning outcome, namely: verbal information, intelectual skills, cognitive strategies, attitudes, motor skills. Furthermore, according to Lorin *et al.* (2001), the leaning result at cognitive domain includes two dimensions, namely: knowledge dimension and cognitive process dimension. David (2016) proposes that the learning outcome at affective domain consists of five levels, namely: receiving, responding, valueing, organization and characterization by value.

The low of quality of Indonesian's human resources in global competition can be used as a reflection that the relevance of learning is worth considered. Another symptom which indicates the uneffective learning at the school is still a lot of natural science learning system at school which runs instinctively, so that, it hamper the students to study creative-actively, experience and feel themselves the natural science (IPA) process. This is one

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cause of the low of student's learning outcome. According to Atkin, there are some priorities in education renewal such as) scientific inquiry in content and learning approach) assessment to improve the learning process) the role of technology in curriculum and the choice and indentification effectively the learning materials.

According to Paul (1977), teaching means to participate with the learners in forming the science and to do the justification. According to Ilahi (2012), students will feel satisfied because of having found themselves their problem solving. Through the experience of solving a real problem they can increase their skill. The nowdays facts there are still many students who only learn by heart the concept, note everything told by the teacher and passive in learning. Furthermore, according to Wynne (2010), scientific observation makes the students enjoy in finding out something and begin to appreciate the power and the limitation of science. Based on the heart of natural science (IPA), namely natural science as product and natural science as process, the students must be given the opportunities to do the observation.

Packaging of education nowdays has not been in line with the nature of learning and the nature of teaching according to the view of constructivism. According to Dahar and Liliasari, learning is the process of adjusting to new ideas with the thinking framework that already exists in the student's mind. According to Richard (2008), students should be involved actively looking for the experience, so that, the meaning can evolve and can be constructed. Learning science can be done through a variety of learning models including the models of inquiry learning, cooperative and the science community technology. According to Joyce *et al.* (2004), true model of learning is a learning model that can help students obtain information, ideas, skills, values, ways of thinking and ways of expressing themselves. According to Udin (1993), inquiry learning model is an instructional technique where in learning the students are faced with problems. Agreeing with Bell *et al.* (2010) defines inquiry as the process of asking questions and investigating.

Wilis (1996) argue that the inquiry learning model gives benefits as follows: increasing the potency of student's intellectual, the students acquire the intellectual satisfaction that comes from within and extending the memory process. According to Udin (1993), the steps that are used in the presentation of the material with inquiry learning model is as follows: phase of dealing with the problem, phase of gathering the information, phase of colecting data in the experiment, phase of formulating and phase of applicating the concept. There are several studies on inquiry learning, namely: the result of Bilgin (2009) shows that, the group of students who use the guided inquiry model has better performance than students who are in control classroom, the research conducted by Marhaeni (2013) shows that, there are the influence of guided inquiry learning model towards the mastery of natural science (IPA) concepts ($F = 25.741$, $p<0.05$) and the average value of student's natural science (IPA) concept mastery who use learning process with guided inquiry model is 85.44 which is higher than the students who use conventional model, 78.09, the result of Mundilarto (2013)'s shows that, the inquiry based learning approach is more effective than conventional approach to increase the discipline character, creative, self-confidence and student's cooperative in learning physics. Beside the learning model, another factor that has to be paid attension in learning is the used evaluation system.

Assessment is a process of collecting information about what have been known and what can be done by the students (Diane, 1994; Janet and Richard, 2004).

According to Klimenko and Sleptsova (2015), formative assessment has multi purposes, namely: teacher can evaluate the student's knowledge level, adapt the learning process and the students can use it in evaluating themselves. According to Taufina (2009), during this time, the assessment is dominated by one method that is written test. Agreeing with Rahmi, according to Nuryani (2013), during this time, the practices of assessment in the classroom use less variative methods and tools. Accoding to Gill (2002), the objective of assessment in learning process is as follows: giving feedback, motivating people, diagnosing the strengths and the weakness, helping to develop self-assessment skill, the student's pass and fail and licence to continue. The curriculum 2013 gives mandate to the teachers in order to use classroom based assessment (PBK). According to Wagiran (2017), classroom assessment is an effective effort in increasing the quality of learning to reach the target of producing graduates who have holistically the capabilities of cognitive, affective and psychomotor according to the demands of human resources in the global era. According to Zainul and Nasoetion (1993), formative assessment is done with the aim of monitoring the education process in order to run as planned. According to Mulyasa, the assessment of learning outcome at classroom level is the assessment don by the teachers. Furthermore, according to Sumarna and Hatta (2004), the classroom based assessment is the assessment done in the learning process to define the student's achievement level toward the education objective. The classroom based assessment can be done through the various ways, among them: written assessment, affective assessment, performance assessment, oral assessment, journal assessment, product

assessment, project assessment, self-assessment, peer assessment and portofolio assessment. According to Marzano (1993), performance assessment can give an effective means in measuring the capability which is difficult or cannot be done by paper and pencil tests. Capabilities that can be measured are like capability to communicate to solve problem and to use skill to think critically. Masnur (2012) says that, assessment at education unit level curriculum (KTSP) follows the principles of comprehensive and sustainable assessment. Therefore, the assessment is done in the frame of classroom based assessment. Stiggin and Chappuis (2005) say that the classroom assessment can be used to encourage the students to be more productive and more confident.

Associated with classroom based assessment, the result of Wiyarsi and Priyambodo research shows that, the application of project based assessment in chemistry learning is effective to increase the SMAN student's achievement in Sleman. Based on the above analysis, it is seen that choosing the kind of assessment and learning model is very important.

Prior knowledge is a capital for students in the learning activity. According to Wayan (2012) before the students get formally the science learning at school, they have already had the ideas about scientific events. Most of the ideas are more as daily knowledge than as scientific knowledge. According to Dochy (1996), prior knowledge is also called as knowledge store, prior knowledge state, expertise, expert knowledge, preknowledge, personal knowledge.

According to Falk and Adelman (2003), learning is seen as a generative process which requires an effort where the students develop themselves the meaning actively. Learning happens through the interaction with the physical world which all of them are screened through prior knowledge. Agreeing with Dochy, according to Telle (2009), prior knowledge can be defined as knowledge which exists before learning process at the classroom is available or can be remembered or reconstructed is arranged in the structured schem is used for other learning duties and is dynamic. According to Steve *et al.* (2009), all learning processes involve prior knowledge and prior experience which can facilitate or hamper the learning. Furthermore, according to Rosalin (1985), the student's ideas are defined as experience based knowledge are developed by the students to understand phenomenon and things. The research of Sudiah *et al.* (2011) about prior knowledge, finds that prior knowledge influences the learning outcome of natural sciences.

MATERIALS AND METHODS

This experiment used a quasi-experimental method. The design of experiment used was 2×2 factorial designs with posttest-only non-equivalent control group. The population of this experiment was 1164 peoples. Sampling acquisition was used with multi stages technique, the number of sample was 136 people.

Instrument for measuring natural science learning outcome was in the form of objective. The content validity of natural science learning outcome test was evaluated by two experts in the field of natural science education. The result of rater's assessment was analyzed by using the formula from Robert (2000), found that the validity coefisient of natural science learning outcome test was 0.95. The empirical result test of natural science result test with reability value was 0.8770. The instrument for measuring the prior knowledge was in the form of argument. The content validity of prior knowledge test was assessed by two experts in Natural Science education field. The result of rater's assessment was analyzed by using the formula from Gregory and found that the validity coefisient of natural science learning outcome test was 0.96. The empirical result test of natural science result test with reability value was 0.8238.

Connected with the statistic used to analyze data in this research, the done precondition tests were data distribution normality test, varians homogeneity test, linierity test, regression influence significance test and alignment test. The used data analysis in this research lncluded descriptive analysis and inferencial analysis with two lanes ANACOVA.

RESULTS AND DISCUSSION

The result of data analysis is summarized as seen at Table 1 and the result of corrected average calculation is presented at Table 2 and 3. Based on the analysis result summarized at Table 1-3 can be defined the result of hyphothesis test as follows.

First hyphothesis test: The natural science learning outcome of the sudents who follow inquiry learning model is higher than those who follow conventional learning model after controlling prior knowledge. The statistical hyphothesis can be written as follows:

The test criteria, H_0 is rejected if $F_{calculation} > F_{table}$ at significance level 0.05. The analysis result of Table 1 shows that the value of $F_{calculation} = 11.717$ is higher than with the value of $F_{table} = 3.92$ for significance level 0.05 ($F_{calculation} = 11.717 > F_{table\ (1.131)} = 3.92$) and shows significant number = $0.001 < \mu = 0.05$. It means that H_0 is rejected and

Table 1: The result of two lanes ANACOVA

Source variant	Sum of squares	dk	Sum of squared	F_h-values	Sig.
A	343.163	1	343.163	11.717	0.001
B	131.401	1	131.401	4.486	0.036
A×B	1.163.327	1	1.163.327	39.719	0.000
D	3.836.828	131	29.289		
Total	718.632.000	136			

Table 2: Corrected average value of natural science learning outcome at each group formed by learning model factor

			95% confidence interval	
MP	Mean	SE	Lower bound	Upper bound
A1	74.100	0.690	72.735	75.465
A2	70.606	0.690	69.241	71.971

Table 3: Corrected average value of natural science learning outcome at each group formed by formative assessment type factor

			95% confidence interval	
JPF	Mean	SE	Lower bound	Upper bound
B1	73.346	0.660	72.041	74.650
B2	71.360	0.660	70.056	72.665

$$H_0: \mu^*A_1 \mu^*A_2$$
$$H_1: \mu^*A_1 > \mu^*A_2$$

H_1 is accepted, so, it can be concluded that there is a difference learning outcome of natural science between the students who follow the inquiry learning model and those who follow the conventional learning model after controlling the student's prior knowledge.

The analysis result of Table 2 shows that, the students who follow learning process with inquiry learning model (A_1) has the corrected average value of natural science by 74.100 while the students who follow the learning with conventional assessment (A_2) has a corrected learning outcome of natural science by 70.606. So, it can be concluded that the learning outcome of the students who follow inquiry learning model is higher than those who follow conventional learning model after controlling the student's prior knowledge.

Second hyphothesis test: Natural science learning outcome of the students who follow the learning process with classroom based assessment (PBK) is higher than the students who follow the learning process with conventional assessment after controlling the student's prior knowledge. The statistical hyphothesis can be written as:

$$H_0: \mu^*B_1 \mu^*B_2$$
$$H_1: \mu^*B_1 > \mu^*B_2$$

The test criteria, H_0 is rejected if $F_{calculation} > F_{table}$ at significance level 0.05. The analysis result of Table 1 shows that $F_{calculation}$ = 4.486 is higher than the value of

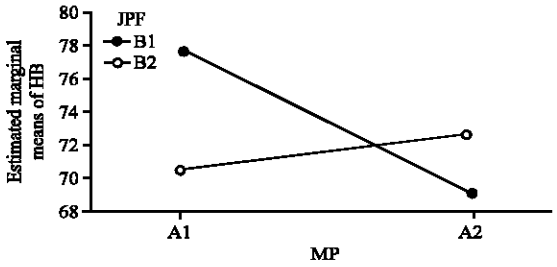

Fig. 1: The visualization of interaction between learning model and formative assessment type in its influence towards the natural science learning outcome after controlling the student's prior knowledge

F_{table} = 3.92 for significancy level 0.05 ($F_{calculation}$ = 4.486> $F_{table\ (1.131)}$ = 3.92) and the showed significancy value = 0.036<α = 0.05. It means that H_0 is rejected and H_1 is accepted, so, it can be concluded that there is a difference natural science learning outcome of the students who follow learning process with PBK with the students who follow learning process with conventional learning model after controlling the student's prior knowledge.

The analysis result of Table 3 shows that, the students who are given the PBK (B_1) has the corrected average value of natural science by 73.346 while the students who are given the conventional assessment (B_2) has a corrected learning outcome of natural science by 71.360. So, it can be concluded that the learning outcome of the students who follow PBK is higher than those who follow the learning with conventional assessment after controlling the student's prior knowledge.

Third hyphothesis test: There is an interaction influence between learning model (A) and formative assessment type towards the natural science learning outcome of the students after controlling the student's prior knowledge. The statistical hyphothesis can be written as follows Fig. 1:

$$H_0: A \times B = 0$$
$$H_1: A \times B = 0$$

The test criteria, H_0 is rejected if $F_{calculation} > F_{table}$ at significance level 0.05. The analysis result of Table 1

Table 4: The t-test stastics of the natural science learning outcome parameter (Y) inter learning model factor level (A) for every factor level of formative assessment type (B) with controlling prior knowledge (X)

Parameters	Symbol parameter	B	SE	t_{hitung}	Sig.	$t_{tabel}\alpha = 0.05$
Intercept	β_0	60.4230	2.422	24.944	0.000	1.67
X	δ_0	0.4870	0.076	6.423	0.000	
[A = 1]	β_1	-3.9280	1.340	-2.932	0.004	
[A = 2]	-	0.0000	-	-	-	
[A = 1] [B = 1]	β_2	9.4070	1.344	7.001	0.000	
[A = 1] [B = 2]	β_3	-2.4190	1.428	-1.694	0.043	
[A = 2] [B = 1]	-	0.0000	-	-	-	
[A = 2] [B = 2]	-	0.0000	-	-	-	

Table 5: The corrected average value of natural science learning outcome at every group formed by learning model factor and formative assessment type

			95% confidence interval	
MP	Mean	SE	Lower bound	Upper bound
A1				
B1	78.049	0.951	76.167	79.931
B2	70.151	0.953	68.266	72.036
A2				
B1	68.642	0.931	66.799	70.485
B2	72.570	0.991	70.610	74.529

shows that $F_{calculation}$ = 39.719 is higher than the value of F_{table} = 3.92 for significancy level 0.05 ($F_{calculation}$ = 39.719> $F_{table\ (1.131)}$ = 3.92) and the showed significancy value = 0.000<α = 0.05. It means that H_0 is rejected and H_1 is accepted, so, it can be concluded that there is an interaction influence between learning model and formative assessment type towards the natural science learning outcome after controlling the student's prior knowledge. The interaction between learning model and formative assessment type in its influence towards the natural science learning outcome can be visualized graphically as seen at.

Since, the truth of interaction hypothesis has been tested significantly, it needs, then, to be done a further test. By applying the Univariate GLM procedure with design: X B A*B, the result of ANACOVA is showed at Table 4 and 5.

The test analysis of Table 4 shows that, statistical value of t-test at row [(A = 1)×(B = 1)] is obtained the value of $t_{calculation}$ = 7.001>$t_{table\ (68)}$ = 1.67. The analysis result of Table 5 shows that a group of the students who follow learning process with inquiry learning model and classroom based assessment (A_1, B_1) has the average value of corrected learning outcome 78.049 while the group of students who follow learning process with conventional learning model and classroom based assessment (A_2, B_1) has the average value of corrected learning outcome by 68.642. So, it can be concluded that for the students who are given classroom based assessment, the students who follow inquiry learning model has higher natural science learning outcome than those who follow conventional learning model after controlling the student's prior knowledge.

The test analysis of Table 4 shows that, statistical value of t-test at row [(A = 1)×(B = 2)] is obtained the value of $t_{calculation}$ = -1.694>$t_{table\ (68)}$ = -1.67. The analysis result of Table 5 shows that a group of the students who follow learning process with inquiry learning model and conventional assessment (A_1, B_2) has the average value of corrected learning outcome 70.151 while the group of students who follow learning process with conventional learning model and conventional assessment (A_1, B_2) has the average value of corrected learning outcome 72.570. So, it can be concluded that for the students who are given the conventional assessment, the students who follow inquiry learning model has lower natural science learning outcome than those who follow conventional learning model after controlling the student's prior knowledge. Furthermore, by applying the univariate GLM procedure with design: X A A*B, the result of ANACOVA is showed at Table 6.

The test analysis of Table 6 shows that statistical value of t-test at row [(A = 1)×(B = 1)] is obtained the value of $t_{calculation}$ = 6.017>$t_{table\ (68)}$ = 1.67. The analysis result of Table 5 shows that a group of the students who follow learning process with inquiry learning model and PBK (A_1, B_1) has the average value of corrected learning outcome 78.049 while the group of students who follow learning process with inquiry learning model and conventional assessment (A_1, B_2) has the average value of corrected learning outcome 70.151. So, it can be concluded that for the students who follow inquiry learning model, a group of students who are given PBK has higher natural science learning outcome than those who are given a conventional assessment after controlling the student's prior knowledge.

The test analysis of Table 6 shows that statistical value of t-test at row [(A = 2)×(B = 1)] is obtained the value of $t_{calculation}$ = -2.932>$t_{table\ (68)}$ = -1.67. The analysis result of Table 5 shows that a group of the students who follow conventional learning model and PBK (A_2B_1) has the average value of corrected learning outcome 68.642 while the group of students who follow conventional learning model and conventional assessment (A_2, B_2) has the average value of corrected learning outcome 72.570. So, it can be concluded that for the students who follow conventional learning model, a group of students who are given PBK has lower natural science learning outcome than those who are given a conventional assessment after controlling the student's prior knowledge.

Table 6: The t-test stastics of the average natural science learning outcome parameter (Y) inter learning model factor level (B) for every factor level of learning model (A) with controlling prior knowledge (X)

Parameters	Symbol parameter	B	SE	t_{hitung}	Sig.	$t_{tabel}\alpha = 0.05$
Intercept	β_0	60.423	2.422	24.944	0.000	1.67
X	δ_0	0.487	0.076	6.423	0.000	
[A = 1]	β_1	-2.419	1.428	-1.694	0.093	
[A = 2]	-	0.000	-	-	-	
[A = 1][B = 1]	β_2	7.898	1.313	6.017	0.000	
[A = 1][B = 2]	β_3	0.000	-	-	-	
[A = 2][B = 1]	-	-3.928	1.340	-2.932	0.004	
[A = 2][B = 2]	-	0.000	-	-	-	

Based on the data analysis result, it has been proved that the natural science learning outcome of the students who follow inquiry learning model is higher than those who follow conventional model after controlling the student's prior knowledge. This is due to that learning process with inquiry learning model gives a vertile condition for the creation of a democratic learning condition. The involvement of students in inquiry activity gives chances to the students to fertilize the sense of responsibility, to develop creativity to fertilize the honesty to fertilize critical attitude and to develop self-confidence. This condition will give a positive impact towards the student's learning outcomes. Besides that, the involvement of the students in inquiry activity will give effect to develop scientific attitude, responsibility, teamwork and student's creativity. This will give affect in character building. This research result supports the theory about the inquiry learning model. According to Robert and Trowbridge (1973), inquiry learning model gives goodness and makes the learning process be contracted to the students. One of the psychology principles about learning states that the greater the students involve to the teaching learning process the bigger the students get the learning capability. This will effect to the student's learning outcomes. The inquiry learning model provides opportunities for the students to associate the student's prior knowledge with the studied material that makes the learning process become more meaningful. At the same time, the conventional learning model is the learning model which has been frequently given by the teachers at school. This learning model gives so less opportunity to the students to involve actively in learning process that makes the learning process unmeaningful. This research result also supports the research conducted by Bilgin (2009). The result of Bilgin's research shows that, the group of students who uses guided inquiry model shows a better performance than the students who are in the control classroom. The research result is also in line with the research result of Pardede and Manurung (2016) which states there is a difference learning outcome between the students who are taught by using inquiry learning model and by using conventional learning model. The result of this research is in accordance with the research result by Sen and Oskay (2017) which shows that the 5E inquiry learning model is more effective in increasing the student's achievements in chemistry equilibrium problem than the traditional learning model.

Furthermore, the test result proves statistically that the natural science learning outcome of the students who are given a classroom based assessment (PBK) is higher than those who are given a conventional assessment after controlling the student's prior knowledge. This is due to that the classroom based assessment (PBK) has a function as: feedback for the students to know their capability and deficiency in order to give rise to a motivation for improving their learning outcomes, monitoring the progress and diagnosing the progress of student's learning in order to make possible do the enrichment and remediation, giving input to the teachers for improving the learning program in the classroom. While the conventional assessment is more focused to the cognitive aspects or in other words, the conventional assessment is so, less comprehensive and less sustainable that it is not able to increase the students learning outcomes.

Classroom based assessment will give accompanying impact towards the student's responsible development, for example in the assessment of task or homework. Giving the project tasks done in groups and must be collected within one month will be able to develop sense of responsible and teamwork among the group members. Giving the classroom based assessment on the whole will give impact in building the student's character. This research result supports the opinions by Sumarna and Hatta (2004) about the classroom based assessment (PBK) that is that the principle of classroom based assessment is valid, fair, open, sustainable, useful, comprehensive and didactive which can motivate the students in learning process. If the students are motivated in learning process this will influence the student's learning outcomes. This research result also supports the theoretical study about classroom assessment proposed by Stiggins and Chappuis (2005). Stiggin and Chappuis (2005) state that, classroom assessment can be used to support the students more productive and more self-confidence,

which then will be able to increase the learning outcome. This research result is in line with the research result of Santoso. The application of classroom based assessment can increase the student's learning outcomes.

The test result proves statistically that there is an influence of interaction between learning model and formative assessment type towards the student's natural science learning outcomes after controlling the student's prior knowledge. Learning inquiry collaboratively is one of challenging and interesting efforts for school nowadays. It is hoped that this way of learning will fertilize student's motivation and interest in science. They learn to do research with similar way with the scientists. In other sides, the conventional learning model tends to be started with presenting the subject material by the teachers and then be continued with giving some examples of questions. This learning model gives so less opportunities for the students to construct their knowledge that the learning process becomes less meaningful. This kind of learning is so, less directed to support the learners to find out various sources of observations, to formulate the problem, to train thinking analytically that the students are less challenged in learning process.

There are three ways to motivate students in order to be always involved in learning process, namely: the involvement of students in process assessment, recording and communication. In the involvement of the students in process assessment, the students are invited to play a role in defining the criteria of where their works will be rated. They learn to apply criteria to identify the strengths and weaknesses of their own. This will build the trust and confidence of the students. The students who are involved in recording support the learners to monitor the improvement of their performance from time to time through self-assessment. For example, the students build portfolio of their success proof from time to time, they can reflect the changing of what they see. When they map the progress they obtain sense of control on their own learning. This can become the developer of strong self-confidence. The students are involved in communication, invite to share with others for example with the teachers and parents. When the students are prepared well through telling the success or the failure story of themselves they experience the fundamental changes in their internal, sense of responsible on that success. The students feel proud when they have the positive story and then give rise to the commitment to learn more. For the students who are less success, feel to have big responsible for working hard and push them to work more productive. In the other side, the conventional assessment only emphasizes the results and the leaning outcome is anly focused at cognitive aspects. Test becomes to be the way of dominant assessment. The assessment is only done by the teachers and conducted after one subject is taught. Such this assessment is called as block assessment.

Based on the description, these research finding are due to that in science learning, the inquiry learning model is more advantaged with classroom based assessment. In this context, variations of assessments are very influential on learning outcomes. This variation of assessment is likely applied to the inquiry learning model. In the other sides, if it is connected with science learning, conventional learning model is more facilitated or more advantaged with the conventional assessment.

CONCLUSION

Based on the research result and discussion, it can be concluded as follows) IPA (natural science) learning outcome of the students who follow inquiry learning model is higher than those who follow conventional learning model after controlling the student's prior knowledge, IPA learning outcome of the students who are given PBK (classroom based assessment) are higher than those who are given conventional assessment after controlling the student's prior knowledge, there is an interaction influence between learning model and formative assessment type towards the IPA learning outcomes of the students after controlling the student's prior knowledge.

RECOMMENDATIONS

Based on the conclusion of this research, it is suggested that: for increasing the quality of learning process and IPA learning outcomes, the teachers had better choose an appropriate learning model and formative assessment type in accordance with characteristics of materials, students and laboratorium tools at school, for increasing IPA learning outcomes, it can be done by applying inquiry learning model and classroom based assessment.

REFERENCES

Anonymous, 2011. [Profile of IPA capabilities Indonesian learners]. Benchmark International, Tampa, Florida. (In Indonesian)

Anonymous, 2015. [National examination activities and school exams SMP/MTs, SMA/MA, SMK and SD/MI lesson level 2014/2015 Buleleng district]. Dinas Pendidikan Buleleng, Buleleng Sub-District, Indonesia. (In Indonesian)

Bell, T., D. Urhahne, S. Schanze and R. Ploetzner, 2010. Collaborative inquiry learning: Models, tools and challenges. Intl. J. Sci. Educ., 32: 349-377.

Bilgin, I., 2009. The effects of guided inquiry instruction incorporating a cooperative learning approach on university students achievement of acid and bases concepts and attitude toward guided inquiry instruction. Sci. Res. Essays, 4: 1038-1046.

David, R.K., B.S. Bloom and B.B. Masia, 1973. Taxonomy of Educational Objectives the Classification of Educational Goals. In: Handbook II: The Affective Domain, David, R.K., B.S. Bloom and B.B. Masia (Eds.). David McKay Publisher, New York,USA., pp: 293-318.

David, W.D., 2016. Way a taxonomy of affective learning. ASCD, Alexandria, Virginia.

Diane, H., 1994. Authentic Assessment a Handbook for Educators. Addison Wesley Publishing Company, Boston, Massachusetts, ISBN:9780201818642, Pages: 120.

Dochy, F.J.R.C., 1996. Prior Knowledge and Learning. In: International Encyclopedia of Developmental and Instructional Psychology: A Potpourri, Corte, E.D. and F.E. Weinert (Eds.). Pergamon, New York, USA., pp: 341-347.

Edgar, F., F. Herrera, K. Abdul-Razzak, H. Lopes and A.V. Petrovsky *et al*., 1982. Learning to be the World Education Today and Tomorrow. Offset Publisher, Liguge, France,.

Falk, J.H. and L.M. Adelman, 2003. Investigating the impact of prior knowledge and interest on aquarium visitor learning. J. Res. Sci. Teach., 40: 163-176.

Gill, N., 2002. Developing Teaching and Learning in Higher Education. Routledge Falmer, London, England, UK., Pages: 193.

Ilahi, M.T., 2012. [Learning Discovery Strategy and Mental Vovational Skill]. DIVA Press, Jogyakarta, Indonesia, (In Indonesian).

Janet, H.S.B. and J. Richard, 2004. Assessing Hands-on Science. Corwin Press, California, USA.,.

Joyce, B., M. Weil and E. Calhoun, 2004. Models of Teaching. China Light Industry Press, Beijing, China, ISBN:9787501945856, Pages: 532.

Keller, J.M., 2005. Principles of Instructional Design. Wadsworth, New York, USA., ISBN:9780534582845, Pages: 387.

Klimenko, M.V. and L.A. Sleptsova, 2015. Formative assessment as a component of the future English teacher training. Intl. Educ. Stud., 8: 157-165.

Lim, D.H. and M.L. Morris, 2009. Learner and instructional factors influencing learning outcomes within a blended learning environment. J. Educ. Technol. Soc., 12: 282-293.

Lorin, W.A. and D.R. Krathwohl, W.A. Peter, A.C. Kathleen and E.M. Richard *et al*., 2001. A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. Longmanm, New York, USA., ISBN:9780321084057, Pages: 352.

Marhaeni, A.A.I.N., 2013. [The influence of inquiry learning model guided to the science process skills and mastery of the concept of IPA students class V group 03 Wanasaba East chili]. J. Basic Educ., 3: 1-8.

Marzano, R.J., 1993. Designing a New Taxonomy of Educational Objectives. Corwin Press, Thousand Oaks, California,.

Masnur, M., 2012. [KTSP Basic Understanding and Development]. Bumi Aksara, Jakarta, Indonesia, (In Indonesian).

Mochtar, B., 2001. [Anticipatory Education]. Kanisius, Yogyakarta, Indonesia, ISBN:9789796726066, Pages: 204 (In Indonesian).

Mundilarto, M., 2013. [Effectiveness of inquiry based learning approach for character improvement of high school students in physical learning (In Indonesian)]. J. Math. Sci. Educ., 1: 24-29.

Nuryani, Y.R., 2013. [Classroom Based Assessment]. Balitbang Diknas, Jakarta, Indonesia, (In Indonesian).

Pardede, D.M. and S.R. Manurung, 2016. Effect of inquiry learning model and motivation on physics outcomes learning students. J. Phys. Educ., 5: 1-6.

Paul, S., 1997. [Philosophy of Constructivism in Education]. Kanisius, Yogyakarta, Indonesia, (In Indonesian).

Richard, I.A., 2008. [Learning to Teach, Helly Pratjitno Soetjipto and Sri Mulyantini Sutjipto]. Purtaka Pelajar, Yogyakarta, Indonesia, (In Indonesian).

Robert, B.S. and L.W. Trowbridge, 1973. Teaching Science by Inquiry in the Secondary School. 2nd Edn., Merrill Publishing Company, Ohio, USA., ISBN:9780675090513, Pages: 631.

Robert, J.G., 2000. Psychological Testing: History, Principles and Applications. Allyn and Bacon, Boston, Massachusetts,.

Rosalin, D., 1985. Children's Ideas in Science. Open University Press, Milton Keynes, England, Pages: 202.

Sen, S. and O.O. Oskay, 2017. The effects of 5E inquiry learning activities on achievement and attitude toward chemistry. J. Educ. Learn., 6: 1-9.

Steve, K., J. Kelly, J. Corkins and A. Tasooji, 2009. Using student's previous experience and prior knowledge to facilitate conceptual change in an introductory materials course. Proceedings of the 39th IEEE Conference on Frontiers in Education FIE'09, October 18-21, 2009, IEEE, San Antonio, Texas, USA., ISBN:978-1-4244-4715-2, pp: 1-5.

Stiggins, R. and J. Chappuis, 2005. Using student-involved classroom assessment to close achievement gaps. Theor. Pract., 44: 11-18.

Sudiah, Sjarkawi and Emosda, 2011. [Contextual approach, early knowledge of students and science study outcomes in junior secondary schools (In Indonesian)]. Techno Pedagogy Journals, 1: 27-37.

Sumarna, S. and M. Hatta, 2004. [Portfolio Assessment]. PT Remaja Rosdakarya, Bandung, Indonesia, (In Indonesian).

Taufina, R., 2009. [Authentic assessment in Indonesian language learning in primary elementary school (In Indonesian)]. Sci. J. Educ., 9: 113-120.

Telle, H., 2009. Assessing university students prior knowledge implications for theory and practice. Master Thesis, University of Helsinki, Helsinki, Finland.

Udin, S.W., 1993. [Teaching and Learning Strategies of Science]. Universitas Terbuka Depdikbud, Jakarta, Indonesia, (In Indonesian).

Wagiran, W., 2017. [Classroom assessment: An integral part of the vocational learning process in preparing a holistic workforce (In Indonesian)]. Innov. Vocational Technol. Educ., 7: 1-16.

Wayan, S.I., 2012. [Innovative Learning]. Undiksha Press, Singaraja, Indonesia, (In Indonesian).

Wilis, D.R., 1996. [Theory-Theory of Learning]. Erlangga, Jakarta, Indonesia, (In Indonesian).

Wynne, H., 2010. Teaching, Learning and Assessing Science. Paul Chapman Publishing, London, England, UK.,.

Zainul, A. and N. Nasoetion, 1993. [Assessment of Learning Outcomes]. Departemen Pendidikan dan Kebudayaan Publisher, Jakarta, Indonesia, (In Indonesian).