

Interactive and Collaborative Learning Activities: Enriching Students' Performance in Understanding the Concept of Practical Research 2

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Abstract: The study intended to govern the effectiveness of interactive and collaborative learning activities in enhancing the performance of students in understanding the concept of Practical Research 2. The study was conducted to Grade 12 Tech-voc students of Santa Rosa National High School during the first semester of the School Year 2018-2019. Findings showed that students' performance were improved after the integration of interactive and collaborative learning activities. Likewise, the obtained t-value denotes that there is significant difference in the performance of students between control and experimental groups after the integration of interactive and collaborative learning activities in Practical Research 2. Accordingly, interactive and collaborative learning activities contributed significant effect in the performance of students. Students are more likely to understand the concept and get the correct answer in the test after the application of interactive and collaborative learning activities regardless of the type of test applied.

Keywords: interactive and collaborative learning activities, active learning, academic performance, practical research.

I. INTRODUCTION

Basic research skills are essential for all senior high school graduates, thus understanding of research in educational systems provides students with tools for understanding research. Practical Research, either quantitative or qualitative provides understanding of the research process, concepts and practices which develop learners' critical thinking and problem solving skills. Nevertheless, topics in practical research are perceived by students as unexciting and uninteresting. As a result, students develop negative attitudes towards these subjects, hence affect their academic performance. According to Sunzuma, Zezekwa and Bhukuvhani (2012), quantitative methods has been noticed to be problematic in many disciplines, such as in education and in social science in general. This results to students' negative attitudes towards the knowledge of research and about problems in making research courses relevant. Moreover, Ball and Pelco (2016) highlighted that research methods courses are challenging to teach because of the technical complexity course material and the fact that students' interest in this material can unfortunately be quite low. This lack of engagement is likely to impact student outcomes, contributing to poorer grades and higher rates of attrition.

Teachers of research subjects assume that students would react more positively to research if they are motivated. Sunzuma et al (2012) suggested that if teachers of research want to increase students' interest in the subject, it may be advisable to use strategies which may capture learners' attention for effective teaching and learning. Allen and Baughman (2016) also cited that research methods and statistics are regarded as difficult subjects to teach, fuelling investigations into techniques that increase student engagement. Students enjoy active learning opportunities like hands-on demonstrations, authentic research participation, and working with real data.

Active learning includes interactive and collaborative learning strategies which can be utilized effectively in learner-centered environments, especially in subject areas that involve teaching student's real-life skills, authentic assessment techniques and hands-on learning activities. Interactive and collaborative learning environments can be very beneficial to student learning for the following reasons: (1) students are more inclined to be interested and active in the learning process; (2) students can develop a sense of community among peers; (3) students are given an opportunity to construct their own knowledge base; and (4) students can develop multiple learning capabilities better (Interactive and Collaborative Learning Environment, 2008).

When applied to the teaching of research methods, active learning approaches typically involve students carrying out research, rather than merely reading about, or listening to instructors talk about it. Active learning in research methods and statistics classes may include taking part in demonstrations designed to illustrate methodological and statistical concepts, participating in authentic research, and working with data the students have been responsible for collecting (Allen and Baughman, 2016).

Motivated by a desire to increase student engagement in research concepts, the researcher developed a series of activities in Practical Research 2. In each of these activities, students are involved and participated making research class more engaging and interesting for effective teaching and learning.

Research Questions:

The study determined the effectiveness of interactive and collaborative learning activities in enriching students' academic performance in Practical Research 2. Specifically, the following problems were sought: (1) how may the performance of Grade 12 students be described before and after the integration of interactive and collaborative learning activities in practical research 2?; (2) is there a significant difference in the performance of students after the integration of interactive and collaborative learning activities in practical research 2?; and (3) how may the test items be analyzed after the application of interactive and collaborative learning activities?

Hypothesis:

The statistical hypothesis "there is no significant difference in the performance of Grade 12 students after the integration of interactive and collaborative learning activities in Practical Research 2" was tested at 0.05 level of significance.

Scope and Limitation:

This study focused only on the effective strategy for enhancing students' academic performance in Practical Research 2. Interactive and Collaborative Learning Activities were integrated to Practical Research 2 classroom to determine its efficiency in improving the performance of the students. Pre-test and post-test were administered to control and experimental groups of Grade 12 students of Santa Rosa National High School for the second quarter period of 1st semester of school year 2018-2019. Test items were analyzed to determine the difficulty index of the items applied by interactive and collaborative learning activities.

II. METHOD

Research Design:

The study used experimental research design. It is a collection of research designs which use manipulation and controlled testing to understand causal processes. Generally, one or more variables are manipulated to determine their effect on a dependent variable. Moreover, is a systematic and scientific approach to research in which the researcher manipulates one or more variables, and controls and measures any change in other variables (Blakstad, 2008). In this study, the effectiveness of interactive and collaborative learning activities was tested to experimental group of students in comparison to control group using traditional method of teaching. Pre-test and post-test were gathered to determine the significant differences in the performance of control and experimental groups.

Participants of the Study:

The respondents of the study were the Grade 12 TVL students of Santa Rosa National High School who were enrolled during the 1st semester of school year 2018-2019. Two heterogeneous classes of the tech-voc track were the participants of the study. Purposive sampling was employed to ensure that the 2 classes have comparable academic performance in research class. Thus, pairing method was applied to match the previous grade of students in Practical Research 1 (see appendix). The table below presents the distribution of respondents:

Table 1: Selection of Respondents

Section	Number of Respondents
12-C (Experimental Group)	22
12-D (Control Group)	22
Total	44

Twenty-two students from each section were used as respondents of the study. The first group was the experimental group where Interactive and Collaborative Learning Activities was applied. The second group served as the control group applied by traditional method of teaching.

Proposed Innovation/Strategy:

This research study conceptualized the effectiveness of interactive and collaborative learning activities in enhancing the students' performance in understanding the concept of Practical Research 2. Active learning coordinates with the principles of constructivism which are, cognitive, meta-cognitive, evolving and affective in nature. Studies have shown that immediate results in construction of knowledge is not possible through active learning, the child goes through process of knowledge construction, knowledge recording and knowledge absorption. This process of knowledge construction is dependent on previous knowledge of the learner where the learner is self-aware of the process of cognition and can control and regulate it by themselves (Anthony, 1996). There are several aspects of learning and some of them are: Learning through meaningful reception by David Ausubel, he emphasized the previous knowledge the learner possesses and considers it a key factor in learning. Learning through discovery by Jerome Bruner, where students learn through discovery of ideas with the help of situations provided by the teacher. Conceptual change: misconceptions takes place as students discover knowledge without any guidance; teachers provide knowledge keeping in mind the common misconceptions about the content and keep an evaluatory check on the knowledge constructed by the students. Social Constructivism by Bandura and Vygotsky, collaborative group work within the framework of cognitive strategies like questioning, clarifying, predicting and summarizing (Rusbult, 2015).

Interactive and collaborative learning activities exemplifies active learning in the classroom. These activities were designed to make practical research 2 class more engaging and interesting, helping students more understand the concept of quantitative research. The interactive and collaborative learning activities included in this study have been gathered from many sources. These are as follows:

Match Mine: Match Mine is a cooperative learning strategy in which students work in pairs to communicate to one another without the use of visuals. This strategy fosters accuracy of verbal communication and also sharpens students' ability to listen and follow verbal directions (Lamberton, 2013).

Jigsaw Activity: The "Jigsaw Method" is a teaching strategy of organizing student group work that helps students collaborate and rely on one another. This teaching strategy is effective for accomplishing multiple tasks at once and for giving students a greater sense of individual responsibility (Catapano, 2018).

4 Corners: The Four Corners is one of the many co-operative teaching and learning strategies. This activity is very useful when the teacher wants to point out the fact that not all in the class have the same view-point or that there are multiple solutions to some problems (Kagan, 2015).

Pairs Check: Pairs check is a Cooperative Learning Strategy that works best with drill or practice activities. It allows students to solve problems independently but still have their work and answers double checked by peers (Herring, 2018).

Buzz Session: Buzz sessions are short participative sessions that are deliberately built into a lecture or larger group exercise in order to stimulate discussion and provide student feedback (Boudreau, 2016).

Think-Write-Pair-Compare: Think-Write-Pair-Compare strategy is designed to differentiate instruction by providing students with time and structure for thinking about a given topic, enabling them to formulate individual ideas and compare these ideas with a peer (Making Connections to Prior Knowledge, 2012).

Role Play: Role-play is a technique that allows students to explore realistic situations by interacting with other people in a managed way in order to develop experience and trial different strategies in a supported environment (Glover, 2014). Buelow (2014) also mentioned that role-playing provides a safe environment to encounter different scenarios for the first time, which builds confidence in team members that can help them in their day-to-day roles..

Poster Making: Making posters in the classroom is an exciting opportunity for students to engage in discussion, to come up with a subject matter, negotiate the various ways in which to depict the ideas, and, most importantly, be creative. This activity is brilliant as it promotes a healthy participation from students despite their levels (Misao, n.d.).

Pass the Chalk: This activity encourages the students to actively participate during recitation by answering teacher's question collaboratively. This strategy creates a more student-centered class and is especially effective when discussing topics on which there might be a variety of opinions (Jones, Daniel and Dimiduk, et al., 2010).

Picture Prompt: Picture prompt is an engaging activity showing an image with no explanation. Students will be asked to identify or explain it, and justify their answers. Or students will be asked to write about it using terms from lecture, or to name the processes and concepts shown. This activity also works well as group activity.

Q and A Session: This activity requires students to jot down questions pertaining to the subject matter in an index card. The discussion begins after the cards are collected. Along the route, the teacher reads and assist them to answer the student generated questions.

Think Piece: A think piece is a question that is answered by means of a short essay or a poster that reflects view on topics learned.

Beach Ball Bingo: This is an engaging activity where questions or prompts are written onto the surfaces of the beach ball. When the student catches the ball, he/she will answer the questions.

Moreover, interactive and collaborative learning activities in practical research 2 aim to develop the following competencies among senior high school students: critical thinking skills, teamwork, creative thinking ability, responsibility in making conclusions and opinions, ability to listen and follow verbal direction, better retention of the topic through individual responsibility and collaboration among peers, and full participation and communication.

Instruments:

The developed interactive and collaborative learning activities in Practical Research 2 was used as instrument of the study. These learning activities were integrated in the lessons of practical research 2 for Grade 12 students. Pretest and post-test were employed before and after the integration of interactive and collaborative learning activities to both control and experimental groups. The results were compared to determine if students' performance were improved after the integration of interactive and collaborative learning activities. An interview guide likewise utilized to validate the results of the study. Moreover, this interview assessed how interactive and collaborative learning activities boost the interest of students in understanding the concept of practical research 2.

Data Collection Procedure:

Permission to conduct the study was first secured by the researcher from the School Principal. Subsequently, the researcher personally conducted the study to 2 TVL sections in Grade 12 taking practical research 2. Pre-test and post-test were administered to both control and experimental groups to determine the effectiveness of interactive and collaborative learning activities used. Likewise, interviews and observations were done to corroborate the results of the study.

Ethical Considerations:

Research ethics was assumed in conducting this study. Ethical considerations were made to protect the participants from any harm. Informed consent, voluntary participation and respect of confidentiality were considered among the respondents of the study. Indeed, codes were used in the selection of respondents and students' name were concealed to protect students from bias and discrimination.

Data Analysis:

Frequency and percentage distribution were employed to describe the performance of students before and after the integration of interactive and collaborative learning activities in Grade 12 Practical Research 2 classes. Independent sample t-test was employed to determine the significant difference in the performance of students between control and

experimental groups before the integration of interactive and collaborative learning activities. On the other hand, paired sample t-test was used to determine if there is enhancement in the performance of students after the integration of interactive and collaborative learning activities. Balajadia's (2014) item analysis template was used in analyzing the test items after the integration of interactive and collaborative learning activities.

III. RESULTS AND DISCUSSION

Pre-test Results of Control and Experimental Groups:

Table 2 presents the pre-test results of control and experimental groups before the integration of interactive and collaborative learning activities in Practical Research 2.

Table 2: Pre-test Results of Control and Experimental Groups.

Group	N	Mean	SD
Control Group	22	11.1435	2.7154
Experimental Group	22	11.1191	2.8657

It can be seen in the table that in a 30-item pre-test, the computed mean score among students of control group was 11.1435. This result is comparable to the mean score of experimental group which was 11.1191. The adjacent mean scores of 2 groups indicates that there is no significant difference in their performances. It can be inferred that both control and experimental groups have the same prior knowledge on Practical Research 2 before the integration of interactive and collaborative learning activities. This shows that selection of participants among control and experimental groups was free from bias, thus can provide a reliable result.

Post-test Result of Control and Experimental Groups:

Table 3 presents the post-test results of control and experimental groups.

Table 3: Post-test Result of Control and Experimental Groups

Group	N	Mean	SD
Control Group	22	16.3254	3.0124
Experimental Group	22	22.9090	1.2721

Table shows that in a 30-item post-test, students in control group obtained a mean score of 16.3254 while pupils of experimental group achieved a mean score of 22.9090. It can be deduced from the result that scores of pupils were improved in the post-tests. However, findings confirmed the difference in the score improvement between control (wm=16.3254) and experimental (wm=22.9090) groups. Likewise, the lower value of standard deviation of experimental group (SD=1.2721) compared to control group (SD=3.0124) shows that distribution of scores among students of experimental group are closed to its mean score. Moreover, the Standard Deviation of 1.2721 shows that the individual responses, on average, were a little over 1 point away from the mean.

Results revealed that students in experimental group obtained better scores compared to control group. It can be inferred from the findings that interactive and collaborative learning activities contributed significant effect in the performance of students. Students' responses in the interviews showed that they became motivated and engaged in the lesson after exposure to interactive and collaborative learning activities. Some of them cited:

"I enjoyed the activities, it made me more interested in our lesson."

"Interactive and collaborative activities are exciting. I don't like research subject at first but it became my favorite because I became interested and enjoyed the activities."

According to Martin (2006) motivation and engagement play a large role in students' interest and enjoyment of school. Understandably, both also play huge roles in academic achievement. Consequently, those students who are motivated by and engaged in learning tend to perform considerably higher academically and are better behaved than unmotivated and un-engaged peers.

Significant Difference between the Post-test Performance of Control and Experimental Groups:

Table 4 presents the t-test result in establishing the significant difference in the post-test scores of control and experimental groups.

Table 4: t-test Result between the Post-test of Control and Experimental Groups

Group	Mean	t	p-value	Decision
Control	28.3254	10.213	.000	Reject Ho
Experimental	37.8123			

The obtained t-value of 10.213 with p-value .000 signifies that there is significant difference in the performance of pupils between control and experimental groups after the integration of interactive and collaborative learning activities. Consequently, the null hypothesis was rejected. It can be observed that students' scores in experimental group (37.8123) is higher than control group (28.3254). This indicates that scores of students who were applied by interactive and collaborative learning activities are higher than scores of students without the intervention material. Furthermore, interactive and collaborative learning activities help students enhance their skills and become competent in other areas. For instance, match mine activity fosters accuracy of verbal communication and also sharpens students' ability to listen and follow verbal directions. One of the students mentioned:

"In match mine, I realized the importance of listening and following directions. So I have to be attentive and focused."

"Four corners" activity enhances the full participation and communication of students with peers. This also enhances higher order thinking skills and responsibility of students in making conclusion and opinions (Kagan, 2015). Indeed, these details were observed during the activity. The students also said:

"I like 4 corners. The activity forced me to listen and think carefully in order to choose the right corner."

Other activities which made significant effect to students include jigsaw puzzle, role play, and buzz session. Jigsaw puzzle organizes student group work that helps students collaborate and rely on one another. This teaching strategy is effective for accomplishing multiple tasks at once and for giving students a greater sense of individual responsibility (Catapano, 2018). On the other hand, role play allows students to explore realistic situations by interacting with other people in a managed way in order to develop experience and trial different strategies in a supported environment (Glover, 2014). Buzz session stimulates discussions and maintained student attention and active involvement in the lesson (Boudreau, 2016). Students cheerfully uttered:

"Yes, it helped me to understand more the concept. Role play for example, teacher discussed already the data sampling procedure and I understand it better when we did the role play."

"through series of buzz sessions, we were able to finish writing our research study. In this activity, we became actively involved and learned from one another's ideas and experiences."

Likewise, students noticed "Pairs check" and "pass the chalk" interesting and enjoyable. Pairs check is a cooperative learning strategy which allows students to solve problems independently but still have their work and answers double checked by peers (Herring, 2018). Pass the chalk activity encourages the students to actively participate during recitation by answering teacher's question collaboratively. According to students, Pass the Chalk obliged them to listen carefully just to answer the questions in the activity. Conversely, Pairs Check helped them solve the problem independently. They quoted:

"Pairs Check helped us to solve problems independently. Pair had no choice but to answer it first on their own. So we are forced to listen and be resourceful in order to answer the problems before we compare it with other groups."

Hence, findings revealed that interactive and collaborative learning activities are effective in improving the students' performance in understanding the concept of Practical Research 2.

Analysis of Test Items after the application of Interactive and Collaborative Learning Activities:

The succeeding tables presents the analysis of items after the utilization of interactive and collaborative learning activities. The difficulty index was determined to examine how the learners answered the item questions applied by different interactive and collaborative learning activities based on blooms taxonomy of learning objectives.

Table 5: Item Analysis showing the Difficulty Index and Interpretation based on Learning Competencies applied by Interactive and Collaborative Learning Activities

Learning Competencies	Interactive and Collaborative Learning Activities Applied	Test Item no.	Type of Item Question based on Blooms Taxonomy of Learning	Difficulty Index (DI)	Interpretation
chooses appropriate quantitative research design	Match Mine, The Jigsaw Classroom, 4 Corners	1	Analysis	0.67	Easy
		4	Remember	0.58	Moderately Difficult
		7	Evaluation	0.58	Moderately Difficult
		8	Evaluation	0.50	Moderately Difficult
			Average DI	0.58	Moderately Difficult
describe sampling procedure and the sample	Think-Write-Pair-Compare, Pass the chalk,	10	Application	0.58	Moderately Difficult
		11	Analysis	0.67	Easy
		12	Application	0.75	Easy
		13	Application	0.75	Easy
		14	Application	0.75	Easy
		15	Application	0.75	Easy
		16	Application	0.67	Easy
	Average DI	0.70	Easy		
constructs an instrument and establishes its validity and reliability	Beach Ball Bingo, Buzz Session, "Q and A Session"	2	Analysis	0.58	Moderately Difficult
plans data collection procedure	"Buzz Session, Role Play	9	Evaluation	0.58	Moderately Difficult
		20	Understanding	0.67	Easy
			Average DI	0.63	Easy
plans data analysis using statistics and hypothesis testing	The Jigsaw Classroom, Pass the chalk	3	Application	0.50	Moderately Difficult
		18	Application	0.75	Easy
		24	Analysis	0.75	Easy
			Average DI	0.67	Easy
presents written research methodology	Buzz Session, Role Pay	23	Analysis	0.67	Easy
Collects data using appropriate instruments	Picture Prompt	6	Evaluation	0.58	Moderately Difficult
		17	Evaluation	0.67	Easy
			Average DI	0.64	Easy
presents and interprets data in tabular and graphical forms	Pairs Check	22	Analysis	0.58	Moderately Difficult
		30	Evaluation	0.75	Easy
			Average DI	0.67	Easy
uses statistical techniques to analyze data— study of differences and relationships limited for bivariate analysis	Think-Write-Pair-Compare, Beach Ball Bingo	5	Remembering	0.67	Easy
		21	Analysis	0.58	Moderately Difficult
		25	Application	0.50	Moderately Difficult
		29	Analysis	0.58	Moderately Difficult
			Average DI	0.58	Moderately Difficult
draws conclusions from research findings	Buzz Session	19	Analysis	0.67	Easy
		26	Evaluation	0.67	Easy
		27	Evaluation	0.67	Easy
			Average DI	0.67	Easy
formulates recommendations	Buzz Session	28	Evaluation	0.75	Easy

It can be seen on table 5 that students answered most of the test items easily. These were the items about sampling procedure (DI=0.70) applied by "think-write-pair-compare" and "pass the chalk"; planning data collection procedure (DI=0.63) applied by "jigsaw classroom" and "pass the chalk"; presenting written research methodology (DI=0.67) applied by "buzz session" and "role play"; collecting data using appropriate instruments (DI=0.64) applied by "picture prompt"; presenting and interpreting data in tabular and graphical forms (DI=0.67) used by "pairs check"; drawing

conclusions (DI=0.67) and formulating recommendations (DI=0.75) both applied by “buzz session”. On the other hand, items about the following were moderately difficult for the students: appropriate quantitative research design (DI=0.58) applied by “match mine”, “jigsaw classroom” and “4 corners”; constructing instrument and establishing its validity and reliability (DI=0.58); and statistical techniques to analyze data (DI=0.58) applied by “think-write-pair-compare” and “beach ball bingo”.

Table 6: Average Difficulty Index and Interpretation of items relatedly applied by Interactive and Collaborative Learning Activities

Interactive and Collaborative Learning Activities	Average Difficulty Index of Items applied by Interactive and Collaborative Learning Activities	Interpretation
Match Mine	0.58	Moderately Difficult
The Jigsaw Puzzle	0.63	Easy
4 Corners	0.58	Moderately Difficult
Think-Write-Pair-Compare	0.64	Easy
Pass the Chalk	0.69	Easy
Beach Ball Bingo	0.58	Moderately Difficult
Buzz Session	0.68	Easy
Role Play	0.63	Easy
Picture Prompt	0.64	Easy
Pairs Check	0.67	Easy

Table 6 presents the average difficulty index and interpretation of items relatedly applied by interactive and collaborative learning activities. It can be seen from the table that items relatedly applied by match mine, 4 corners and beach ball bingo have difficulty index of 0.58 which is verbally interpreted as moderately difficult. On the other hand, students found it easy in answering the item questions associated to the application of jigsaw puzzle, think-write-pair-compare, pass the chalk, buzz session, role play, picture prompt, and pairs check.

It can be inferred from the findings that interactive and collaborative learning activities play an important role in helping the students understand the concept of practical research 2. Role play for an instance was used in data collection procedure and writing research methodology. Students perceived the test items applied by role play as easy (items 20 and 23). According to students, these items became easy for them as they understood the process of data collection.

Some of the competencies being developed in role play are confidence, listening and creative problem solving skills. Role play, including acting out scenarios to problem solve, story making through dramatic play and practice in coping with real life situations support learners' social-emotional growth and development. Role play give learners the skills to handle problematic social interactions which may happen as they progress through life. When learners engage in role playing it helps to develop their way of thinking and helps them to develop feelings of empathy (Pitz, n.d.).

Another instance is the application of think-write-pair-compare in sampling procedure and sample. In this activity, the students in pair were trained how to determine and compute the number of suitable sample participants from the given population. This activity is connected to items 12-16 where students solved the number of appropriate research sample from a given population. These items had the highest difficulty index of 0.75 which indicates that majority of the students answered these correctly. According to Pardeshi (2016), think-write-pair-compare learning strategy promotes classroom participation by encouraging a high degree of student responses. It also gives students an opportunity to rehearse their answers with each other before speaking in front of the class.

Table 7: Average Difficulty Index and Interpretation of Test Items when grouped according to Bloom's Taxonomy of Learning Objectives

	Test Items	Average Difficulty Index	Interpretation
Remembering	4, 5	0.67	Easy
Understanding	20	0.67	Easy
Application	3, 10, 12, 13, 14, 15, 16, 18, 28	0.67	Easy
Analysis	1, 2, 11, 19, 21, 22, 23, 24, 29	0.63	Easy
Evaluation	6, 7, 8, 9, 17, 26, 27, 28	0.64	Easy

Table 7 illustrates the average difficulty index and interpretation of test items when grouped according to Bloom's taxonomy of learning objectives. The table evidently shows the high average difficulty index in remembering, understanding, application, analysis and evaluation test items. This indicates that majority of the students answered the questions correctly in all the types of learning objectives. Moreover, it can be noted that majority of the test items are application, analysis and evaluation. The highest value of difficulty index were found in items 12, 13, 14, 15, 16, 18, 24, 28 and 30. Items 12, 13, 14, 15, 16 and 18 are application questions; item 24 is an analysis while items 28 and 30 fall as evaluation questions. Results revealed that generally, students found the test items "easy" because of the high value of difficulty index. It can be gleaned from the table that majority of the items were application, analysis and evaluation questions. These items have high difficulty index which means that majority of the students answered it correctly. It can be noted that one of the target competencies of interactive and collaborative learning activities is higher order thinking skills of the learners. The Bloom's Taxonomy helps teachers distinguish between Higher Order Thinking Skills (HOTS) and Lower Order Thinking Skills (LOTS). At the lowest level, one just remember the information, then understand, then apply, then analyze, evaluate and create at highest level. Thus, application, analysis and evaluation test items promote higher order thinking skills of the learners.

According to Cullinane (2010) application questions are the application of knowledge to a new situation. Students will have to apply and use the knowledge they have learned. They might be asked to solve a problem with the information they have gained in class, to create a viable solution, or illustrate an idea or concept with the use of a diagram. On the other hand, analysis breakdown into parts and show relationships among parts. In this level, students will be required to go beyond knowledge and application and actually see patterns that they can use to analyze a problem. This involves dissecting ideas and material into its component parts; therefore, examining and discriminating between the relationships of the parts. Conversely, evaluations items are judgments about the value of materials and methods for given purpose. Evaluation is deemed the highest level of cognitive thinking. It is a complex process and is regarded to encompass combinations of all the other objectives. Students are expected to assess information and come to a conclusion such as its value or debating the pros and cons of the information in front of them.

Students correctly answering the high-complexity items, it can be deduced that interactive and collaborative learning activities play a significant role in developing the higher order thinking skills of the learners.

IV. CONCLUSION

Conclusions:

Based on the findings of the study, the following conclusions were drawn: (1) both control and experimental groups have the same prior knowledge on Practical Research 2 before the integration of interactive and collaborative learning activities. Selection of participants among control and experimental groups was free from bias, thus can provide a reliable result; (2) students in experimental group applied by interactive and collaborative learning activities obtained better scores compared to control group. Interactive and collaborative learning activities contributed significant effect in the performance of students; and (3) interactive and collaborative learning activities are connected to difficulty of items in the test. Students can easily answer the items correctly when applied by Jigsaw Puzzle, Think-Write-Pair-Compare, Pass the chalk, buzz session, role play, picture prompt and pairs check. On the other hand, students are more likely to understand the concept and get the correct answer in the test after the application of interactive and collaborative learning activities regardless of the type of test applied. Application, analysis and evaluation questions tend to become easy for students when the lessons are integrated by interactive and collaborative learning activities, thus play a significant role in developing the higher order thinking skills of the learners.

Recommendations:

Based on the findings and conclusion drawn, the following recommendations are offered: (1) teachers should integrate interactive and collaborative learning activities in helping the students to understand the concept of practical research 2; (2) the interactive and collaborative learning activities should also be utilized to academic track to validate its effectiveness in improving the performance of students in understanding the concept of practical research 2; and (3) future study should be conducted using a descriptive evaluation tool measuring higher-order thinking skills, communication skills, problem-solving and creative thinking skills of the learners applied by interactive and collaborative learning activities.

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