Contextualized and Localized Teaching as a Technique in Teaching Basic Statistics

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Abstract - *Problems on students' diversity with diverse needs still persist nowadays. To address this problem, the teacher need to be conscious on their socio-cultural background so as to benefits everyone in the classroom. This study determined the effect of teaching statistics using contextualized and localized (indigenized) information on the performance of students. The study was carried out using pretest-posttest control group single blind experimental research design. Two intact classes were used and this was done by random assignment. There are thirty four students exposed to contextualized and localized teaching (experimental) and thirty students exposed to contextualize but not localized teaching (control). T-test for independent samples and ANCOVA was utilized in comparing the pretest and posttest performances of the two groups. Concerning on the result, it was found out that the performance of the experimental group was significantly different to the performance of the control group on the empirical probability, but they were not significantly different on the theoretical probability. The finding indicates that the use of indigenous data in teaching statistics along empirical probability is an effective teaching and learning strategy. Additionally, the study recommends developing an authentic, contextualized and localized instructional material in statistics subject to improve the performance of the students.*

Keywords: *Teaching strategy, learning, real and indigenized data*

INTRODUCTION

This study aimed to determine the effect of teaching localized data on the performance of the students in Probability. Bringas [1] gives important reminders on contextualization and localization: Localization and contextualization can be done in all learning areas; localization maximizes materials, activities, events, and issues that are readily available in the local environment; to contextualize, teachers must use authentic materials, and anchor teaching in the context of learners' lives.

According to Mouraz and Leite [2], contextualization is a prerequisite in addressing the content and organization of activities to be undertaken in the classroom. Students' engagement in their schoolwork increases significantly when they are taught, why they are learning the concepts and how those concepts can be used in real-world contexts [3]. According to Ozele [4], cultural contextualize education motivates students to know more about their cultural heritage in order to appreciate and understand other cultural heritage.

The current concern in several countries and enlightens discussions about the importance of refinement of national cultures as an overall purpose of the curriculum and how this match idea of qualifying students for life does. Philippine National Educational Testing and Research Center [5] reported that the mean percentage score of high schools in the National Achievement Test (NAT) in mathematics school year 2011-2012 is 46.37. This result is obviously lower than the passing rate of 75.00. This is an evidence that our students have been scoring low in mathematics. According to Young, Hodge, Edwards, and Leising [6], one such answer to this problem has been to find a way to motivate students to learn mathematics by making the mathematics meaningful to them. Groups such as the National Council of Teachers of Mathematics (NCTM, 2000) and the National Research Council (2001) have called for the need for placing mathematics in context and adding "real world" examples in mathematics.

Based on participants' posts on the discussion board, the greatest barriers to implementing the curriculum were learner-content mismatch, lack of relevance in contexts and in content, difficulty in interpreting the lesson plans, attendance patterns and time constraints. Despite the numerous barriers, several aspects of the high-level contextualized curriculum had positive effects on adult learners and instructions. In most cases, these facilitators were strong enough to overcome the barriers listed above [7].

Contextualize teaching is defined operationally in different ways. According to Spring [8] contextualize teaching means to teach in connection with real life and within the culture of the learners Bird, Livesey & Simon [9]; Mazzeo, Rab, and Alssid as cited by Perin [10] states that contextualize teaching is an instructional strategy concentrating on presenting the lesson directly on concrete applications in a specific context to appeal to the interest of the students. According to Mazzeo et al., (as cited by Perin, [10]) contextualized teaching is a method of presenting the subject matter in meaningful and relevant context. Thus, the teachers should use issues, events, activities, and authentic materials related to the learners to meet their needs on the subject. According to Marri et al., in press; McDermott, [11] some instructors are hesitant to consider contextualized teaching because they believe that it is beyond their range of responsibilities and/or skills.

The following discussion presents the theories, concepts, insights, generalizations, and ideas which aided and inspired the researcher to examine the effect of contextualized and localized teaching in Probability.

This paper is anchored on the effect of the contextualized and localized teaching on the students' performance in Probability. The diagram below shows the theories displayed in the form of a diagram as covered in established theoretical framework of the study.

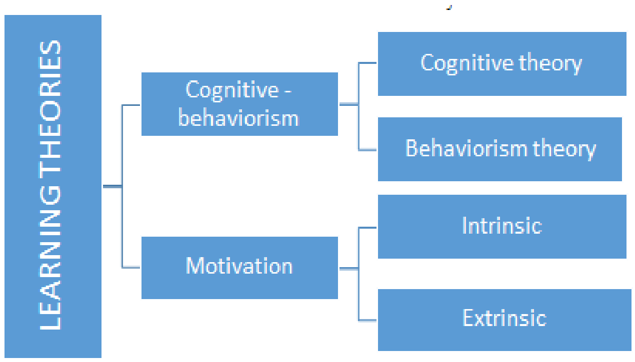

Figure 1. Learning Theories and concepts

Learning. The goal of this work is to determine the effect of the local contexts on the students' performance. According to Shuell [12] learning is the most important activities of humans. Learning may happen in school or outside the school. It is at the very core of the educational process, although most of what people learn occurs outside of school.

Cognitive-behaviorism theory. The following learning theories served as a guide for the researcher. One of these theories is the Cognitive-behaviorism theory. Innovative Learning-Behaviorism, (2013) as cited in Walker and Moore [13] behaviorism theories define learning as "semi-permanent change in behavior". In other words, if the behavior of the learners substantially changes positively, then learning has evidently happened. Innovative Learning-Cognitivism (2013) states that learning is an "internal processes". This entails that learning will be acquired more if the learners have higher interest to learn. A cognitive-behaviorism is an interaction between the mind and behavior. The learner will behave accordingly if the learner thinks that he/she, his/her family, and other human being will be benefited by what he/she is doing. Every human being is different in terms of objectives, ambitions, principles and they like. All of these things are based on what is on our thought, feelings and behavior. According to Fritscher [14] if our thoughts, feeling and behavior are satisfied this may change our reaction. According to Badura, Beck, Ellis, Lazaras, Meichenbaum, Pavlov and Wolpe [15] cognitive and behavioral approach is an important approaches in understanding and determining the human being needs.

Motivation theory. Learning theories are diversified in scope, but relates closely to contextualize teaching and learning. Another type of learning theory which gives highlight on contextualize teaching and learning is motivation theory. To motivate the students the teacher should give an interesting problem as the basis of instruction [16].

According to Kelemen [17], the reasons that make the child to come to school, to listen to the teachers and to learn is divided into two main groups. (1) Extrinsic motivation-when the student falls into school discipline without a direct interest in what is taught, but to receive, directly or indirectly, certain rewards, especially moral ones. (2) Intrinsic motivation – where the learning and the acquiring knowledge, interest directly the student. Moldovan, Ignat, Bălas-Timar [18] stated that the center of intrinsic motivation is curiosity, that means the desire to know much more. Curiosity becomes permanent when it is combined with beliefs about the value of culture, which facilitates the communication with others and provides a great wealth of experiences, sources of satisfaction and equanimity. Stimulating children's curiosity was achieved net enrichment of their vocabulary, have developed strategies of thought and action that can help them to solve the experimental tasks proposed [19].

Perin [10] states that the perceived value of contextualized teaching and learning is that this method can create a commonsense structure with which to focus instruction. Decontextualized instruction may be difficult for students to connect to because they do not have an understanding of how the material may be useful and meaningful, thereby failing to engage with the material or increase intrinsic motivation. To show the importance of Statistics to the learners, the teacher should relate the teaching and learning process to the local environment. The teacher should create possibilities on how he/she could motivate and inspire students, so that retention of the lessons will be lasting. Meaningful learning facilitates faster acquisition and longer retention than learning by rote.

Figure 2 shows the two teaching techniques that were used in this study and the written performance of the students in Statistics.

This study considered two objectives:

1. The pre-test and post-test performance of the students exposed to the different approaches,
2. And the significant difference in the pre-test and post-test performances of the students across group.

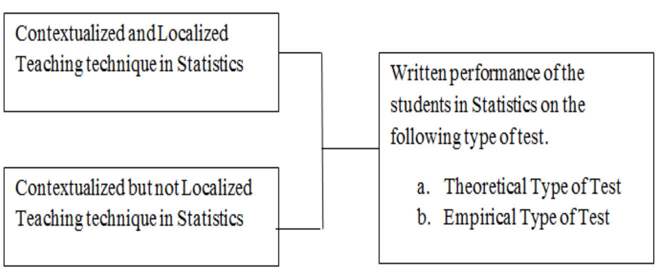

Figure 2. Research Paradigm

METHODOLOGY

Research Design

This study used the single – blind experimental method of research, particularly the pretest-posttest control group design and focused on finding out the effect contextualized and localized teaching on the performance of the students in Basic Statistics. According Shuttleworth [20] the investigation may result to experimental flaws (bias) if both or each group knows that they are belong to the investigation. The idea is that both experimental and control groups are not aware that they are the respondents of the study. This study used two groups of students, one group was exposed to contextualized and localized teaching and the other group were exposed contextualized but not localized teaching. The result of the pretest and posttest of each group was used to draw conclusions.

Respondents of the study

The subjects of the study were the students enrolled in Basic Statistics during the School Year 2015-1016. This study used two intact groups of students enrolled in the Pangasinan State University, Bayambang, Pangasinan to measure the effect of contextualized and localized teaching on the students' performance: one group was exposed to contextualized and localized teaching (experimental group) while the other group was exposed to the contextualized but not localized teaching (control group).

Instrumentation and Data Collection

The topics and objectives were the same in both groups except the teaching strategy. The topics used covers two chapters of Basic Statistics (Probability and Normal Distribution). Each group will take an examination using the test questionnaire constructed by the researcher. The test questionnaire is composed of fifteen theoretical and empirical problems in probability. The test questionnaire instrument was trial – tested to 15 randomly selected BSE second year math major, students who are not the subjects to calculate its reliability. Kuder Richardson Formula 20 revealed a reliability coefficient of 0.79 which denotes that the test has high internal consistency. The result of the examination of each group was analyzed to draw conclusion about the effect of the contextualized and localized teaching on the performance of the students.

Analysis of Data

To obtain the validity and reliability of the results of the study, appropriate statistical tools were used.

The following statistical tools were used in the study. To determine the level of performance of the students' mean percentage score will be used. The mean percentage score is the quotient of the raw score and the total number of points times 100%.

To determine if there is a significant difference between the pretest performance of the experimental group and the control group t-test was used. Analysis of covariance (ANCOVA) was used to examine if

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there is a significant difference between the posttest performances of the students exposed to each type of teaching strategies.

RESULTS AND DISCUSSION

This part presents the effectiveness of teaching localized (indigenous) data in teaching probability subjects. The students' performance on the different type of test were determined using mean percentage score (MPS). The pre-treatment measure used to decide if the two groups are comparable regarding their knowledge along the probability subject was examined using t-test. The posttest performance was done using the Analysis of Covariance procedure.

Table 1 revealed that the pre-test performance (Average Mean Percentage Score AMPS) of the experimental group (24.51) on the theoretical type of test is slightly lower than the control group (24.67). Nevertheless, the pre-test performance of the experimental group (23.53) on the Empirical type of exam is slightly higher than the control group (22.67). Generally, the pre-test performance of the experimental group (24.02) is more eminent than the control group (23.67).

It can be gleaned also from table 1 that the posttest performance (AMPS) of the control group (66.22) on the theoretical type of test is higher than the experimental group (64.22). However, the posttest performance of the experimental group (67.06) on the empirical type of test is higher than the control group (58.67). Generally, the posttest performance of the experimental group (65.59) is higher than the control group (62.44).

As reflected also in Table 1, the pupils mean percentage score in the pretest examination is below 50. There are 93.33% and 97.1% of the respondents in the control group and the experimental group, respectively scores below 50 on the theoretical type of test. Spell along the empirical type of test, all of the pupils in both groups received a percentage score of below 50. Generally, both groups had a very low performance (below 50) on both types of test.

Table 1 also demonstrates that the prevalent mean percentage score on the posttest of both groups in both types of test is 50 – 74. Both groups generally had low performance (50 – 74) on both types of test.

Table 1. Descriptive Statistics of Student Pretest and Postest Performance on the Theoretical and Empirical Type of Test.

		Theoretical		Empirical		Over-all	
		Control (%)	Experimental (%)	Control (%)	Experimental (%)	Control (%)	Experimental (%)
Pretest	50 Below	93.3	97.1	100.0	100.0	96.7	98.4
	50-74	6.7	2.9	0.0	0.0	3.3	1.6
	N	30	34	30	34	64	64
	AMPS	**24.67**	**24.51**	**22.67**	**23.53**	**23.67**	**24.02**
Posttest	50 Below	3.3	20.6	33.3	23.5	6.7	10.9
	50-74	70.0	50.0	56.7	41.2	76.7	62.5
	75-79	0.0	0.0	0.0	0.0	3.3	4.7
	80-84	13.3	14.7	6.7	11.8	10.0	12.5
	85-89	10.0	11.8	3.3	11.8	0.0	1.6
	90 and above	3.3	2.9		11.8	3.3	7.8
	N	30	34	30	34	64	64
	AMPS	**66.22**	**64.12**	**58.67**	**67.06**	**62.44**	**65.59**

Table 2. Comparative Analysis of Student Pretest Performance in Probability Measured Using Theoretical and Empirical test Questions

		Mean	**Mean Difference**	**Df**	**t-value**	**Sig.**
Theoretical	Experimental	3.6765	-.02353	62	-.052	.959
	Control	3.7000				
Empirical	Experimental	3.5294	.12941	62	.392	.696
	Control	3.4000				
Overall	Experimental	7.2059	.10588	62	.175	.861
	Control	7.1000				

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Table 3. Comparative Analysis of Student Performance in Probability Measured Using Theoretical and Empirical Test Questions with Pre-treatment Measure as a Covariate

	Source	Sum of Squares	Df	Mean Square	F	Sig.
Theoretical test Performance	Pretest Theoretical	21.719	1	21.719	4.904	.031
	Between Groups	1.511	1	1.511	.341	.561
	Within Groups	270.177	61	4.429		
	Total	6397.000	64			
Empirical test Performance	Pretest empirical	7.460	1	7.460	1.281	.262
	Between Groups	23.848	1	23.848	4.095	.047
	Within Groups	355.222	61	5.823		
	Total	6126.000	64			
Over-all Performance	Pretest over-all	176.364	1	176.364	11.631	.001
	Between Groups	12.031	1	12.031	.793	.377
	Within Groups	924.944	61	15.163		
	Total	24793.000	64			

Table 2 revealed that the computed significant values are greater than the alpha level 0.05 (0.959, 0.696, 0.861). The t-test comparison of the Pretest performance of the both types of test implies that no significance difference between the experimental and control group. This implies that the two groups are comparable in terms of their pretest performance.

Table 3 shows the computed F-value and significant value of the theoretical and the empirical type of test. The F – value (0.341) corresponds to the theoretical type of test generates a significance (0.561) higher than the alpha level 0.05. With this, it is apparent that the null hypothesis stating that there is no significant difference in the posttest performance of the students on the theoretical type of test is rejected. This means that the posttest performance of the control group and experimental group significantly the same from each other.

Table 3 also shows the F-value (4.905) corresponds to the empirical type of test generates a significance (0.47) lower than the alpha level 0.05. With this result, the null hypothesis stated that no significant difference between the performances across the type of teaching exposure on the said type of test is rejected. The experimental group mean percentage score in the posttest was 67.06, and the control group mean percentage score in the posttest was 58.67 (Table 1). This signifies that the posttest performance of the experimental group along empirical type of test is significantly higher than the control group.

The F – value (0.793) corresponds to the overall performance of each group generates a significant value (0.337) higher than the alpha level 0.05. This result implies that the overall performance of each group on the posttest were not significantly different from each other.

FINDINGS

The pretest average mean percentage score (AMPS) of the students exposed to contextualized and localized teaching (24.51) is slightly lower than the student exposed to contextualized but not localized teaching (24.67) on the theoretical type of test. However, regarding the empirical type of test the performance of the students expose to contextualized and localized teaching (23.53) is slightly higher than the performance of the students expose to contextualized but not localized teaching (22.67). Moreover, the prevailing mean percentage score of the students on the theoretical (96.7%) and empirical type of test (98.4%) is below 50.

The posttest performance (AMPS) of the students expose to contextualized and localized teaching (64.12) is lower than the student expose to contextualized but not localized teaching (66.22) on the theoretical type of test. However, regarding the empirical type of test the performance of the students exposes to contextualized and localized teaching (67.06) is higher than the performance of the students exposing to contextualized but not localized teaching (58.67). The prevailing mean percentage score of the students with the theoretical (76.7%) and empirical type of test (62.5) is 50-74.

The pretest performance of the students is comparable for the two types of test when they are grouped according to the said teaching approaches.

The posttest performance of the students is the same on the theoretical type of test when they are grouped according to the said teaching approaches.

The students exposed to contextualized and localized teaching significantly performed better than students exposed to contextualized and but not localized teaching on the empirical type of test.

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CONCLUSION AND RECOMMENDATION

The pretest and posttest performance of the students exposed to contextualized and localized teaching is higher than the group of students exposed to contextualized and but not localized teaching on the empirical type of test, but they have a lower performance on the theoretical type of test. Generally, the group of students exposed to contextualized and localized teaching performed better than the group of students exposed to contextualized and but not localized teaching.

There is no significant different between the pretests performance on the theoretical type of test when they are grouped according to the said teaching strategies. However, in the posttest, concerning the empirical type of test the students exposed to contextualized and localized teaching were performed better than the students exposed to contextualized but not localized teaching.

It is recommended that teachers should use localized examples, exercises, and illustrations in teaching Statistics to improve the student performance in mathematics.

The curriculum developers can include the use of indigenous data in teaching Statistics as one of the leading teaching-learning strategy.

The exercises, illustrations, and examples of the instructional material that should be used by a teacher must be authentic and indigenous to be effective.

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