

EXPLORING THE EFFECT OF NTeQ MODEL ON STUDENT TEACHER'S ACADEMIC ACHIEVEMENT

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Abstract : *Effective technology integration has always been a challenge for teachers in classroom. This paper discusses about the integration of technology in the classroom via NTeQ (iNtegration of Technology for inQuiry) model to see its impact on student teachers' academic achievement in pedagogy of science during their teacher education course. Quasi experimental research was conducted on 60 student teacher's divided in two groups as CG (Control Group) and EG (Experimental Group). CG was taught by traditional method and EG was taught by NTeQ based lesson plans. The scores were compared using appropriate statistical techniques and result showed a significant difference in the academic achievement of two groups.*

Key words - *NTeQ model, teaching learning process, academic achievement*

INTRODUCTION

In today's time technology is making its place in almost every field. People from varied field are using technology in different ways. In education, teacher and student are using technology to make their teaching and learning effective respectively. For effective results, it is really important for teachers to take care of, how and when the technology is to be integrated. When planned and executed properly, technology is not just useful in delivering a high quality learning experience for students, but also in collecting evidence of that delivery. Various models and approaches are coming up to integrate technology in classroom. One of the effective ways of using technology in teaching learning process can be the implementation of NTeQ model.

NTeQ MODEL

NTeQ model is developed by Lowther and Morrison (1998) to provide a 10 step framework for technology integrated lesson planning. NCF (2005) says the classroom environment should be integrated with technology so that the students in the classrooms will not be mere passive receiver of knowledge but will be actively engaged in the teaching learning process. NTeQ model provide opportunity to students to work at their own pace with their own interest as they get ample options to enhance their learning by exploring themselves to find solution for the given problem. According to Lowther and Morrison (1998) this model has five important components as follows:-

1. Teacher:- Teacher is the one who facilitate students throughout the session.
2. Student:- Student gets actively engaged in the learning process and explore to solve the problem.
3. Lesson:- Lesson are technology integrated provide an organized path for the session to go on.
4. Computer:- Computer is used as a tool to carry out the teaching learning process more innovatively.
5. Environment:- Environment is totally student centered and well equipped with technology.

NTeQ model is a 10 step based lesson plan model. The steps are as follows:

1. Specify Objectives:- The step includes all the predetermined objectives of the lesson that students will achieve during the session. It will clearly specify what the students are expected to do using computer.
2. Computer Functions:- In this step the required computer functions are specified out of various functions available. Each computer function will be associated with any of the objectives to be achieved.
3. Specify Problem:- This step includes the problem for which solution is to be explored.
4. Data Manipulation:- The step includes how learners manipulate data using different functions of computer keeping in mind the lesson objectives.
5. Result Presentation:- This steps tells how learners will present the result they have arrived at in finding solution of problem. Different ways of result presentation can include PowerPoint presentation, poster, charts, activities etc.
6. Activities Prior to Computer:- Before working on computer, teacher gives a brief introduction about the topic and how to find the solution of the problem given using technology.
7. Activities While at Computer:- This step explains what all different activities the learners are going to do on computer to achieve predetermined objectives where teacher acts as a facilitator to keep learners on track.
8. Activities After Using Computer:- Here the learners will present and interpret their results by comparing it with other's result. Sharing and generation of knowledge takes place in this step. Teacher act as a facilitator in filling up the missing points.
9. Supporting Activities:- Teacher uses different supporting activities to clear the students doubts and to fully achieve the predetermined objectives.

10. Evaluation:- To know whether they have understood the concept.

Academic Achievement

Academic achievement represents the performance of students or the extent to which the academic goals are accomplished by the student. Pratibha and Suraksha (2014) conducted a research to see effect of CAI on Secondary students' academic achievement and found a significant difference over traditional method. Academic achievement of students depends largely on classroom environment, teacher, teaching learning process (Suleman & Hussain, 2014). Teacher uses different aids, tools and techniques to make the teaching learning process effective in the class so that the students perform well and achieve good score in exam and also to make their learning permanent. Also, students like when their teachers listen to them, encourage them and provide a lively and challenging environment to make them learn effectively (Knoell, 2012). Teacher makes the environment challenging by providing various opportunities like integration of technology in classroom. Now, how well the teacher is implementing the technology in classroom depend largely on teachers' competency and skills in using technology and the pre service training which the teacher has received during her training course.

METHOD

Design and participants of Study

The study is the quasi experimental design conducted on first year B.Ed students of two teacher education institutes. Intact group of pedagogy of science was taken from both the institutes. The groups were randomly assigned as experimental and control. A total of 60 student teachers (30 in each group) participated in the study. Pre test and post test were conducted on both the groups. The study was conducted over a period of two months. At the beginning of the study both the groups were given pre achievement test of pedagogy of science to know the group equivalence. IQ scale was also administered on both the groups to check whether groups possess IQ equivalence or not. After pre test, both the groups were taught few topics of pedagogy of science. CG was taught using traditional method of teaching and EG was taught by implementing NTeQ model.

CONTROL GROUP

CG consisted of 30 student teachers of pedagogy of science. In the first session the group was administered the pre achievement test and IQ scale to see their equivalence with EG. In the next session the group was taught about NTeQ model and in the further sessions all the topics (teaching methods) of pedagogy of science were taught by traditional method of teaching.

EXPERIMENTAL GROUP

EG consisted of 30 student teachers of pedagogy of science. In the first session the group was administered the pre achievement test and IQ scale to see their equivalence with CG. In the next session the group was taught about NTeQ model and in the further sessions all the topics (teaching methods) of pedagogy of science were taught by implementing NTeQ model in the computer lab where each student teacher got access of computer to work individually.

DATA COLLECTION TOOLS

NTeQ Model Lesson Plans

The NTeQ model based lesson plans were prepared by researcher on different teaching methods for subject Pedagogy of Science. The teaching methods taught were Demonstration Method,, Project Method, Discovery Method, Inquiry Method, Inductive and Deductive Approach. Face validity of these lesson plans was checked by experts.

Achievement Test

A self prepared achievement test was used by researcher for data collection. The test contains 30 MCQ (Multiple Choice Questions) of different domains (Knowledge, Understanding, Application). For Pilot testing the test was conducted on 20 student teachers of pedagogy of science. The reliability of the test was calculated and Cronbach's Alpha coefficient came out to be 0.801 which is greater than 0.7 and considered as a sensible value of reliability (Pallant, 2005).

Raven's Progressive Matrices (RPM)

The standard Raven's Progressive Matrices (1960) was used by the researcher to check the IQ equivalence of both groups. The reliability of the scale is 0.83.

DATA ANALYSIS

The quantitative data was analyzed by using SPSS software. t-test and ANCOVA was used to analyze the data.

Pre Test

Table 1 and 2 presents the analysis of the pre test scores of CG and EG. The value of $F = 1.395$ and $\text{Sig.} = 0.242 > 0.05$ indicates equal variances can be assumed. Further in the table t-test for equality of means is presented. The value of $t = 1.746$ at $df = 58$ shows 2-tailed significance is 0.086 ($p > 0.05$) which indicates that there is no significant difference between the academic achievement mean score of CG and EG on pre test. Hence, we can say that both groups lies at the same level of achievement before introducing them with different teaching methods of pedagogy of science and NTeQ model.

Table 1. Descriptive Statistics of Pre-test Academic Achievement Scores of the CG and EG

Variable	Group	N	M	SD
Academic Achievement	CG	30	13.967	2.965
	EG	30	15.167	2.320

Table 2. Independent Samples t-test Result of Pre-Test Academic Achievement Scores of CG and EG

Variable		Levene's Test for Equality of Variances						t- test for Equality of Means					
		F	Sig.	t	df	P	Mean Difference						
Academic Achievement	Equal Variances Assumed	1.395	0.242	1.746	58	0.086	1.200						

IQ Scale

The analysis of IQ scale scores showed both groups have comparable IQ level. The students were categorized in three grades based on RPM. Grade I consisted of 14 and 13 participants from CG and EG respectively. Grade II consisted of 13 and 15 participants from CG and EG respectively. Grade III consisted of 3 and 2 participants from CG and EG respectively.

Pre- Post Test CG

Table 3 shows the result of Descriptive statistics and paired sample t-test applied on pre-post test scores of academic achievement of CG to see if there is any significant difference between the two or not. The calculated value of $t = 4.316$ at $df = 29$ is greater than table value of $t = 2.04$ at 0.05 level of significance. It indicates that there is a difference in the academic achievement of CG in pre and post test which is significant at 0.05 level of significance. But looking at the pre test mean ($M = 13.967$) and post test mean ($M = 17.800$), it can be said that the difference is not very high.

Table 3. Descriptive Statistics and paired sample t test result of Pre-Post test Academic Achievement Scores of the CG

Variable	CG	Pre Test	Post Test	Df	t
Academic Achievement	M	13.967	17.800	29	4.316
	SD	2.965	3.642		

Pre-Post Test EG

Table 4 shows the result of descriptive statistics and paired sample t-test applied on pre-post test scores of academic achievement of EG to see if there is any significant difference between the two or not. The calculated value of $t = 14.110$ at $df = 29$ is greater than table value of $t = 2.04$ at 0.05 level of significance. It indicates that there is a difference in the academic achievement of EG in pre and post test which is significant at 0.05 level of significance. Also, Looking at the difference in the mean scores, it can be said that the academic achievement mean score of post test ($M = 24.500$) is much higher than the pre test mean ($M = 15.166$) for student teachers' of EG.

Table 4. Descriptive Statistics and paired sample t test result of Pre-Post test Academic Achievement Scores of the EG

Variable	EG	Pre Test	Post Test	Df	t
Academic Achievement	M	15.166	24.500	29	14.110
	SD	2.320	3.025		

Difference in Post-test Academic Achievement Scores of the CG and the EG by Partialling out the Effect of Pre-test Academic Achievement Scores

ANCOVA was used to assess the differences in post-test academic achievement scores between the CG and the EG by considering pre-test academic achievement scores as a covariate. ANCOVA is a statistical technique that helps in balancing out the effect of covariates by adjusting the scores on dependent variable for initial differences on some other variable such as pre-test scores (Field, 2009; Leech, Barrett, & Morgan, 2008). To use ANCOVA it is really important to check and fulfill the assumptions first, and make sure that the covariate meets the requirement to use ANCOVA. According to Cohen (1998) the effect size of intervention is measured by using Partial Eta Square (η^2) as ($\eta^2 = 0.01$ “small effect”, $\eta^2 = 0.06$ “medium effect” and $\eta^2 = 0.14$ “large effect”). The basic assumptions like Significance of pre test scores, homogeneity of regression, and equality of variance were tested and fulfilled to apply ANCOVA.

Table 5 shows the descriptive statistics applied on post test academic achievement scores of CG and EG. The mean and standard deviation of CG is 17.800 and 3.642 respectively, whereas the mean score and standard deviation for EG is 24.500 and 3.025 respectively.

Table 5. Descriptive statistics

Dependent Variable	Group	Mean	Standard Deviation	N
Post Test Academic Achievement Scores	CG	17.800	3.642	30
	EG	24.500	3.025	30
	Total	21.150	4.736	60

Table 6 shows the result of ANCOVA applied on post test academic achievement scores. The results yielded significant differences between the CG and the EG with $F(1, 57) = 57.479$, $p = 0.000$ ($p < 0.05$), partial $\eta^2 = 0.502$ with large effect size (Cohen, 1988). These results indicate that the CG and EG differ significantly in terms of their academic achievement. Since the adjusted mean scores of the EG is 24.500 which is greater than adjusted mean scores of CG 17.800, it indicates that student teachers of the EG performed better in post-test as compared to student teachers of the CG. Hence, it can be said that when student teachers are taught using NTeQ model, their performance improves and their knowledge and understanding of the concept become clearer as they have achieved a better score than the group which was taught by traditional method of teaching.

Table 6. ANCOVA Results for Post-Test Academic Achievement Scores by using Pre-test Academic Achievement Scores as a Covariate

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Pre-Test Academic Achievement Scores	1.607	1	1.607	0.141	0.709	0.002
Group	654.145	1	654.145	57.479	0.000	0.502

Error	648.693	57	11.381			
Total	28163.000	60				

Conclusion

This research aimed to see the effect of Technology integration in classroom via NTeQ model on student teachers' academic achievement in the pedagogy of science. The result shows that when student teachers are taught using traditional method of teaching and are taught about NTeQ model in classroom, then their academic achievement does not show any large effect. But when student teachers' are taught by integrating technology using NTeQ model during the teaching learning process, then they performed very well on achievement test and scores good marks. Hence, it can be concluded that merely telling student teachers about technology will not leave a large effect whereas implementation of technology will definitely leave a large effect on their performance.

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