Research Paper　　　　　　　　　　　　　　　　　　　　　　**Education**

Technology Enabled Learning Strategy Based on Multiple Intelligences Intervention And its Impact On Achievement in History and Civics Of Elementary School Students

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ABSTRACT

The integration of technology into the curriculum has opened up the classroom to accommodate more flexible teaching methods that result not only in more engaged student learning processes, but also in the changing roles of the teacher and student. Technology also assists and accommodates the various intelligences as articulated by Dr. Howard Gardener. The present study is an experimental study exploring the relation of 'technology enabled learning strategy based on multiple intelligences' on the achievement in History and Civics of elementary school students. Data was collected using a Pre-test, Teaching Intervention that involved Technology Enabled Learning Strategy based on Multiple Intelligences, Post-test and Achievement Test. Results indicate a significant relation between 'technology enabled learning strategy based on multiple intelligences and the achievement of students'.

Keywords : Technology Enabled Learning Strategy, Multiple Intelligences

Introduction

The concept of integrating technology in schools has attracted extensive attention in educational research because of the digital world we are living in. Most of the schools, the world over have now integrated technology into the curriculum. Technology is the new tool that has made traditional teaching methods redundant with its wide scope and reach. Children today are more familiar with their favourite sites on the 'World Wide Web' than their textbooks. In such a scenario, it therefore becomes mandatory that teachers familiarize themselves with the latest technology and its appropriate use in integrating it in the teaching learning process to channelize students' interest and motivation to learn with understanding and achieve success.

Technology and Multiple Intelligences in Elementary School Education

Technology in Education comprises the use of educational software, the Internet, Power Point Lessons, Worksheets, Handouts, Simulations, Educational Games and Activities in the teaching learning process.

Technology can definitely be used to facilitate learning in different areas. The concept of 'Multiple Intelligences' indicates that children demonstrate different intelligences and therefore learn differently. The multiple intelligences theory propounded by Howard Gardner states that humans possess several intelligences. He identified seven such intelligences in his original work. These are Logico Mathematical Intelligence, Linguistic Inelligence, Musical Intelligence, Spatial Intelligence, Bodily Kinethetic Intelligence, Interpersonal Intelligence and Intrapersonal Intelligence. (Gardner 1999: 41-43).

There is no "right way" to integrate intelligences or technology into the classroom.

The key is to provide the most effective learning environment for students.

Kagan and Kagan (1998) in their study found that the more diverse learning experiences we provide our students, the more robust their education will be, the more ways they will learn each topic, hence the more they are prepared to succeed in a world marked by increasing diversity and an accelerating change rate.

In a study by Onika Douglas (2008) on 'The effects of the multiple intelligence teaching strategy on the academic achievement of eighth grade math students', she found that performance on a post mathematics assessment for students exposed to Multiple Intelligences showed considerable increase when compared to those taught using direct instruction.

The concept of combining both 'Technology and Multiple Intelligences' is fairly new, though some educationists have experimented with this concept.

In an experimental study titled, 'Schools Beyond Walls' M. Srinivasan, (1990) Principal of Gear Innovative International School, Bangalore stated that Multiple Intelligences had two related impacts that aid in transforming schools. It enables a better understanding of each individual child's unique talents and provides each child with more confidence in his/her learning process and helps transform the roles that teachers and administrators must play in enhancing the teaching learning process. He also suggests that Information Technology (IT) is the second crucial tool that must be utilized in transforming schools into 'Schools Beyond Walls'.

Bruce Campbell (1996) implemented Gardner's theory in an educational setting. He organized his third grade classroom into seven learning centres, each dedicated to one of the seven intelligences. An action research project was conducted in his classroom to assess the effects of this multimodal learning format. The research data revealed that co-operative learning skills and academic achievement improved significantly in all students.

For the purpose of this study, Technology Enabled Learning Strategy is an integration of the Multiple Intelligence Theory with Technology thus using various teaching styles and strategies that will help meet the needs of diverse students in a classroom.

Need And Rationale

An overview of researches carried out in the area of 'Technology and Multiple Intelligences' indicates that these variables have been extensively studied in isolation However, previous literature does not reveal any study which focusses on activities based on a blend of 'Technology and Multiple Intelligences' on elementary school students in India indicating the need for the present investigation.

In the context of emerging trends in employing technology enabled learning in education, the teaching of History and Civics in particular has been by and large very 'text-book' oriented with teachers rarely taking the trouble of going beyond the text to explore issues, challenge existing beliefs and opinions, form value judgements or even appreciate a concept/principle/work. A position paper on the 'Teaching of Social Sciences' published by NCERT (2006) states, "The popular perception of Social Sciences is that it is a non-utility subject. As a result low self-esteem governs the classroom transaction process with both teachers and students feeling uninterested in comprehending its contents." This paper therefore attempts to look at the design of 'Technology Enabled Learning Strategy' based on the Multiple Intelligences approach in History and Civics that will integrate technology and the various intelligences of students and how a meaningful blend of the two can result in holistic learning and higher achievement for the students.

Statement Of The Problem

Technology Enabled Learning Strategy Based on Multiple Intelligences Intervention And its Impact On Achievement in History and Civics of Elementary School Students

The Methodology

This paper is based on a 'Pretest Posttest Experimental and Control Group Design' in order to measure the impact of 'Technology Enabled Learning Strategy based on Multiple Intelligences' on the 'Achievement' of students in History and Civics.

2 sections of Class VI were selected for the empirical study. Section A was the Experimental Group and Section B was the Control Group. The Pre test was then administered to both groups. The Experimental group was treated to the 'Technology Enabled Strategy Teaching Intervention based on Multiple Intelligences' while the Control group was taught through traditional methods.

Sample Size And Technique:

Table showing details of samples drawn from a State Board School in Bangalore

Tabl1 1:

Control Group	Experimental Group	Total
Class VI B	Class VI A	
34	30	64
Total		64

Tools Used:

1. Test for equating groups
2. Pre test and Post test for 25 marks designed by Researcher
3. Teaching Intervention - Technology Enabled Learning Strategy based on MI

Achievement Test in History and Civics

The Pretest and Post Test:

The items selected for both the Pre-test and Post-test were based on Blooms' taxonomy of educational objectives as well as catering to some of the multiple intelligences such as Linguistic, Logico-mathematical, Spatial, Interpersonal and Intrapersonal. The Post-test and Pre-test were equal and parallel tests in the number of items, choice of test items, difficulty level and marking scheme.

Teaching Intervention: The Researcher prepared the Content Modules i.e. 'Technology Enabled Learning Strategy based on Multiple Intelligences' using the 1st Semester syllabus for Class VI Karnataka State Board in History and Civics. The teaching intervention used a blend of technology enabled learning strategy based on the Multiple Intelligences. Power Point lessons for each unit were prepared with animated timelines, colourful visuals and genealogy charts. Musical CDs were also used along with Role Plays. A posttest after the teaching intervention was given to both the control and experimental groups.

The Achievement Test: A standard Achievement test in History and Civics for 25 marks was also administered to both groups. This was a standard paper with both short answer and objective type items based on the School's parameters for the 1st Semester Examination.

Results

Table 2   Mean and SD scores of Pretest and Posttest for Control Group and Experimental Group

Variables	Summary	Control group	Experiment group	Total
Pretest	n	34	30	64
	Mean	13.76	13.17	13.48
	Std.Dev.	3.58	2.56	3.13
Post test	Mean	11.62	18.33	14.76
	Std.Dev.	1.6	4.25	4.58

The above table 2 shows the Mean Scores and Standard Deviation of the Pretest and Posttest of the Control and Experimental Groups. The students of experimental group have higher Mean Scores in the Posttest. The following figure 2 graphically represents the same.
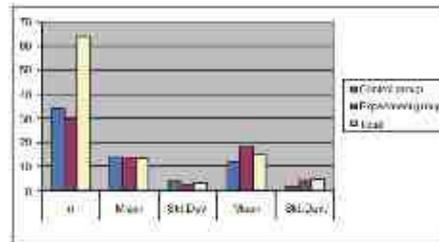
Figure 1

Table 3: Mean and SD of achievement scores of students by study groups

Summary	Control group	Experiment group	Total
n	34	30	64
Mean	16.52	18.07	17.25
Std.Dev.	1.84	3.82	3.02

The above table 3 presents the Mean and SD of achievement scores of students by study groups.   The total mean of achievement scores is 17.25±3.02.

The students of experimental group have higher achievement scores (18.07±3.82) as compared to control group (16.52±1.84). The mean scores are presented in the following figure 2.
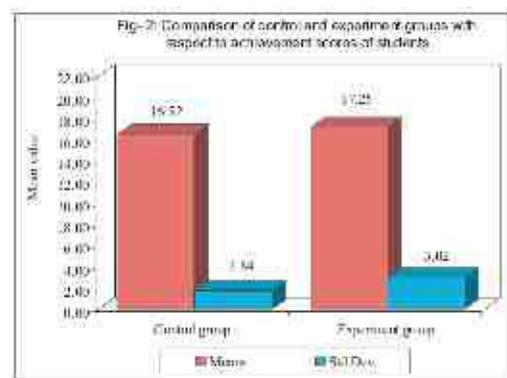
Table 4: "Results of t-test between control and experiment groups with respect to pre test, posttest and achievement scores with technology enabled learning strategy MI Modules"

Variable	Group	Mean	SD	Equal Variances (Levene's test)	t-value	p-value
Pretest	Control	13.764	3.576	Assumed	0.7597	0.450
	Experiment	13.166	2.560			
Post test	Control	14.623	1.595	Assumed	- 8.170	0.000*
	Experiment	18.333	4.245			
Achievement Score	Control	16.529	1.846	Not Assumed	- 2.006	0.052
	Experiment	18.066	3.823			

There is no significant (statistical) difference between control and experimental groups with respect to pretest scores (t=0.7597, p>0.05) of technology enabled learning strategy MI Modules at 5% level of significance. It means that, the pre test scores are similar in control and experimental groups. There is a significant difference between control and experiment groups with respect to post- test (t= - 8.170, p<0.05). There is a significant difference between control and experimental groups with respect to achievement scores (t=-0.050, p<=0.05) scores of technology enabled learning strategy MI Modules at 5% level of significance.

Table 4(a): Paired t-test result of pre test, posttest by its technology enabled learning strategy MI Modules for control and experiment group:

MI Module	Test group	CONTROL GROUP (n = 34)			
		Mean	SD	t-value	p-value
Linguistic	Pre test	3.500	0.992	2.963	0.006
	Post test	2.918	0.668		
Logico mathematical	Pre test	1.588	0.856	3.651	0.001
	Post test	1.147	0.743		
Spatial	Pre test	2.267	0.827	- 0.442	0.661
	Post test	2.323	0.638		
Interpersonal	Pre test	3.294	0.835	3.106	0.004
	Post test	2.709	0.629		
Intra-personal	Pre test	3.117	0.977	3.470	0.001
	Post test	2.529	0.614		

MI Module	Test group	EXPERIMENTAL GROUP (n = 30)			
		Mean	SD	t-value	p-value
Linguistic	Pre test	3.167	0.698	- 4.372	0.000
	Post test	3.867	1.105		
Logico mathematical	Pre test	1.433	0.935	-7.940	0.000
	Post test	2.533	1.306		
Spatial	Pre test	3.000	0.694	- 0.1500	0.000
	Post test	4.867	0.345		
Interpersonal	Pre test	2.768	0.727	- 6.547	0.000
	Post test	3.733	1.229		
Intra-personal	Pre test	2.800	0.761	- 3.117	0.004
	Post test	3.333	1.184		

*p<0.05

As we see from Table 4(a) that there is a significant difference between pre test and post test scores of all the intelligences at 5% level of significance in experimental group.

Table 5: "Results of t-test between boy and girl students with respect to achievement scores by t-test"

Gender	Mean	SD	Equal Variances (Levene's test)	t-value	p-value
Boys	16.897	2.741	Assumed	-1.1711	0.246
Girls	17.800	3.3911			

From the results of the above table, it can be seen that, there is no significant difference between boy and girl students with respect to achievement scores (t=-1.1711, p>0.05) of technology enabled learning strategy MI Modules at 5% level of significance.

Table 6: "Results of t-test between low SES and medium SES students with respect to achievement scores by t-test"

SES	Mean	SD	t-value	p-value
LG	17.545	3.173	0.354	0.724
MG	17.188	3.013		

From the results, it can be seen that, there is no significant difference between low SES and medium SES students with

respect to achievement scores (t=0.354, p>0.05) of technology enabled learning strategy MI Modules at 5% level of significance.

Correlation between posttest score and achievement score with respect to experimental group:
Table 7

Correlations a

		Ach_tes_ Sc_MI	Total Post test Score
Ach_tes_Sc_MI	Pearson Correlation	1	.874**
	Sig. (2-tailed)		.000
	N	30	30
Total Post test Score	Pearson Correlation	.874**	1
	Sig. (2-tailed)	.000	
	N	30	30

**. Correlation is significant at the 0.01 level (2-tailed).

a. Group type = Treatment

Fig 3: Scatter plot of post score and achievement scores
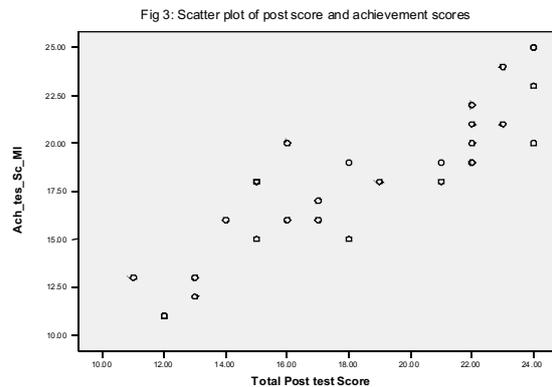
As we see from scatter plot, (fig - 3) as the post score increases, there is a linear increase in achievement score, which is also significant. These two are highly correlated with a value of r = 0.874 (from above output) and it is positive.

Table 8 Correlation coefficient between posttest and chievement scores:

Variable	Control Group (n = 34) Correlation co-efficient	Experimental Group (n = 30) Correlation co-efficient	t-value	p-value
Post test Linguistic	0.137	0.769**	- 4.266	0.000
Achievement score			- 2.006	0.000
Post test Logico mathematical	0.427*	0.732**	- 5.126	0.000
Achievement score			- 2.006	0.000
Post test Spatial	0.365*	0.450*	- 19.422	0.000
Achievement score			- 2.006	0.000
Post test Interpersonal	0.034	0.767**	- 4.124	0.00
Achievement score			- 2.006	0.000
Post test Intra-personal	0.037	0.680**	- 3.342	0.000
Achievement score			- 2.006	0.000

* Significance at 0.05 level, ** Significance at 0.01 level

From the results of table 7, it can be seen that a significant and positive relationship is observed between achievement and posttest scores of technology enabled learning strategy MI Modules of total students (r=0.544, p<0.05) at 1% level of significance under control group. An increase in correlation coefficient of 0.874 is observed between posttest and achievement scores for experimental group showing significant association between the two as shown in the graph (figure 4) above.

The table 8 shows significant increase in correlation coefficient of individual intelligences in the experimental group.

Educational Implications

The results indicate that the teaching intervention of technology enabled learning strategy based on multiple intelligences has had a definite impact on the post-test and the achievement test scores of students. Therefore, teachers must be trained to use technology based on multiple intelligences. School Principals and Managements should organize seminars and workshops to familiarize, acquaint and train teachers in using technology based on multiple intelligences. The Government should also ensure that all schools are provided with computers and Internet facility so that teachers and students have access to them and use it in an optimum manner. In an age of e-books, online tutorials and I-pads, stakeholders in education cannot afford to ignore the impact of technology. The co relational analyses showed that the 5 MI components Linguistic, Logico-Mathematical, Spatial, Inter-personal and Intra-personal showed an increase and an impact on the Achievement scores of students in the experimental group. Hence it is suggested, that teachers employ a meaningful and holistic blend of technology enabled learning strategy and multiple intelligences to increase student comprehension, involvement and thereby their academic achievement. Innovative and creative teachers can harness the power of technology in diverse ways to create a meaningful and effective learning environment for their students, in every subject. They can provoke, inspire, enthuse, initiate, motivate and spur students to higher order thinking skills which in turn can help mould the future citizens of this country and world.

School administrations must encourage and support their teachers in the creative use of technology enabled learning strategy based on multiple intelligences, so that students not only enjoy the experience but also benefit from such an experience. Teachers who employ such innovative methods and strategies must be recognized, lauded and rewarded with incentives so that other teachers are also motivated to use such strategies. The Government should take the initiative to formulate policy decisions that will encourage implementation of such technology enabled learning strategies based on multiple intelligences across the spectrum of both urban and rural schools. The traditional method of teaching can no longer continue to hold the attention of students or motivate them. Therefore, the extent to which teachers can successfully employ such a blend of teaching techniques would determine the success rate of students.

Summary And Conclusion:

Based on the findings there is a clear direction and feasibility to further empirically intensify the study of technology enabled learning based on the Multiple Intelligences approach.

It can be concluded that the Linguistic, Logico-mathematical, Spatial, Interpersonal and Intrapersonal intelligence scores were higher in the Experimental group mainly due to the use of pictorial, symbolic and chronological timelines along with colourful visuals in the Power Point lessons during the intervention which generated a lot of animated discussion and reflection. This clearly indicates that learning modules that combine both 'Technology and Multiple Intelligences' can be effective tools in providing students with meaningful learning experiences that result in higher academic achievement of students.

Thus, Educators must prepare for a technology-rich future and keep up with change by adopting effective strategies that infuse lessons with appropriate technologies based on psychological theories such as the Multiple Intelligences approach, which does provide a theoretical basis, if they wish to motivate their students to higher achievement and bring about meaningful learning.

Limitations

The sample of the study is confined to students studying in Standard VI of a State Board School in the city of Bangalore. The sample size is confined to 30 + 34 students. The study is confined to the study of History and Civics in Standard VI.

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