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EFFECT OF MULTIMEDIA ON LEARNING OUTCOME OF PROSPECTIVE TEACHERS: AN EMPIRICAL STUDY

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Abstract

The present study was undertaken to find out the effect of multimedia package on learning outcome of prospective teachers in relation to their levels of intelligence.Pre-test post-test quasi experimental research design was adopted in which 60 prospective teachers selected from college of education of Rohtak using stratified random sampling technique on the basis of varied levels of intelligence(high, average and low) out of which 30 prospective teachers were taught through multimedia formed as experimental group (EG)and 30 prospective teachers were taught through conventional method of teaching formed ascontrol group (CG). To measure learning outcome, investigator applied self-developed achievement test for prospective teachers on unit-III (learning perspectives) of course-1 of B.Ed. 1st year syllabus (B.Ed. 2-year programme (2016-18)). Lesson plans and formative assessment developed with the help of multimedia strategy to carry out teaching learning process on experimental group for nine weeks only. At the end of the experiment, learning outcome per-test, post-test and mean gain score was computed. Then, data were subjected to analyzed by using ANOVA and t-test to determine the performance by comparing the mean scores. Results revealed that prospective teachers taught through multimedia package showed significant improvement in their learning outcome than the prospective teachers taught through conventional method. Further, high, average and low intelligence prospective teachers taught through multimedia package performed better than counter parts. There was no significant interaction effect of instructional treatment and levels of intelligence on mean gain learning outcome scores. In conclusion, this study had proven that teaching through multimedia instructional package enhance the prospective teachers' learning performance.

Keywords: *Multimedia Instruction, Conventional Instruction, Learning Outcome, Levels of Intelligence.*

INTRODUCTION

The development in computer technology and digital media have offered students' new improved learning opportunities. As a result, educational uses of multimedia cannot have ignored in today's class room. Since teachers are the key to providing quality learning experiences for students, they need to make the best use of multimedia within framework of educational theories and learning principles. Multimedia knowledge will be valuable for teachers who want to integrate multimedia into curriculum and teach with cognitive tools. Multimedia technology is better than tradition method of teaching. Along with multimedia in pre-service teacher education to achieve successful learning outcome for various content areas.The researchers are of belief that rudimentary changes in computing, entertainment and education are due to the rapid growth of multimedia technology (ibid). Despite the well-documented provocations associated with the assimilation of new technologies in education, Multimedia teaching integrates verbal material, such as printed and spoken text, and visual material, such as pictures, graphs, photos, and dynamic graphics (Mayer et. al,2001) [18].

Learning outcome indicates the intended gain in knowledge and skills related to different levels of learning that will be the aim to achieve. Learning outcomeassessed with the help of proper evaluation tool. The university distinguished the module outcomes from those for the programme, which is defined as Programme Outcome: An expression contained within a programme specification of what a typical learner will have achieved at the end of the programme. Programme outcomes are

related to the qualification level and will relate to the sum of the experience of learners on a particular programme (lagasse,2000) [14]

In the present study, the learning outcomes of prospective teachers studied in terms of academic achievement. learning outcome often referes to as degree/ level of performance success and proficiency attainment in academic work. Learning outcome is an expression of what a student will demonstrate on the successful completion of a module. Learning outcome is related to the level of the learning. It indicates the intended gain in knowledge and skills that a typical student achieves and should be capable of assessed.(Sharma & Khakkar,2010) [20]

LITERATURE FRAMEWORK

In the realm of multimedia package for instruction, there has been a strong link between computer and learning outcome. Various studies have shown that students who studied topics food and nutrition by multimedia have higher achievement than the conventional teaching control group(Chavan, Patankar& Patil, 2017) [2]) studied the multimedia package developed was effective in terms of achievement of class XI students in Economics. (Yudhister (2015)[25]Nidhi (2010) [16] reported that multimedia learning package helps in improving the achievement of B.Ed. learners. Both teachers as well as students showed positive opinion towards using multimedia learning package. Ultimately, Higher achievers in multimedia-based teaching technique showed significant supremacy over high achievers taught by traditional method. Retention of the students of experimental group was found significantly better than that of the students of control group. A significant positive effect of multimedia found on the academic learning outcome of student teachers. (Suleman et al. ,2012)[24]

OBJECTIVES OF THE STUDY

1 To compare the mean learning outcome scores of prospective teachers adjusted on intelligence and socio-economic status taught through Multimedia Teaching Method (MTM) and through conventional Teaching Method (CTM) before experimental treatment.

2 To compare the mean learning outcome scores of prospective teachers adjusted on intelligence and socio-economic status taught through Multimedia Teaching Method (MTM) and through Conventional Teaching Method (CTM) after experimental treatment.

3 To study the main effect of Instructional treatment [Multimedia Teaching Method (MTM) & Conventional Teaching Method (CTM]) on the mean gain learning outcome scores of the prospective teachers after experiment treatment.

4 To study the main effect of levels of intelligence (high, average & low) on the mean gain learning outcome scores of the prospective teachers after experiment treatment.

5 To study the interaction effect of Instructional treatment [Multimedia Teaching Method (MTM) & Conventional Teaching Method (CTM]) and levels of intelligence (high, average & low) on the mean gain learning outcome scores of the prospective teachers after experiment treatment.

HYPOTHESES OF THE STUDY

H1.1 At the end of experiment, the pre-test group of prospective teachers taught through multimedia package attained a significantly higher on learning outcome score than the group of prospective teachers taught through the conventional method.

H1.2 At the end of experiment, the post-test-group of prospective teachers taught through multimedia package attained a significantly higher on learning outcome score than the group of prospective teachers taught through the conventional method.

H_o1.3 There is no significant main effect of instructional treatment [Multimedia Teaching Method (MTM) & Conventional Teaching Method (CTM)] on the mean gain learning outcome scores of the prospective teachers after experiment treatment

H_o1.4 There is no significant main effect of levels of intelligence (high, average, low) on the mean gain learning outcome scores of the prospective teachers after experiment treatment

H_o1.5 There is no significant interaction effect of instructional treatment [Multimedia Teaching Method (MTM) & Conventional Teaching Method (CTM)] and levels of intelligence (high, average, low) on the mean gain learning outcome scores of the prospective teachers after experiment treatment

DESIGN OF THE STUDY

The present study is pre-test post-test quasi-experimental research design.

SAMPLE

The sample for the study comprises of 60 prospective teachers of varied level of intelligence (high (14), average (32) and low level (14)) studied in G.B. College of Education, Rohtak. The 60 Prospective teachers were equally divided and formed as experimental (30 prospective teachers) and control group(30 prospective teachers).

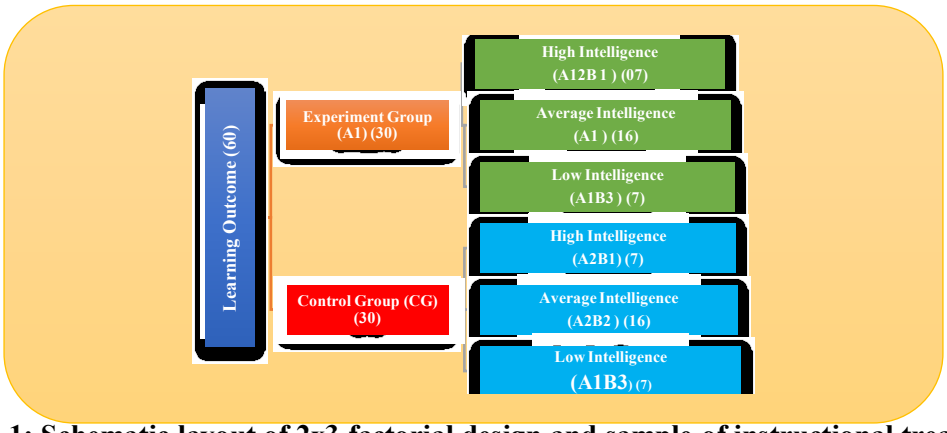

Fig. 1: Schematic layout of 2x3 factorial design and sample of instructional treatment and levels of intelligence on mean gain learning outcome scores of prospective teachers.

TOOL USED

Following tools were used for the purpose of collecting data related to different variables covered in the study:

- Misra& Pal's Test of General Intelligence for College Students (TGI-MP) (2016) [15] to measure the intelligence of prospective teachers
- Kalia &Sahu'sSocio-Economic Status Scale -Urban and Rural (SESS-UR-KASS)(2012) [13] to measure the socio-economic level of prospective teachers.
- Achievement test for prospective teachers is developed by investigator herself was used to measure learning outcome of the prospective teachers. The test consists of 75 items with reliability of .85 and high content validity
- Multimedia package for prospective teachers (MPPT) is developed by investigatorwas used. The package was developed by using software such as Adobe Photoshop 0.7 version, Adobe sound booth, and Swish MX 2.0.

PROCEDURE OF THESTUDY: This study examined the effect of multimedia teaching method (MTM) on the learning outcome of prospective teachers. For this purpose, two groups were formed i.e. experimental group that taught through the multimedia teaching method (MTM) and control group that taught by conventional teaching method(CTM). To collect the data of prospective teachers' learning outcome, the investigator prepared an achievement test on topic unit-3 'Theoretical perspective to enhance learning among children and adolescent' in the course-1: Childhood & growing up of B.Ed. syllabus.The nine weeks experimental treatments were given with help of multimedia package developed by investigator to experimental group and conventional teaching to

control, group and achievement test applied before and after experimental treatment to both the groupsand collected pre-test, post-test and mean gain scores.

STATISTICAL TECHNIQUES USED

1. Descriptive statistic such as Mean, S.D. were worked out on the scores of learning outcome.
2. Two-way analysis of variance (ANOVA) with 2x3 factorial design was employed to study the main effects and interaction effect of independent variables (instructional treatments and levels of intelligence) on dependent variable (learning outcome) supplement by t-test. To test the assumption of homogeneity of variable for ANOVA, Levene's test was employed.

RESULT AND DISCUSSION

1. Comparison of learning outcome scores of experimental and control groups(Before Experimental Treatment)

Considering the objective 1, this section deals with the comparison of learning outcome scores (Achievement test scores) of the two groups experimental group (EG), & control group(CG) of prospective teachers at pre-test phase then learning outcome scores were subjected to 't-test'. The means, S.D.'s and t-values of both the groups (EG & CG) at pre-test phase have been presented in table .1.

Table 1 t-values for difference in Learning Outcome Scores of Experimental and Control Group (Before Experimental Treatment)

Variable	Group	N	Mean	S.D.	Df	't' value	Level of Significance
Pre-test Learning Outcome	**Experimental**	**30**	**35.00**	**6.09**	**58**	**0.281**	**Not Significant**
	Control	**30**	**35.47**	**6.76**			

The results displayed in table 1 reveals that the t-value0.281 of pre-test scores of experimental group and control group is not significant. The mean value for experimental group was found to be 35.0 while for control group it was 35.47. Thus, the**directional hypothesis H**1.1, '*At the end of experiment, the pre-test group of prospective teachers taught through multimedia package attained a significantly higher on learning outcome score than the group of prospective teachers taught through the conventional method.*

' is **rejected**. It may therefore be concluded that there was no significant difference in the learning outcome scores of both the groups (experimental & control) before conducting experiment. The mean scores are further presented graphically in fig. 2.

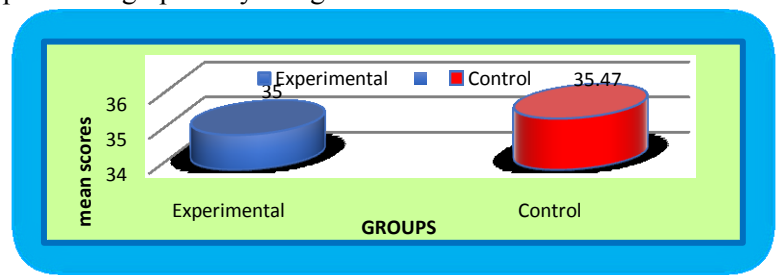

Fig. 2 Comparison of Pre-test Mean Learning Outcome Scores of Experimental & Control Group (Before Experimental Treatment)

2. Comparison of learning outcome scores of experimental and control groups (After Experimental Treatment)

Considering the objective 2, This section deals with the comparison of learning outcome scores (Achievement test scores) of the two groups experimental group (EG), & control group(CG) of prospective teachers at post-test phase then learning outcome scores were subjected to 't-test'. The

means, S.D.'s and t-values of both the groups (EG & CG) at post-test phase have been presented in table 2. The mean scores of learning outcome of experimental and control group are further being presented graphically in fig. 3

Table 2 t-values for difference in Learning Outcome Scores of Experimental and Control Group (After Experimental Treatment)

Variable	Group	N	Mean	S.D.	Df	't' value	Level of Significance
Post-test Learning Outcome	Experimental	30	53.90	8.70	58	4.11	Significant At 0.01 level
	Control	30	45.77	8.17			

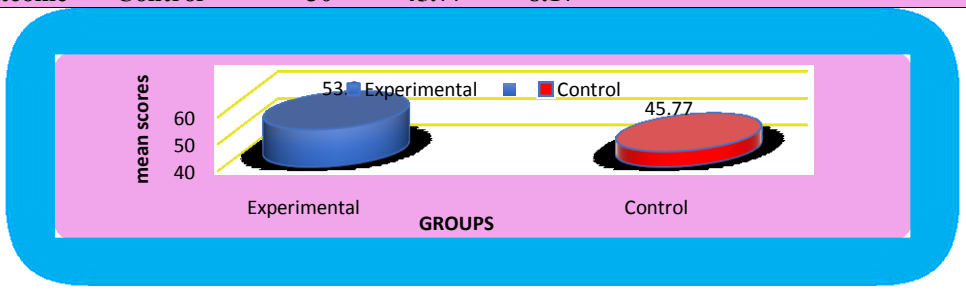

Fig. 3: Comparison of Post-test Mean Learning Outcome Scores of Experimental & Control Group (After Experimental Treatment)

The results displayed in table 2 reveals that the t-value 4.11 of post-test scores of experimental and control groups is significant at 0.01 levels. The mean value for experimental group was found higher (M= 53.9) than the control group (M= 45.7) on learning outcome scores at post-test stage. Thus, the**directional hypothesis H1.2** of the study, '*At the end of experiment, the post-test-group of prospective teachers taught through multimedia package attained a significantly higher on learning outcome score than the group of prospective teachers taught through the conventional method*' stands **retained**. It may therefore be concluded that the subject exposed to multimedia teaching method (MTM) achieved significantly higher mean level of learning outcome in comparison to that in conventional teaching method. (CTM). It can therefore be concluded that multimedia teaching method were found to be more effective in raising the learning outcome of prospective teachers.

The result is in tune with conclusion drawn by various researches abroad as well as India. Mao & Hu (2013) [17], Patil (2006), [21]Singaravelu (2009) [23]&Yudhister (2015) [25]found that multimedia package & Edu cam smart class (Sharma & Anju, 2016) were significantly superior to conventional method in terms of achievement of students.The findings are supported by Suleman et al. (2012) [24]foundsignificant positive effect of multimedia on the academic learning outcome of student teachers.Aloraini (2012) [1] observed that the development of the academic achievement for the experimental group is greater than that of control group. Ibrahim and Watts (2014)[8]showed that students' Multimedia-based discussion post scores related positively and significantly to their frequency of using computers in online courses. In the contrary Jothikani and Thiagarajan (2004) [9] found the mean score of post-test of control groups was significantly higher than that of the experimental group.

3 Effects of instructional treatment and levels intelligence on mean gain learning outcome scores of prospective teachers

In order to study the effect of instructionaltreatment and levels of intelligence,first to check the homogeneity of variance, Levene's test of Equality of Variance has been applied on the data and it reports that F_{Levene} is 1.32 with degrees of freedom df 5,54 ($p = 0.273$) which does not fall in the critical region this means to acceptance of H_0 ($\sigma^2A= \sigma^2B= \sigma^2C= \sigma^2D= \sigma^2E= \sigma^2F$). Therefore, it is

reasonable to believe that the variance of six groups are homogenous i.e. the groups are assumed to have similar or equal variances

The summary of descriptive statistics i.e. means and SD.'s of sub samples of 2x3 design for mean gain learning outcome scores of prospective teachers with respect to instructional treatment and levels of intelligence have also been presented in the table- 3 and fig. 4.The summary of Two-Way ANOVA (2x3) for post-test mean gain learning outcome scores of prospective teachers with respect to instructional treatment and levels of intelligence has been further presented in table- 4, which is analyze in terms of main effects and interaction effect

Table- 3 Summary of descriptive statistics i.e. Means and S.D.'s of sub samples of cells of for mean gain learning outcome scores of prospective teachers

Group of Treatment	Levels of Intelligence	N	Mean	S. D.
Experimental	High	7	19.57	6.35
	Average	16	18.56	6.37
	Low	7	17.42	4.43
Control	High	7	10.57	3.36
	Average	16	8.88	4.46
	Low	7	7.29	2.56
Total	High	14	15.07	6.75
	Average	32	14.72	6.67
	Low	14	14.36	6.31

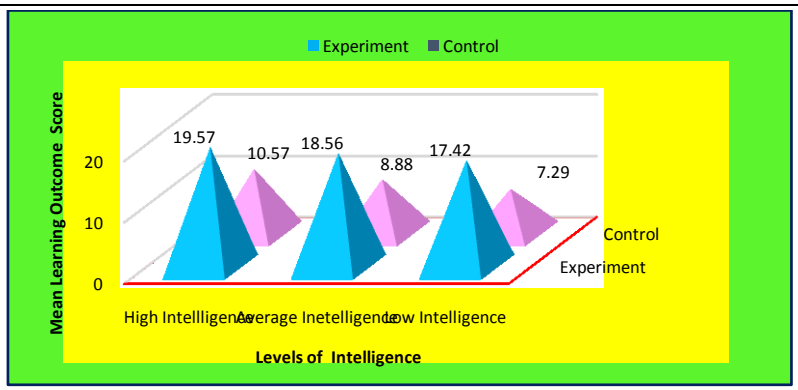

Fig 4: Summary of mean score different sub sample formean gain learning outcome scores of prospective teachers

Table- 4 Summary of Two-Way ANOVA (2x3) for mean gain score of learning outcome of prospective teachers

Sources of Variation	Df	SS	MS	F-Ratio	p-value
Treatment (A)	1	1033.66	1033.66	40.68	.000**
Intelligence (B)	2	3.572	1.79	0.070	.932*
Treatment x Intelligence (A x B)	2	15.54	7.77	0.31	.738*
Between Cells	5	1119.9			
Within Subjects	54	1372.26	25.41		
Total	59	2492.18			

***NS= Not Significant** ****S= Significant at 0.01 level**

Main Effect

(I) Instructional Treatment (A) (MTM & CTM)

On perusal of the Table-4, it is evident that F- ratio 40.68 for main effect of instructional treatment (MTM & CTM) on mean gain learning outcome scores of prospective teachers is found significant at .01 level of significance leading to the inference that experimental treatment yielded difference in mean gain learning outcome score of prospective teachers. Therefore, the null **hypothesis Ho1.3,** '*There is no significant main effect of instructional treatment [Multimedia Teaching Method (MTM) & Conventional Teaching Method (CTM)] on the mean gain learning outcome scores of the prospective teachers after experiment treatment.* **'**is **rejected.**

The result has been supported by the findings of Sharma & Kumari (2010) who investigated that mean scores of mean gains learning outcome of preservice teachers who taught topic 'learning' using multimedia learning package (MMLP) was significantly higher than the mean score of mean gain learning outcome of preservice teachers under tradition instructional setting. They also revealed that MMLP based learning enhanced the learning outcome of the pre-service very significantly. To investigate further, the 't' -value was compute and has been given in Table-5, the mean of mean gain learning outcome scores for main effect of treatment have been presented graphically in the form of bar diagram in fig. 5

Table 5

t-values for mean gain learning outcome scores of MTM (Experiment Group) and CTM (Control Group)

Variable	Group	N	Mean	S.D.	Df	't' value	Level of Significance
Mean-gain Learning	Experimental	30	19.00	5.79	58	6.77	Significant At 0.01 level
	Control	30	10.43	3.79			

A close perusal of Table 5 reveals that the t-value 6.77 for difference in mean gain scores of learning outcome of prospective teachers of experimental and control group is significant at 0.01 level. It is evident that experiment group achieved higher mean gain score (M= 19.00± 5.79) than the control group in learning outcome at post-test stage. Based on the obtained from analysis of data, the group of prospective teachers taught through multimedia package attained a significantly higher mean gain score on learning outcome than the group of prospective teachers taught through the conventional method.

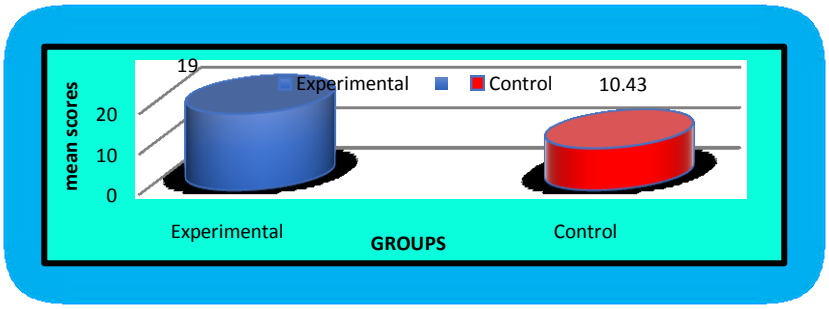

Fig. 5: Comparison of mean gain learning outcome scores for instructional treatment (Experimental (MTM) & Control Group (CTM))

As the examination of mean gain scores that prospective teachers,the finding exposed to multimedia teaching package exhibited better performance as compared to those taught by conventional teaching method are in tune with conclusions drawn by various researches abroad as well as in Indian. The findings are supported Eze&Olusole (2015) [5] recommended that teacher training institution disseminated effective technology integration, it will help to prepare our student teachers for

successful life and careers in a technological world. Ibrahim & Callaway (2014) found that the use of flipped teaching strategies on pre-service teacher shown higher mean learning outcome scores and mean learning outcome scores. Suleman et al. (2012) [24] indicated that multimedia – based teaching learning technique is more effective and successful as compared to traditional teaching method. It is further stated that student teachers of experimental group taught through multimedia-based teaching, were found more attentive and motivated. Findings are also supported by the findings of Aloraini (2012) [1] who revealed that there is statistically significant increase in the learning outcome of theeducation college 's students in the experimental group that received the multimedia instructions. So, it can be easily concluded that teaching through MMP is more valuable than conventional methods of teaching in raising the learning outcome of prospective teachers.

Main Effect

(II) Levels of Intelligence (B)

It can be revealed from table **4** that F-ratio is 0.070 on df 2&54 for main effect of levels of intelligence on learning outcome of prospective teachers is highly significant at 0.05 level (p=.002) which indicates that intelligence has significant main effect on learning outcome of prospective teachers. Therefore, the null **hypothesis Ho 1.4,** "*There is no significant main effect of levels of intelligence (high, average, low) on the mean gain learning outcome scores of the prospective teachers after experiment treatment.*" is **rejected**. It may be said that there is no significant main effect of intelligence on mean gain learning outcome of prospective teachers leading to inference various levels of intelligence does not show any difference in learning outcome due to experimental treatment. It means that High Intelligence (HI), Average Intelligence (AI), Low Intelligence (LI) groups did not show much difference in their mean gain learning outcome after the experiment.

After analysis of different groups, it found that different intelligence group teaching through multimedia package are equal in their performance. In the context of mean scores,mean scores of HI (15.0) is higher than AI (14.7) & LI (14.4) which indicates that high intelligence performed better than average intelligence & low intelligence after being exposed to experimental treatments. This result is in agreement with the findings of Dull & Bisht (2016) [3] who reported that the students that are high intelligence showed superior in achievement there was found difference in the mean of post-test mean gain scores of learning outcome of HI, AI and LI interpret that high intelligence have high academic learning outcome. The reason is that high Intelligence helps in developing critical thinking in students, which helps in concept formation that is pre- conditions for the good academic performance.

Interaction Effect

(III) Instructional Treatment & Levels of Intelligence (A x B)

The F_{AB} value from table-4 for double interaction between instructional treatment (MTM & CTM) and level of intelligence (HI, AI&LI) is 0.31 with Df 2,54 which is significant at 0.01 level leading to inference that there is no interaction between Instructional treatment and levels of intelligence in mean gain learning outcome scores of prospective teachers. Therefore, in pursuance of the 4(c)objective, the **null hypothesis Ho1.5,"***There is no significant interaction effect of instructional treatment [Multimedia Teaching Method (MTM) & Conventional Teaching Method (CTM)] and levels of intelligence (high, average, low) on the mean gain learning outcome scores of the*

prospective teachers after experiment treatment." is **retained**. The Interaction effect of instructional treatment and levels of Intelligence on mean gain learning outcome score has been illustrated in fig.6

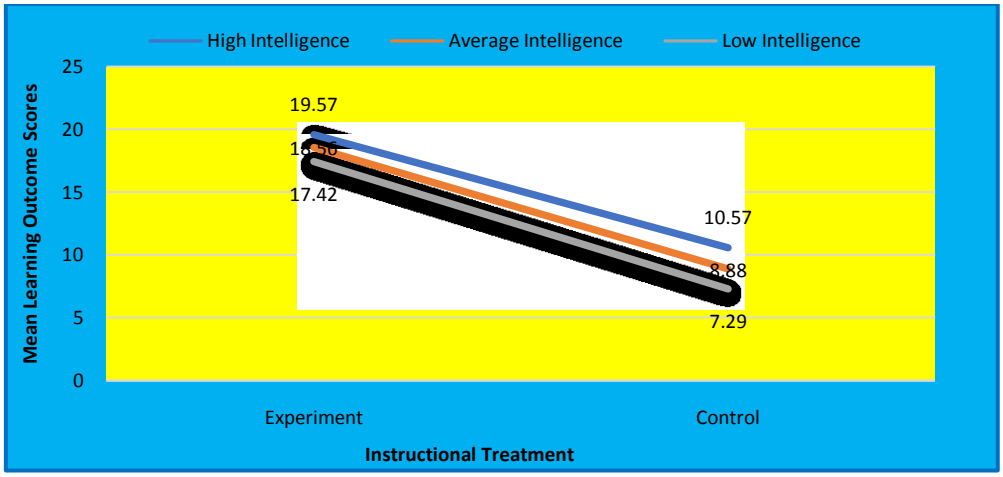

Fig. 6: Interaction effect of instructional treatment and levels of Intelligence on mean gain learning outcome score of prospective teachers

The graphical presentation for A×B do not interaction indicates that there is no significant interaction effect between Instructional treatment [multimedia teaching method (MTM) &conventional teaching method (CTM)]of experimental and control groups respectively and levels of Intelligence [HI, AI & LI] on mean gain score of learning outcome of prospective teachers as the three lines (blue line = high intelligence; red line= average intelligence, grey line= low intelligence) do not interact on Instructional treatment.

FINDINGS OF THE STUDY

1 It was found that there was no significant difference between the learning outcome scores of prospective teachers of control group that taught through conventional method and experimental group that taught through multimedia teaching methodbefore experiment treatment. It was revealed that pre-test group of prospective teachers taught through multimedia package similar to group taught through conventional method on learning outcome scores.

2 It was found from analysis of post-test scores that prospective teachers who exposed to multimedia package teaching achieved higher on learning outcome score in compare to the prospective teachers who were exposed to conventional method. A significant difference was found between post-test learning outcome score of experimental group of prospective teachersthat taught with the help of multimedia package and control group of prospective teachersthat taught through conventional teaching method after experimental treatment.

3 There was significant main effect of instructional treatment on mean gain learning outcome scores of prospective teachers leading to the inference that experimental treatment yielded difference in learning outcome. After comparing the mean gain learning outcome scores of experimental and control groups with the help of t-test, a significant difference was found in both the groups. It discloses the fact that prospective teachers of experimental group have higher learning outcome than the prospective teachers of control group. It can therefore be inferred that prospective teachers who are taught through multimedia instructional method show significant improvement in their learning outcome than the prospective teachers who received instructions through conventional method of teaching.

4 No significant main effect of intelligence on mean gain learning outcome of prospective teachers leading to inference various levels of intelligence does not show any difference in learning

outcome due to experimental treatment. It discloses that High Intelligence (HI), Average Intelligence (AI), Low Intelligence (LI) groups did not show much difference in their mean gain learning outcome after the experiment.

5. There was no significant interaction effect of Instructional treatment and levels of intelligence on mean gain learning outcome scores of prospective teachers leading to inference that two variables do not interact each other with respect to learning outcome of prospective teachers.

CONSLUSION

ICT plays transformation role in the modern system of education. It completely transforms the present classroom teaching. So, there is urgent need for future teacher to acquitted with new technology. Usemodern technologies incolleges of educationfor prospective teachers teaching are is improving the prospective teacher's knowledge as well asmake them aware of innovative techniques. Multimedia will provoke radical changes in teaching system because it is a woven combination of text, graphic, animation, sound and video elements. It represents the second wave in educational technology. It puts the learning into the control of learner. It improves not only learning outcome and it motives the prospective teachers to apply this technology in their teaching that is demand of the present scenario.

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