

## **Multimedia Instruction & Cognitive Style of Prospective Teachers: An Investigation**

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### **ABSTRACT**

New technology has been playing a significant role in determining prospective teachers 'cognitive style. Keeping this in view, the present study was designed to examine influence of multimedia package on cognitive style (Systematic cognitive Style & Intuitive cognitive Style) of urban and rural prospective teachers. Pre-test post-test quasi experimental research conducted on 60 prospective teachers selected from G.B. college of education, Rohtak using random sampling. To measure cognitive style (Systematic cognitive Style & Intuitive cognitive Style) of prospective teachers, investigator applied standardized Jha's Cognitive style inventory (CSI-J) (2011). Instructional treatment given to prospective teacher in experimental and control group for Nine weeks. Cognitive style (Systematic cognitive Style & Intuitive cognitive Style) pre-test, post-test and mean gain score of prospective teachers was computed. Then, data were subjected to analyzed by using t-test to determine the cognitive style by comparing the mean scores. Results revealed that before experiment treatment, pre-test cognitive style score showed no difference in both experiment and conventional group of prospective teachers furthermore, posttest cognitive style score showed significant difference in experimental and control group after teaching experimental group through multimedia package. Experiment group exposed to multimedia teaching achieved higher on systematic cognitive style and Intuitive cognitive Style score in compare to the prospective teachers who were exposed to conventional method. Further it found that prospective teachers exposed to multimedia teaching method (MTM) shown significantly higher mean gain systematic cognitive style and Intuitive cognitive Style score in comparison to conventional method. In conclusion, this study had proven that teaching through multimedia instructional package enhance the prospective teachers' cognitive style i.e. may be either Systematic cognitive Style or Intuitive cognitive Style.

**KEYWORDS: Multimedia Teaching method, Conventional Teaching Method, Cognitive Style**

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It is the teacher education which prepares the teachers among those, who want to join this profession through the process of discovering, analyzing, and synthesizing educative experiences. Multimedia knowledge is indispensable tool for prospective teachers, who must be amalgamate multimedia into content presentation and instruct with cognitive instruments. Cognitive style is a bridge between intelligence and personality measures in the individual. “Cognitive style is unique in its polar nature, having an uncertain measure, where the absence of one feature imply the presence of its extreme. This is in opposition to personality measures that are more multifaceted “. Cognitive style is the individual ‘s approach to adapting and assimilating information, which does not interact directly with the environment, but is an underlying and relatively permanent personality dimension that is observed across many learning examples. Undoubtedly, a learners’ cognitive style is the area of learning style that relates to how learners perceive and store information. Cognitive style inventory is self-report measure of the ways of thinking, judging, remembering, storing information, decision making and believing in interpersonal relationship. The cognitive style is having two extremes as: Systematic style & Intuitive style. The systematic style is associated with logical and rational behaviour that uses a step by step sequential approach to thinking, learning, problem solving and decision making. In contrast the intuitive style is associated with a spontaneous holistic and visual approach i.e. uses unpredictable ordering of analytical steps for solving a problem. Cognitive style is considered here as static, relatively in-built, and fairly fixed characteristic of an individual. Individuals may vary their learning strategy or approach to learning as required, but the underlying cognitive style will remain fairly constant. The cognitive style assumed as a single dimension with two extremes as: Systematic style and Intuitive style. The Systematic style is associated with logical, rational behaviour that uses a systematic, sequential approach to thinking, learning, problem solving and decision-making. In contrast, the intuitive style is associated with a holistic and visual approach.

## **CONCEPTUAL FRAMEWORK**

The study done by Massa and Mayer (2006) revealed the cognitive styles in varied learning preference of spatial ability students and found these were correlated each other. In contrary, Chang, et al. (2010) found that learners adopted distinctive learning approaches, corresponding to various levels of cognitive loads. While, Evans & Waring (2011) found cognitive style and trainee teacher conceptions of differentiation had significant relationship. In the study of Jena, (2013), it found that urban students differ from rural students on cognitive style. Stephen & George (2010) explored that cognitive style with respect to multimedia presentation quality. It was found that significant correlation among cognitive style, user personality and perceived multimedia quality. It was recommended that personality and cognitive style have impact on user multimedia perception. A study by Gerald Haefel., Ivan, Vargas (2011) illustrated that enhancing cognitive style interacts with positive life events to reduce depression. It was observed that enhancing cognitive style will reduce depression. Choi, et al. (2011) examined verbal learning preferences association with cognitive style ability and the finding of the study divulged that spatial abilities predicted visual cognitive style by which learners predict visual learning preferences. Rossafri & Toh (2011) revealed that Multimedia Simultaneously Instruction Students does not show better performance than Multimedia Segmental Instruction students. The studies related to cognitive style elaborated that it is need of the day to increase cognitive style, and learning preference using multimedia for instruction delivery in educating the prospective teachers. In light of above review, it reveals that till date very less study done on multimedia and cognitive style. So, the present study is undertaken with a view to investigate the effect of multimedia on cognitive style of prospective teachers.

## **RESEARCH OBJECTIVES**

- 1 To compare the mean cognitive style score (Systematic cognitive Style & Intuitive cognitive Style) 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 cognitive style score (Systematic cognitive Style & Intuitive cognitive Style) 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 cognitive style score (Systematic cognitive Style & Intuitive cognitive Style) of the prospective teachers after experiment treatment.

### **RESEARCH HYPOTHESES**

- H<sub>0</sub>1 There exists no significant difference between the mean systematic cognitive style and mean Intuitive cognitive Style of experimental group prospective teachers (taught through multimedia package) and control group prospective teachers (taught through the conventional method) before experimental treatment
- H<sub>0</sub>2 At the end of experiment, the post-test-group of prospective teachers taught through multimedia instructional package attained a significantly higher on mean cognitive style score (Systematic cognitive Style & Intuitive cognitive Style) than the group of prospective teachers taught through the conventional method.
- H<sub>0</sub>3 At the end of experiment, the post-test-group of prospective teachers taught through multimedia package attained a significantly higher on mean gain cognitive style score (Systematic cognitive Style & Intuitive cognitive Style) than the group of prospective teachers taught through the conventional method.

### **DESIGN OF THE STUDY**

In the present study pre-test post-test quasi-experimental research design were used.

### **SAMPLE**

The sample for the study comprises of 60 prospective teachers of G.B. College of Education, Rohtak taken randomly. The 60 Prospective teachers were equally divided and formed as experimental (30 prospective teachers) and control group (30 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) to measure the intelligence of prospective teachers. The reliability of the scale is measure by split half that value is 0.95 and test-retest method value is 0.81. Criterion

related Validity was calculated by product moment coefficient of correlation value is 0.68.

- **Kalia & Sahu's Socio-Economic Status Scale -Urban and Rural (SESS-UR-KASS)** (2012) to measure the socio-economic level of prospective teachers. Reliability of scale has been measured by split-half method and test-retest method and the value is 0.86 and 0.71. content validity used to validate the test.
- **Jha's Cognitive style inventory (CSI-J) (2011)** was used to evaluate the cognitive style of the prospective teachers. The full-length split half reliability of CSI was 0.653 and test retest reliability of the whole test was calculated to be 0.39. The validity of CSI was examined by three ways as judge validity; concurrent validity and internal validity. This inventory is highly reliable and valid.
- **Multimedia Package for Prospective Teachers (MPPT)** is developed by investigator was used to teach experimental group. The package was developed by using software such as Adobe Photoshop 0.7 version, Adobe sound booth, and Swish MX 2.0.

### **PROCEDURE OF THE STUDY**

This study examined the effect of multimedia instruction on the systematic cognitive style scores & intuitive cognitive style scores 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) on the basis of intelligence and socio-economic status scale. To collect the data of prospective teachers' cognitive style, the investigator applied Jha's cognitive style inventory. 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 cognitive style inventory applied before and after experimental treatment to both the groups and collected pre-test, post-test and mean gain systematic cognitive style scores & the intuitive cognitive style scores.

### **STATISTICAL TECHNIQUES USED**

Descriptive statistics such as Mean, S.D. & t-test were work out on pre-test , post-test and mean gain cognitive style score (systematic cognitive style scores & intuitive cognitive style scores).

### **ANALYSIS AND DISCUSSION**

## 1 COMPARISON OF EXPERIMENTAL GROUP AND CONTROL GROUP ON SYSTEMATIC COGNITIVE STYLE & INTUITIVE COGNITIVE STYLE (BEFORE EXPERIMENTAL TREATMENT)

This section deals with the comparison of two groups of prospective teachers i.e. experimental group (EG), and control group (CG) before experimental treatment on the systematic cognitive style scores & intuitive cognitive style scores. In the light of the objective 1, pre-test score of systematic cognitive style & pre-test intuitive cognitive style was subjected to ‘t-test’ for find the result for following hypotheses.

- H<sub>0</sub>1(a) There exists no significant difference between the mean systematic cognitive style of experimental group prospective teachers (taught through multimedia package) and control group prospective teachers( taught through the conventional method) before experimental treatment.
- H<sub>0</sub>1(b) There exists no significant difference between the mean intuitive cognitive style of experimental group prospective teachers ( taught through multimedia package) and control group prospective teachers( taught through the conventional method) before experimental treatment.

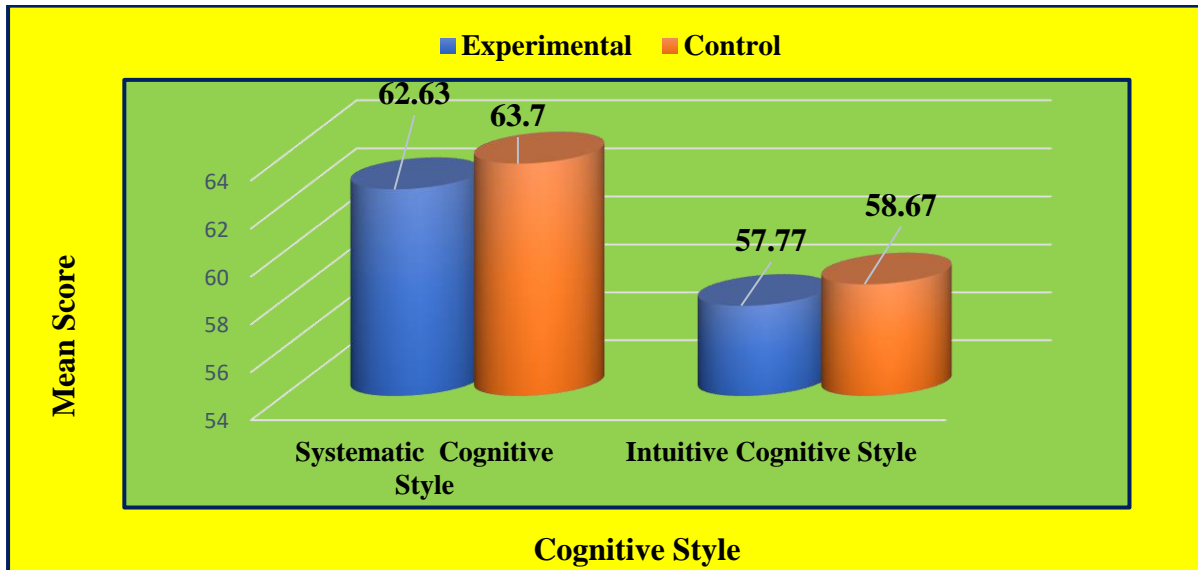
The means, S.D.’s and t-values of systematic as well as intuitive cognitive style score of both the groups (EG & CG) at pre-test phase have been presented in table 1.

**Table 1**  
**t-values for systematic cognitive style scores and intuitive cognitive style scores of experimental (MTM) and control group (CTM) (Before Experimental Treatment)**

	Variable	Group	N	Mean	S.D.	df	‘t’ value	Remarks
<b>PRE-TEST COGNITIVE STYLE</b>	<b>Pre-test Systematic Style</b>	<b>Experimental</b>	<b>30</b>	<b>62.63</b>	<b>16.5</b>	<b>58</b>	<b>1.83</b>	<b>Not Significant</b>
		<b>Control</b>	<b>30</b>	<b>63.70</b>	<b>19.5</b>			
	<b>Pre-test Intuitive Style</b>	<b>Experimental</b>	<b>30</b>	<b>57.77</b>	<b>12.9</b>	<b>58</b>	<b>0.86</b>	<b>Not Significant</b>
		<b>Control</b>	<b>30</b>	<b>58.67</b>	<b>13.0</b>			

It revealed from table 1 that the t-value 1.83 for mean systematic cognitive scores & t-value 0.86 for mean intuitive cognitive scores experimental and control groups before the experiment treatment, were not significant. The null hypothesis H<sub>0</sub>1(a) & hypothesis H<sub>0</sub>1(b) is **retained**.

It can be concluded that there was no significance difference in mean systematic cognitive style scores & intuitive cognitive styles of the both group (experimental & control) before experiment treatment. The pre-test mean scores of systematic cognitive style & intuitive cognitive styles of experimental and control group are further presented graphically in Fig. 1.



**Fig.1: Pre-test Mean Score of systematic cognitive style and intuitive cognitive style scores of experimental group and control group (Before Experimental Treatment)**

## 2 COMPARISON OF EXPERIMENTAL GROUP AND CONTROL GROUP ON SYSTEMATIC COGNITIVE STYLE & INTUITIVE COGNITIVE STYLE (AFTER EXPERIMENTAL TREATMENT)

This section deals with the comparison of two groups of prospective teachers i.e. experimental group (EG), and control group (CG) after experimental treatment on the systematic cognitive style scores and the intuitive cognitive style scores. Considering the objective 2, post systematic cognitive style scores & the post intuitive cognitive style scores was subjected to ‘t-test’ for find the result for following hypotheses.

H<sub>0</sub>2 (a) There is no significant difference between the mean systematic cognitive style of experimental group prospective teachers (taught through multimedia package) and control group prospective teachers (taught through the conventional method) after experimental treatment.

H<sub>0</sub>2(b) There is no significant difference between the mean intuitive cognitive style of experimental group prospective teachers (taught through multimedia package) and

control group prospective teachers (taught through the conventional method) after experimental treatment.

The means, S.D.'s and t-values of both the groups (experiment & control) at post-test phase have been presented in table 2.

**Table 2**  
**t-values for systematic cognitive style scores and intuitive cognitive style scores of experimental (MTM) and control group (CTM) (After Experimental Treatment)**

	Variable	Group	N	Mean	S.D.	Df	't' value	Remarks
<b>POST-TEST COGNITIVE STYLE</b>	<b>Post-test Systematic Style</b>	<b>Experimental</b>	<b>30</b>	<b>79.17</b>	<b>11.9</b>	<b>58</b>	<b>2.80</b>	<b>Significant At 0.01 level</b>
		<b>Control</b>	<b>30</b>	<b>69.97</b>	<b>14.8</b>			
	<b>Post-test Intuitive Style</b>	<b>Experimental</b>	<b>30</b>	<b>74.60</b>	<b>10.0</b>	<b>58</b>	<b>6.03</b>	<b>Significant At 0.01 level</b>
		<b>Control</b>	<b>30</b>	<b>56.37</b>	<b>13.1</b>			

The table 2 exposed that for experimental and control groups after the experiment treatment the t-value 2.80 on mean systematic cognitive scores & t-value 6.03 on mean intuitive cognitive scores which is significant at 0.01 level. The null hypothesis Ho2 (a)& hypothesis Ho2(b) were **rejected**. It can be inferred that multimedia package has enhanced the systematic cognitive style & intuitive cognitive style as experimental group showed higher systematic cognitive style score & high intuitive cognitive style. The mean scores of systematic cognitive style & mean scores of intuitive cognitive styles of experimental and control group are further presented graphically in Fig. 2.



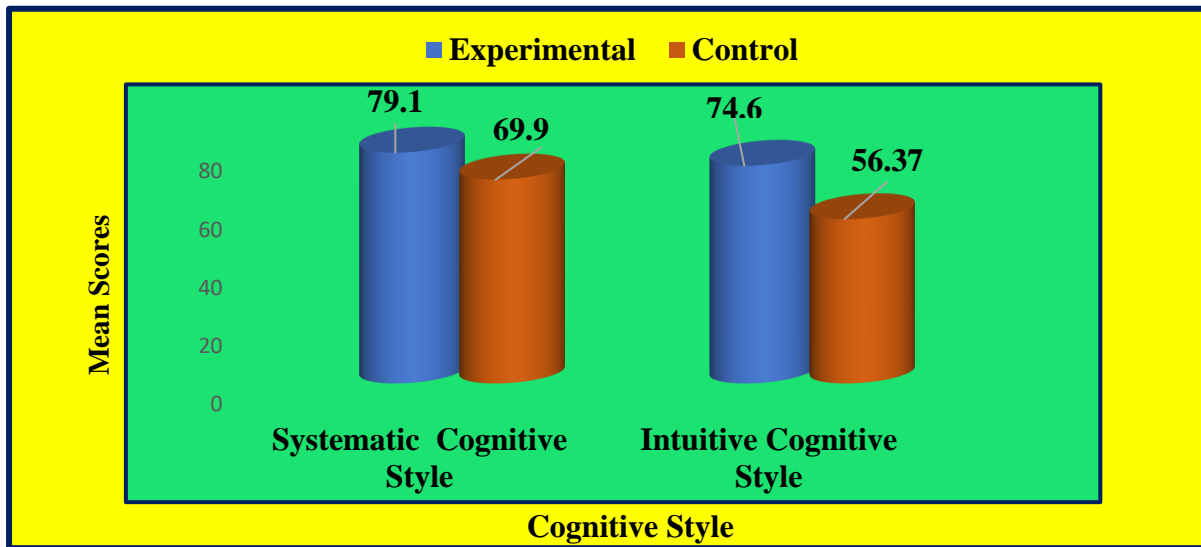


Fig. 2: Mean post test systematic cognitive style & intuitive cognitive style score of experimental group and control group (After Experimental Treatment)

### 3 COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS OF MEAN GAIN SYSTEMATIC COGNITIVE STYLE & MEAN GAIN INTUITIVE COGNITIVE STYLE SCORES

This section deals with the comparison of two groups of prospective teachers i.e. experimental group (EG), and control group (CG) after experimental treatment on the mean gain systematic cognitive style scores and mean gain intuitive cognitive style scores. Considering the objective 3, mean gain systematic cognitive style scores & the mean gain intuitive cognitive style scores was subjected to 't-test' for find the result for following hypotheses.

Ho 3(a) There exists no significant difference between the mean gain systematic cognitive style of experimental group prospective teachers (taught through multimedia package) and control group prospective teachers (taught through the conventional method) after experimental treatment.

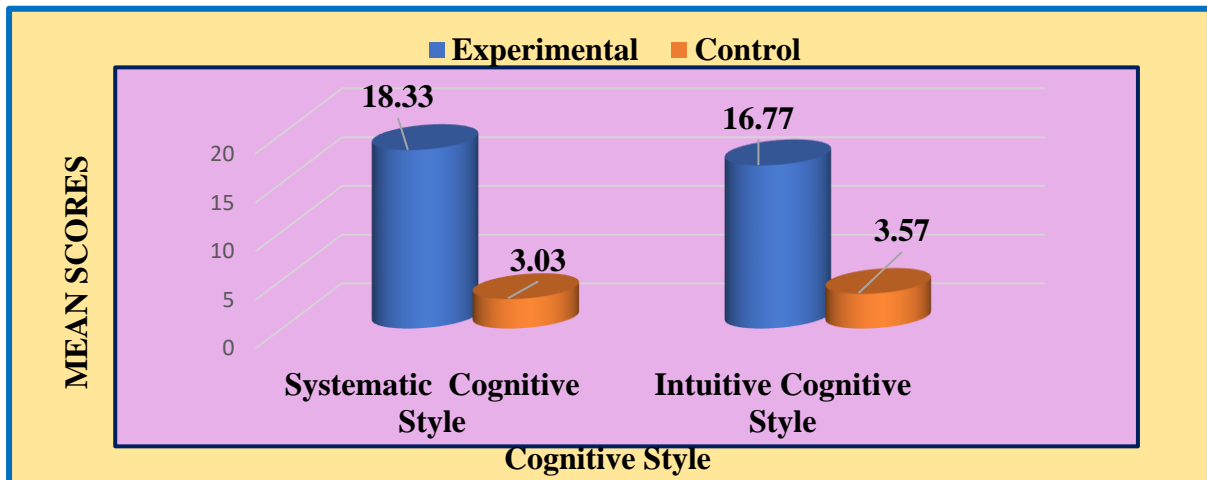
Ho 3 (b) There exists no significant difference between the mean gain systematic cognitive style of experimental group prospective teachers (taught through multimedia package) and control group prospective teachers (taught through the conventional method) after experimental treatment.

The means, S.D.'s and t-values for difference in mean gain systematic cognitive style scores and mean gain intuitive cognitive style scores of experimental & control groups have been presented in table 3.

**Table 3**  
**t-values for post-test mean gain systematic cognitive style and intuitive cognitive style of experimental group and control group (After Experimental Treatment)**

	Variable	Group	N	Mean	S.D.	df	't' value	Remarks
<b>MEAN GAIN COGNITIVE STYLE</b>	<b>Mean-Gain Systematic Style</b>	<b>Experimental</b>	<b>30</b>	<b>18.33</b>	<b>8.80</b>	<b>58</b>	<b>6.34</b>	<b>Significant At 0.01 level</b>
		<b>Control</b>	<b>30</b>	<b>3.03</b>	<b>9.11</b>			
	<b>Mean-Gain Intuitive Style</b>	<b>Experimental</b>	<b>30</b>	<b>16.77</b>	<b>8.93</b>	<b>58</b>	<b>10.1</b>	<b>Significant At 0.01 level</b>
		<b>Control</b>	<b>30</b>	<b>3.57</b>	<b>6.45</b>			

The perusal of Table 3 shows the effect of multimedia package on cognitive style of prospective teachers and it was revealed that for experimental and control groups before the experiment treatment, the t-value 6.34 of mean gain systematic cognitive scores & t-value 10.1 of intuitive cognitive style was significant at 0.01 level. The null hypothesis Ho3 (a) & hypothesis Ho 3 (b) is **rejected**. The mean scores of mean gain systematic cognitive style & mean scores of intuitive cognitive styles of experimental and control group are further presented graphically in Fig. 3



**Fig. 3: Mean score of mean gain systematic cognitive style & mean scores of intuitive cognitive styles of experimental group and control Group**

### FINDING OF THE STUDY

- 1 No significant difference between the systematic cognitive style scores & intuitive cognitive style scores of prospective teachers of control group that taught through conventional method and experimental group that taught through multimedia teaching method before experiment treatment. The pre-test group of prospective teachers taught through multimedia package similar to group taught through conventional method on systematic cognitive style scores & intuitive cognitive style scores.
- 2 A significant difference was found between experimental group of prospective teachers that taught with the help of multimedia package and control group of prospective teachers that taught through conventional teaching method after experimental treatment post-test systematic cognitive style score & intuitive cognitive style scores. It was found from analysis of post-test scores that prospective teachers who exposed to multimedia package teaching achieved higher on systematic cognitive style score & intuitive cognitive style score in compare to conventional method.
- 3 Experiment group of prospective teachers that are exposed to multimedia teaching method (MTM) shown significantly higher mean gain systematic cognitive style score & mean gain intuitive cognitive style scores in comparison to conventional method. It can be inferred

effectiveness of multimedia package using for teaching as compared to the conventional teaching method in enhancing systematic cognitive style score as well as intuitive cognitive style of prospective teachers.

## **CONCLUSION**

It can be concluded that multimedia package has significant effect on systematic cognitive style as well as intuitive cognitive style score. It can be stated that after experimental treatment the cognitive style is more systematic. The present study reveals that the systematic and intuitive cognitive were significantly difference in experimental and control group and experimental group cognitive style boost up with the implementation of multimedia instructional package. The result of the studies (Barker, et al.,2002; Byrne,2002; Ruttun,2003 Mayer et al.,2004 Charoula et al.,2009; Stephen & George,2010; Salahuddin, 2015) showed the agreement with present study finding of improvement in cognitive style of prospective teacher through use of multimedia package instruction method prospective teacher.

## **EDUCATIONAL IMPLICATION**

Multimedia teaching package mode of teaching needs to be introduced for prospective teachers as it significantly enhances cognitive style among would-be teachers. ICT used learning sessions in class may act as a source of edutainment (education plus entertainment). The sessions may include games, recreational activities like solving puzzles and riddles, holding group discussions on some general topics to create interest among prospective teachers. This makes the teachers more resourceful. Important skills such as creativity and communication skills can inculcate through ICT assisted learning in the classroom. The careful incorporation of computer for teaching prospective teachers' course will help the prospective teachers to grasp the basic concept of the course as well as help to easily understand the theories and difficult topics of course.

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