INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE, ECONOMICS & MANAGEMENT

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    INTRODUCTION

    REVIEW OF LITERATURE

    NEED/IMPORTANCE OF THE STUDY

    STATEMENT OF THE PROBLEM

    OBJECTIVES

    HYPOTHESES

    RESEARCH METHODOLOGY

    RESULTS & DISCUSSION

    FINDINGS

    RECOMMENDATIONS/SUGGESTIONS

    CONCLUSIONS

    SCOPE FOR FURTHER RESEARCH

    ACKNOWLEDGMENTS

    REFERENCES

    APPENDIX/ANNEXURE

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- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio" Ohio State University, Nigeria.

CONTRIBUTIONS TO BOOKS
- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

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- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS
- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

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- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

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- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

COGNITIVE STYLES AND MULTI-MEDIA LEARNING: A QUASI-EXPERIMENTAL APPROACH

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ABSTRACT

This paper describes an investigation into the relationship between users' cognitive styles and their performance on a multi-media application. The application was used to present information in form of picture and words by using VICS and ECSA-WA tests. The investigator looked at the preference, correlation and differences between Verbal-Imagery and Wholist-Analytic dimensions of cognitive styles in the areas of application of multi-media presented either as text or as picture. Initially, it is found that all the participants little prefer the imagery and analytic dimensions for learning. Further, significant correlation is found in Verbal-Imagery (in pre and post-test sessions) and Wholist-Analytic (in post-test session) dimensions of cognitive styles among participants. And it is also found that there is a significant difference through paired t-test statistic between users towards verbal (p=.003, df=9) and imagery (p=.036, df=9) dimensions of cognitive styles during pre and post-test sessions. Further, it is also found that there no significance difference towards VI and WA dimensions of cognitive styles in pre-test and post-test sessions of multi-media learning software due to different genders and ages of the participants but it emerged due to multi-media learning.

KEYWORDS

Cognitive, Learning, Multi-media, Quasi-experimental, Ratio, VICS and ECSA-WA.

INTRODUCTION

Cognitive style is seen as an individual's preferred and habitual approach to organizing and representing information. They concluded that the various style labels could be grouped into two principal dimensions; the Wholist-Analytic (WA) and the Verbal-Imagery (VI), which may be summarised as: (i) The Wholist-Analytic dimension of whether an individual tends to organize information in wholes or parts; and (ii) The Verbal-Imagery dimension of whether an individual is inclined to represent information during thinking verbally or in mental pictures (Riding and Rayner, 2005). The two basic dimensions may be assessed by using the computer-presented Cognitive Styles Analysis test (CSA-test). It directly assesses both ends of the Wholist-Analytic and Verbal-Imagery dimensions, and comprises three subtests. The first assesses the Verbal-Imagery dimension by presenting verbal statements one at a time to be judged true or false. Half of the statements contain information about conceptual categories while the rest describe the appearance of items. Half of the statements of each type are true. It is assumed that imagers respond more quickly to the appearance statements, because the objects can be readily represented as mental pictures and the information for the comparison can be obtained directly and rapidly from these images. In the case of the conceptual category items, it is assumed that verbalisers have a shorter response time because the semantic conceptual category membership is verbally abstract in nature and cannot be represented in visual form. The computer records the response time to each statement and calculates the Verbal-Imagery Ratio. A low ratio corresponds to a Verbaliser and a high ratio to an Imager, with the intermediate position being described as Bimodal. It may be noted that in this approach individuals have to read both the verbal and the imagery items so that reading ability and reading speed are controlled. The second two subtests assess the Wholist-Analytic dimension. The first of these presents items containing pairs of complex geometrical figures which the individual is required to judge either the same or different. Since this task involves judgments about the overall similarity of the two figures, it is assumed that a relatively fast response to this task is possible by wholists. The second presents items each comprising a simple geometrical shape (e.g., a square or a triangle) and a complex geometrical figure, and the individual is asked to indicate whether or not the simple shape is contained in the complex one by pressing one of the two marked response keys. This task requires a degree of dis-embedding of the simple shape within the complex geometrical figure in order to establish that it is the same as the stimulus simple shape displayed, and it is assumed that Analytics are relatively quicker at this. Again the computer records the latency of the responses, and calculates the Wholist-Analytic Ratio. A low ratio corresponds to a Wholist and a high ratio to an Analytic. Ratios between these positions are labelled Intermediate. Each of the cognitive style dimensions is a continuum, and labels are only attached to ranges on a dimension for descriptive convenience. The dimensions are independent of one another, in as much as position on one dimension does not influence position on the other. Hence, the present paper will focus on aspects particularly relevant to cognitive styles and learning performance of students towards multi-media.

REVIEW OF LITERATURE

Smith, Eugene Sadler and Riding, Richard (1999) investigated the relationship between learners' cognitive styles and their instructional preferences by taking a sample of 240 business studies students at University of Plymouth, UK. They assessed the subjects cognitive by using the Cognitive Styles Analysis (WA and VI dimensions of style) and their instructional preferences by using an instructional preferences inventory consisted of three sub-inventories (instructional method, instructional media and assessment method). They found that most of the subjects favoured dependent methods, print based media and informal assessment methods. They also found that there is a significant impact of WA style on collaborative method preference like role play, group discussions and business games and non-print based media preference like overhead transparencies, slides and videos. Further, authors also found an interaction of the two dimensions of style and gender in their effect on informal assessment method preferences such as individual and group assignments and multiple choice and short answer type questions.

Davies and Graff (2006) explored the influence of a reflective–impulsive approach on wholist and analytic processing, by counterbalancing presentation of the embedded figures and matching figures subtests of Riding's cognitive styles analysis (CSA) among 193 participants. They revealed that the wholist–analytic ratio is extremely sensitive to the order in which each subtest was presented. They noticed the higher ratios for the matching figures subtest as they were presented first but lower ratios for embedded figures subtest when they were presented first. Therefore, they concluded significant interaction between the presentation order of the subtests and individual differences in reflective–impulsive style. According to them, reflective individuals were found significantly more analytic than the impulsive individuals when the matching figures subtest was presented first and were marginally but not significantly more wholist when presentation order was reversed.

Massa and Mayer (2006) studied 52 college students recruited from the Psychology Subject Pool at the University of California, Santa Barbara, with 26 students serving in the pictorial group and 26 in the text group by using four cognitive style measures (Verbal-Visual Learning Style Rating, Verbalizer-Visualizer Questionnaire, Santa Barbara Learning Style Questionnaire, and the Learning Scenario Questionnaire), the three learning preference measures (Multimedia Learning Preference Questionnaire, Multimedia Learning Preference Test Choice Scale, and Multimedia Learning Preference Test Preference Scale), and the three general achievement measures (SAT-Math, SAT-Verbal, and the vocabulary test). They found that the cognitive style factor was significantly correlated with the learning preference factor, and with the spatial ability factor whereas, only the learning preference factor correlated significantly with the cognitive style factor.

Barker, et al. (1999) investigated the relationship between a users' cognitive style and their performance on a multimedia application. The application was designed to present information in users' preferred and non-preferred cognitive style. They considered the difference in performance between Verbalisers, Bimodals and Imagers in areas of the application that presented information either as text and narrative or as a succession of images. And the ivetigators found that there is no significant difference between users in supported and non-supported areas of the application, although the differences were approaching significance (p=0.067). But, after exclusion of Bimodals, a significant difference was found (p<0.01) by the researchers. They also found that verbalisers and imagers liked most to select a presentation in a matched cognitive style and the potential for the individual configuration of multi-media.

Debasri (2011) tried to find out whether Cognitive Style has any determining effect on creativity by taking a sample of 567 Students (300 boys and 267 girls) of class VII and VIII of secondary schools in Kolkata by using three standardized tests and oneself-made information schedule. The scholar found that there is a positive and significant correlation between creativity and cognitive style.

After reviewing the above said literature and considering the future directions of **Mayer and Massa (2003)** it becomes pertinent to determine relationship among cognitive ability, cognitive style, and learning preference of individual differences alongwith verbal, imagery, wholist and analytic dimensions with multimedia learning. Further, it is also important to establish that the measures of ability and preference are correlated with measures of learning outcome through multimedia sessions.

OBJECTIVES AND METHODOLOGY

The present study restricted itself for learning preference to individual differences along the Verbal-Imagery and Wholist-Analytic dimensions of cognitive style within a multimedia learning environment.

OBJECTIVES

The objectives of the study are to: (i) know the preference of participants towards Verbal-Imagery and Wholist-Analytic dimensions of cognitive styles during multi-media learning; and (ii) to synthesis the relationship between Verbal-Imagery and Wholist-Analytic dimensions of cognitive styles with multi-media learning.

HYPOTHESIS

The study attempts to validate the results through following hypothesis:

H_1: There is no significant correlation between verbal and imagery dimensions of cognitive styles during pre-test and post-test sessions among the participants.

H_2: There is no significant correlation between wholist and analytic dimensions of cognitive styles during pre-test and post-test sessions among the participants.

H_3: There is no significant correlation between the pre-test and post-test scores on verbal dimension of cognitive styles among the participants.

H_4: There is no significant correlation between the pre-test and post-test scores on imagery dimension of cognitive styles among the participants.

H_5: There is no significant correlation between the pre-test and post-test scores on wholist dimension of cognitive styles among the participants.

H_6: There is no significant correlation between the pre-test and post-test scores on analytic dimension of cognitive styles among the participants.

H_7: There is no significant difference among the participants towards pre-test and post-test scores for between and within verbal-imagery dimension of cognitive styles.

H_8: There is no significant difference among the participants towards pre-test and post-test scores for between and within wholist-analytic dimension of cognitive styles.

H_9: There no significance difference towards verbal-imagery and wholist-analytic dimensions of cognitive styles in pre-test and post-test sessions due to different genders and ages of the participants.

RESEARCH DESIGN AND SAMPLING PLAN

The present study is quasi-experimental study in nature. In this study an evaluation is done to determine whether a program (VICS and Extended CSA-WA software) or intervention (Multi-media learning with picture and word) has the intended effect on a study's participants in terms of Verbal-Imagery and Wholist-Analytic dimensions of cognitive styles. In the study 'pre-post test design without a control group' is used. Being the pre-post test design the data is collected from 10 elementary school students' level of performance before the intervention took place (*i.e.* pre) and after the intervention took place (*i.e.* post). The study design looked at one group of individuals who receive the intervention, which was called the treatment group because, the pre-post test design allowed to make inferences on the effect of intervention by looking at the differences in the pre-test and post-test results. On the basis of these results the relationship between cognitive styles and multi-media learning is established (Exhibit 1).

EXHIBIT 1: PRE-POST TEST DESIGN WITHOUT A CONTROL GROUP
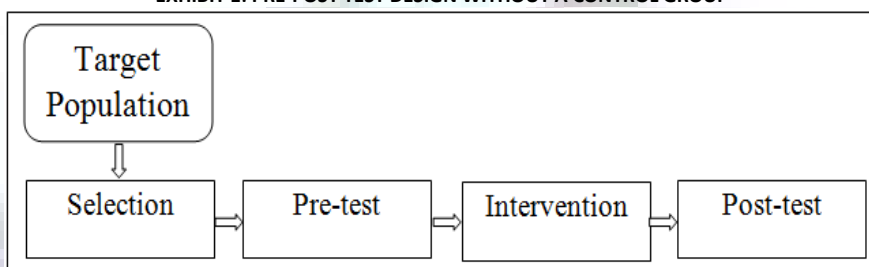
To select a sample of 10 students from the elementary schools the convenience as well as purposive sampling were used. To execute the sampling plan Verbal Imaginary Cognitive Styles Test (VICS) and the Extended Cognitive Styles Analysis Wholistic-Analytic (CSA-WA) and Foot-in Door Strategy' (FIDS) for face to face interaction with students was done.

DATA COLLECTION

To know the background information of the participants in the study, or information about prior interventions they have received; the data was collected through well structured questionnaire including demographic and other details of the participants. Further, the Verbal Imaginary Cognitive Styles Test (VICS) and the Extended Cognitive Styles Analysis Wholistic-Analytic (CSA-WA) were conducted in a relaxed and distraction-free room and participants were assessed individually by the researcher. No information about how the tests actually measure styles was given prior to conduct the test (pre-test). Strictly after a gap of one-week post-test outcomes were collected from the participants of treatment group. Finally, the researcher collected outcome data in quantitative nature in order to be able to analyze it. The quantitative data include test scores, observations (how many times each participant complete the tests), data on how users interacted with software, and survey responses. Qualitative data was also collected from the participant through personal interviews so that the said information could explain the quantitative results.

DATA ANALYSIS AND INTERPRETATION

After collecting the data in forms of qualitative and quantitative in nature, the data was analysed and interpreted accordingly. Most of them calculation were made with the help of the computerized packages namely Statistical Package for Social Sciences (SPSS 16.0 version) and Microsoft Excel 2007. Interpretation of data was based on rigorous exercise aiming at the achievement of the objectives of the study and findings of the existing studies. The statistical tools and techniques used in the present study are Mean, Median, S. D., Maxima, Minima, correlation coefficient and *t*-test and ANOVA were used to validate the results or to test the hypothesis.

VALIDITY AND RELIABILITY

In order to strengthen internal validity, the present study tend to focus on specific population *i.e.* effect of VICS and CSA-WA tests on elementary school students' learning scores in Sirsa City. To assess the internal consistency or homogeneity among items available in the research instrument, Cronbach's alpha coefficient was applied. The coefficient varies from 0 to 1 and a value of 0.6 or less generally indicates unsatisfactory internal consistency reliability. In the present study, the Cronbach's alpha coefficient scores were calculated for Verbal-Imagery and Wholist-Analytic dimensions of cognitive styles and the reliability scores for most of dimensions indicated that the scores collected from these tests were reliable and suitable for further analysis (Table 1).

TABLE 1: RELIABILITY SCORES FOR DIFFERENT DIMENSIONS OF THE COGNITIVE STYLES

Description	Items	Cronbach's alpha
Pre-Mean and Post-Mean Scores for Verbal Dimension	2	0.924
Pre-Mean and Post-Mean Scores for Imagery Dimension	2	0.856
Pre-Mean and Post-Mean Scores for Wholist Dimension	2	0.608
Pre-Mean and Post-Mean Scores for Analytic Dimension	2	0.449
Pre-Median and Post-Median Scores for Verbal Dimension	2	0.682
Pre-Median and Post-Median Scores for Imagery Dimension	2	0.812
Pre-Median and Post-Median Scores for Wholist Dimension	2	0.669
Pre-Median and Post-Median Scores for Analytic Dimension	2	0.457

Source: Survey through VICS and ECSA-WA (Data processed through SPSS 16.0 version).

RESULTS AND DISCUSSIONS

Table 2 depicts the ratios calculated by the VICS and Extended CSA-WA test during pre-test and post-test sessions of it.

TABLE 2: PRE-TEST AND POST-TEST VERBAL-IMAGERYAND WHOLIST-ANALYTIC RATIOS

Pre-test-V/I Ratio	Post-test-V/I Ratio	Pre-test-W/A Ratio	Post-test-W/A Ratio
0.802	0.809	1.443	0.963
1.127	1.146	1.082	1.063
1.680	1.362	1.877	2.088
0.959	0.988	0.883	0.910
0.696	0.723	1.231	1.135
0.796	0.771	1.195	0.897
1.195	1.162	1.092	0.985
1.055	0.992	0.726	0.929
1.179	1.667	1.762	0.823
1.335	1.571	0.844	1.199

Source: Survey through VICS and ECSA-WA.

TABLE 3: DESCRIPTIVE STATISTICS FOR DIFFERENT DIMENSIONS OF THE COGNITIVE STYLES

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-Test Verbal-Imagery Ratio	10	.70	1.68	1.0824	.29266
Post-Test Verbal-Imagery Ratio	10	.72	1.67	1.1191	.32889
Pre-Test Wholist-Analytic Ratio	10	.73	1.88	1.2135	.38150
Post-Test Wholist-Analytic Ratio	10	.82	2.09	1.0992	.36573

Source: Survey through VICS and ECSA-WA (Data processed through SPSS 16.0 version).

Table 3 depicts that the mean values for Verbal-Imagery ratios of the 10 participants during the pre-test are 1.08 (S.D.=0.29) and post-test are 1.12 (S.D.=0.32), respectively which goes to the closer to 1, therefore, it may be concluded that the participants have a little tendency to prefer the imagery dimension of cognitive styles.

Further, the table also analyse that the mean values for Wholist-Analytic ratios for pre-test are 1.21 (S.D.=0.38) and for post-test are 1.09 (S.D.=0.37), respectively which lies between 1 and 1.25. Hence, it may be concluded that the participants have little preference towards analytic dimension of the cognitive style during the multi-media learning.

TABLE 4: PAIRED SAMPLES CORRELATIONS FOR DIFFERENT DIMENSIONS OF THE COGNITIVE STYLES

		N	Correlation	Sig.
Pair 1	Pre-Mean V RT & Pre-Mean I RT	10	.644	.045*
Pair 2	Post-Mean V RT & Post-Mean I RT	10	.636	.048*
Pair 3	Pre-Mean W RT & Pre-Mean A RT	10	.488	.152
Pair 4	Post-Mean W RT & Post-Mean A RT	10	.747	.013*
Pair 1	Pre-Mean V RT & Post-Mean V RT	10	.887	.001*
Pair 2	Pre-Mean I RT & Post-Mean I RT	10	.806	.005*
Pair 3	Pre-Mean W RT & Post-Mean W RT	10	.457	.184
Pair 4	Pre-Mean A RT & Post-Mean A RT	10	.289	.417

Notation used: V=Verbal, I=Imagery, W=Wholist, A=Analytic and RT=Response Time.
*significant correlation at 0.05 level.

Source: Survey through VICS and ECSA-WA (Data processed through SPSS 16.0 version).

Table 4 is prepared on the basis of mean scores achieved by the 10 participants during pre-test session and post-test session of multi-media learning software and then correlation coefficients are calculated. And it is found that there is significant correlation among participants towards verbal-imagery dimensions of cognitive styles during pre-test and post-test sessions and rejects the null hypothesis that there is no significant correlation between verbal and imagery dimensions of cognitive styles during pre-test and post-test sessions among the participants……………………………………….H$_1$.

On the other hand, there is no significant correlation between wholist-analytic dimensions among the participants during pre-test session by accepting the null hypothesis that there is no significant correlation between wholist and analytic dimensions of cognitive styles during pre-test session among the participants. But, it is found significant in the post-test session of the multi-media learning software by rejecting the null hypothesis that there is no significant correlation between wholist and analytic dimensions of cognitive styles during post-test session among the participants. …………………………H$_2$.

Moreover, it is also found that there is a significant correlation towards the verbal and imagery dimensions individually in the pre-test and post-test sessions of multi-media learning software and rejected the null hypotheses that there is no significant correlation between the pre-test and post-test scores on verbal as well as imagery dimensions of cognitive styles among the participants………………………………………………………H$_{3-4}$.

Whereas, there is no significant correlation between wholist and analytic dimensions individually among the participants during pre and post test sessions of the software by accepting the null hypotheses that there is no significant correlation between the pre-test and post-test scores on wholist as well as analytic dimension of cognitive styles among the participants.………………………………………………………H$_{5-6}$.

TABLE 5: PAIRED SAMPLES TEST FOR DIFFERENT DIMENSIONS OF THE COGNITIVE STYLES

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre-Mean V RT – Pre-Mean I RT	.17370	.93328	.29513	-.49393	.84133	.589	9	.571
Pair 2	Post-Mean V RT – Post-Mean I RT	-.01790	.70457	.22281	-.52192	.48612	-.080	9	.938
Pair 3	Pre-Mean W RT – Pre-Mean A RT	.39590	.57550	.18199	-.01579	.80759	2.175	9	.058
Pair 4	Post-Mean W RT – Post-Mean A RT	.22400	.48670	.15391	-.12416	.57216	1.455	9	.180
Pair 1	Pre-Mean V RT – Post-Mean V RT	.68780	.54496	.17233	.29796	1.07764	3.991	9	.003*
Pair 2	Pre-Mean I RT – Post-Mean I RT	.49620	.63856	.20193	.03940	.95300	2.457	9	.036*
Pair 3	Pre-Mean W RT – Post-Mean W RT	.24860	.67256	.21268	-.23252	.72972	1.169	9	.272
Pair 4	Pre-Mean A RT – Post-Mean A RT	.07670	.72875	.23045	-.44462	.59802	.333	9	.747

*significant correlation at 0.05 level.

Source: Survey through VICS and ECSA-WA (Data processed through SPSS 16.0 version).

Table 5 depicts that there is no significant difference among the participants within the verbal-imagery and wholist-analytic dimensions of cognitive styles in pre-test and post-test sessions of multi-media learning software. But, the significant difference is found towards the verbal (p=.003, df=9) and imagery (p=.036, df=9) dimensions individually in the pre-test and post-test sessions of multi-media learning software and rejects the null hypothesis that there is no significant difference among the participants towards pre-test and post-test scores on verbal-imagery dimension of cognitive styles………………H$_7$.

On the other side, there is no significant difference among the participant towards the preferences of wholist and analytic dimensions individually during pre and post sessions of the multi-media learning software and accepts the null hypothesis that there is no significant difference among the participants towards pre-test and post-test scores on wholist-analytic dimension of cognitive styles……………………………………….H$_8$.

TABLE 6: GENDER-WISE ANOVA VALUES FOR DIFFERENT DIMENSIONS OF THE COGNITIVE STYLES

		Sum of Squares	df	Mean Square	F	Sig.
Pre-Mean V RT	Between Groups	1.051	1	1.051	.778	.403
	Within Groups	10.803	8	1.350		
	Total	11.854	9			
Pre-Mean I RT	Between Groups	.585	1	.585	.497	.501
	Within Groups	9.419	8	1.177		
	Total	10.004	9			
Pre-Mean W RT	Between Groups	.419	1	.419	1.564	.246
	Within Groups	2.143	8	.268		
	Total	2.562	9			
Pre-Mean A RT	Between Groups	.941	1	.941	3.295	.107
	Within Groups	2.285	8	.286		
	Total	3.227	9			
Post-Mean V RT	Between Groups	1.171	1	1.171	1.558	.247
	Within Groups	6.011	8	.751		
	Total	7.181	9			
Post-Mean I RT	Between Groups	.410	1	.410	.787	.401
	Within Groups	4.165	8	.521		
	Total	4.574	9			
Post-Mean W RT	Between Groups	.068	1	.068	.119	.739
	Within Groups	4.602	8	.575		
	Total	4.670	9			
Post-Mean A RT	Between Groups	.001	1	.001	.002	.966
	Within Groups	3.497	8	.437		
	Total	3.497	9			

Source: Survey through VICS and ECSA-WA (Data processed through SPSS 16.0 version).

TABLE 7: AGE-WISE ANOVA VALUES FOR DIFFERENT DIMENSIONS OF THE COGNITIVE STYLES

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Pre-Mean V RT	Between Groups	6.339	5	1.268	.920	.548
	Within Groups	5.514	4	1.379		
	Total	11.854	9			
Pre-Mean I RT	Between Groups	4.073	5	.815	.549	.737
	Within Groups	5.931	4	1.483		
	Total	10.004	9			
Pre-Mean W RT	Between Groups	1.479	5	.296	1.093	.479
	Within Groups	1.083	4	.271		
	Total	2.562	9			
Pre-Mean A RT	Between Groups	1.753	5	.351	.952	.534
	Within Groups	1.473	4	.368		
	Total	3.227	9			
Post-Mean V RT	Between Groups	3.946	5	.789	.976	.524
	Within Groups	3.235	4	.809		
	Total	7.181	9			
Post-Mean I RT	Between Groups	.988	5	.198	.220	.936
	Within Groups	3.586	4	.897		
	Total	4.574	9			
Post-Mean W RT	Between Groups	2.229	5	.446	.731	.637
	Within Groups	2.441	4	.610		
	Total	4.670	9			
Post-Mean A RT	Between Groups	.583	5	.117	.160	.965
	Within Groups	2.915	4	.729		
	Total	3.497	9			

Source: Survey through VICS and ECSA-WA (Data processed through SPSS 16.0 version).

Table 6 and 7 depict that there is no significant difference among the participants towards verbal-imagery and wholist-analytic dimensions of cognitive styles in pre-test and post-test sessions of multi-media learning software in terms gender and age of participants. which also supports most of the results derived from *t*-test and accepts the null hypothesis that there no significance difference towards verbal-imagery and wholist-analytic dimensions of cognitive styles in pre-test and post-test sessions of multi-media learning software due to different genders and ages of the participants...........................H_9.

Therefore, it may be concluded that the significance difference in pre-test and post-test session in verbal (p=.003, df=9) and imagery (p=.036, df=9) dimensions of cognitive styles emerged due to multi-media learning among the participants.

CONCLUSIONS AND RECOMMENDATIONS

In total, it may be concluded that the students at elementary level in the schools prefer to learn by images with an analytic approach through multi-media pedagogies. Therefore, it may be recommended that the contents for multi-media learning be prepared by using pictures and they should be inserted in an analytic way not in wholist way. However, it is pertinent to mention that to get the deep knowledge of the subject or course verbal and wholist dimensions of cognitive style may also be used in the broad spectrum. Consequently, students may boost their knowledge and can build the understanding towards contents, object, things, etc.

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