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Relationship of Cognitive Styles with Academic Achievement among Secondary School Students

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Abstract: This study purports to examine the association between cognitive styles (field independent/dependent) and academic achievement of 9th grade students in English. With regard to objectives, this research is applied and in terms of data gathering, it is correlational. The investigation was carried out on a sample of 64 students of 9th class of Om Public School of Gohana (Dist Sonapat). The investigation was conducted in an experimental setting. The teaching material consisted of some concepts of English grammar and these concepts were taught through multimedia and traditional instruction. Group Embedded Figure Test (GEFT) developed by Witkin et al. was used to measure cognitive styles (field independent/ dependent). Academic Achievement of students was measured by an achievement developed by investigator herself. Pearson's Product Moment Correlation was used for the purpose of data analysis. The findings of the study revealed that there is a significant positive relationship between cognitive styles (Field Independent & Field Dependent) and academic achievement.

Keywords: Cognitive Style, Field Independence, Field Dependence, Academic Achievement.

I. INTRODUCTION

Cognitive styles refer to preferences for information processing. In other words, cognitive styles refer to how information is received and organized. This is a new topic in light of research on how information from the environment is received and organized. The results of various studies indicated that individuals have different approaches in dealing with one single task. However, these differences do not reflect their intelligence or specific abilities. These differences deal with individuals; preferences for information processing and organization and reaction to environmental stimuli (Noroozi, 2003). For instance, some people have quick reactions in most circumstances, while others are reflective and react slowly, although these two groups of individuals may have similar knowledge with regard to a particular task.

Cognitive styles have been described in a border between mental abilities and personality types. They are thinking styles and probably affect and are affected by cognitive abilities (Noroozi, 2003). It should be noted that cognitive styles influence preferences for dealing with the environment, social relations, and personality types. Cognitive Styles are important because they are learning methods that are appropriate to each individual. Individual differences should be considered as valuable because they are unique features of individuals and personalities. It has been said that there are two common misunderstandings about paying attention to individual differences in instruction. The first misunderstanding is that teaching patterns are fixed and should be carefully applied in order to gain better results. Secondly, we assume that each learner has a particular learning style that does not change or develop (Mokhtarian, 2003). There are individual differences among school students with regard to learning. They approach their academic tasks differently. These differences reflect their cognitive styles rather than their mental abilities. The fact that some students perform one single academic task differently in similar conditions demonstrates that they are different as regards to processing and organization of information and reaction to environmental stimuli (Mokhtarian, 2003). These differences are rooted in many various factors, one of which is cognitive style. Teachers' experience has shown that different students in a class do one single academic task differently. Even, they answer identical exam questions differently. Some students write the answer in complete accordance with the reference, while others do it in their own language. Since all instructional activities carried out at schools are aimed at enhancing students' academic achievement, it seems necessary to conduct research to offer teachers with effective guidelines in giving academic tasks to students in which students have different cognitive styles.

Multimedia instructional strategy has become popular in the ever changing world of computers. Multimedia is media and content that uses a combination of different content forms. It includes a combination of text, audio, still images, animation, video or interactivity content forms. It merges multiple levels of learning into an educational tool that allows for diversity in curricula presentation. Now the question arises what is the

use of multimedia in education? The answers to this question could be sought through an understanding of the capabilities of the medium. With multimedia, the process of learning becomes more goal oriented, more participatory, flexible in time and space, unaffected by distances and tailored to individual learning styles, and increased collaboration between teachers and students. Multimedia makes learning friendly and fun-oriented without fear of inadequacies or failure. The pedagogical strength of multimedia is its natural information-processing abilities that we already possess as humans. It has been observed worldwide that applications of multimedia have resulted into higher strides of achievement for the learners. Studies conducted by Adegoke (2011) examined the effect of multimedia instruction on senior secondary school students' and found that students under multimedia instruction performed better than the lecture group. Aloraini (2012) also find out the positive impact of multimedia on students' academic achievement. Maree, et al. (2013) showed significant effect of multimedia instructional strategy on academic achievement. Satyaprakasha & Sudhanshu (2014) found that multimedia significantly promoted achievement with respect to knowledge, understanding, application and total achievement. Sharma & Priyamvada (2017) also found significant effect of multimedia instructional strategy on academic achievement. The literature related with the use of multimedia suggests that multimedia learning is a sense-making activity in which the learner seeks to build a coherent mental representation from the presented material.

Due to the importance of academic achievement in contemporary life and the predicative power of cognitive styles for academic achievement, the present research intends to examine the association between cognitive style (field independent/dependent) and academic achievement in students. Previous studies have demonstrated that field dependence/independence is positively related to academic achievement. Furthermore, field independent students have been shown to be better achievers than field dependent students. Some of such studies are reported here. Yaghubi (2006) investigated the relationship between field dependence/independence and success in language learning in students of English at Teacher Training University and concluded that field independent students are better in learning and comprehension. Mokhtarian (2003) demonstrated a significant relationship between the harmony between high school students' and teachers' cognitive styles (field dependence/independence) and students' academic achievement. Samavati (2001) investigated the association between cognitive styles (convergent, divergent, absorptive, and adaptive) and locus of control (internal and external). There were meaningful differences among different major groups with regard to cognitive styles. Khodabakhsh (2011) concluded that students' math scores are significantly related to their cognitive styles (field dependence/independence). Researches also investigated students' and teacher' cognitive styles and found that field independent students are more successful when they work with field independent teachers. Barry demonstrated that field independent students taught by field independent teachers - rather than field dependent teachers - are more successful in sciences (Homayooni et al. 2006). While examined the role of gender in cognitive styles, the results showed that women are more likely to be field dependent and men are more likely to be field independent. Alsandro and Antononi explored individual differences in deductive problem solving. They concluded that field independent participants are more capable of deductive problem solving than field dependent participants (Homayooni, Kadivar, and Abdollahi, 2006). Sharma et al. found that those individuals who have gained more academic achievements tend to be field independent in comparison to those who are less successful in their studies (Khodabakhsh, 2011). Homayooni et al. (2006) concluded that there exists a significant positive relationship between field independence and academic achievement, particularly when intelligence - as a variable - is controlled. Angeli et al. (2009) found that field independence and success in English language are positively correlated.

Objectives of the study

1. To find the relationship between cognitive styles and academic achievement of 9th grade students in multimedia instructional environment.
2. To find the relationship between field independent cognitive style and academic achievement of 9th grade students in multimedia instructional environment.
3. To find the relationship between field dependent cognitive style and academic achievement of 9th grade students in multimedia instructional environment.
4. To find the relationship between cognitive styles and academic achievement of 9th grade students in traditional instructional environment.
5. To find the relationship between field independent cognitive style and academic achievement of 9th grade students in traditional instructional environment.
6. To find the relationship between field dependent cognitive style and academic achievement of 9th grade students in traditional instructional environment.

Hypotheses of the study

H₀₁ There exists no significant relationship between cognitive styles and academic achievement of 9th grade students in multimedia instructional environment.

H₀₂ There exists no significant relationship between field independent cognitive style and academic achievement of 9th grade students in multimedia instructional environment.

H₀₃ There exists no significant relationship between field dependent cognitive style and academic achievement of 9th grade students in multimedia instructional environment.

H₀₄ There exists no significant relationship between cognitive styles and academic achievement of 9th grade students in traditional instructional environment.

H₀₅ There exists no significant relationship between field independent cognitive style and academic achievement of 9th grade students in traditional instructional environment.

H₀₆ There exists no significant relationship between field dependent cognitive style and academic achievement of 9th grade students in traditional instructional environment.

II. RESEARCH DESIGN AND METHODOLOGY

- i) **Variables-** Cognitive Style was taken as independent and Academic Achievement was taken as independent variable.
- ii) **Method-** Experimental Method with Factorial design was used.
- iii) **Sample-** In the present study, a sample of 64 students of Om Public School Gohana (Dist. Sonapat) was taken.
- iv) **Research Instruments-** In the present study following tools were used for data collection:
 - 1) **Group Embedded Figure Test (GEFT)** developed by Witkin et al. was used to measure cognitive style (field dependence/independence). This test consists of 25 pictures, in each of which examinees are asked to find and color a geometric shape in a more complicated scheme. There are three parts in this test. The first part includes seven pictures, the shapes of which are easy to find. This is a training part showing examinees what to do, and should be completed in 2 minutes at most. The scores related to this part are not considered. The third and the second part each have nine pictures that are more difficult to answer in comparison to those of part 1. Examinees are supposed to complete each of these two in 5 minutes. The participants' ability to find hidden patterns in complicated schemes shows their field dependence/independence. Each correct response is worth one mark and the total number of correct responses in the latter two parts is considered the total score of the test. Scores range from 0 to 18. Zero reflects total field dependence and 18 represents total field independence. It is important that participants be provided with clear instruction on how to complete the test. These instructions and two samples items are answered on the first page. Parallel form reliability was utilized to measure the reliability, which was 0.79, indicating high reliability.
 - 2) **Achievement Test in English** - Since no specific achievement test in the selected topic was available, so, an achievement test in English grammar for 9th class was prepared by the investigator herself. Achievement test was prepared consisting of 110 multiple choice questions in total. As a result of first draft, second draft and item analysis in final try-out 44 items were dropped from the achievement test and finally 66 items were retained out of 110 items in the final draft of the achievement test.
 - i) **Procedure for Data collection-** The research instruments were administered on the subjects personally by the researcher herself. The respondents were informed that the information given by them would be kept confidential and would be used for research purpose only. They were asked to follow the instructions. The sheets were collected back on the spot.
 - ii) **Statistical Technique-** Pearson correlation coefficient was analyzed by using SPSS 20.0 version.

III. ANALYSIS AND INTERPRETATION

The scores were analyzed and described by using Pearson correlation coefficient.

Table 1: Pearson correlation coefficient between cognitive styles and academic achievement in multimedia instructional environment

Variables	Correlation coefficient	Sig.
Cognitive Styles	0.74**	0.01**
Academic Achievement		

Table 1 shows that the correlation coefficient between cognitive styles and academic achievement in multimedia instructional environment is 0.74 ($p < 0.01$). Therefore, the relationship between the two variables is statistically significant. Thus **H₀₁**, "There exists no significant relationship between cognitive styles and academic achievement of 9th grade students in multimedia instructional environment" is **rejected**.

Table 2: Pearson correlation coefficient between field independent cognitive style and academic achievement in multimedia instructional environment

Variables	Correlation coefficient	Sig.
Field Independent Cognitive Style	0.75**	0.01**
Academic Achievement		

Table 2 shows that the correlation coefficient between field independent cognitive style and academic achievement in multimedia instructional environment is 0.75 ($p < 0.01$). Therefore, the relationship between the two variables is statistically significant. Thus H_{02} , “There exists no significant relationship between field independent cognitive style and academic achievement of 9th grade students in multimedia instructional environment” is **rejected**.

Table 3: Pearson correlation coefficient between field dependent cognitive style and academic achievement in multimedia instructional environment

Variables	Correlation coefficient	Sig.
Field Dependent Cognitive Style	0.66**	0.01**
Academic Achievement		

Table 3 shows that the correlation coefficient between field dependent cognitive style and academic achievement in multimedia instructional environment is 0.66 ($p < 0.01$). Therefore, the relationship between the two variables is statistically significant. Thus H_{03} , “There exists no significant relationship between field dependent cognitive style and academic achievement of 9th grade students in multimedia instructional environment” is **rejected**.

Table 4: Pearson correlation coefficient between cognitive styles and academic achievement in traditional instructional environment

Variables	Correlation coefficient	Sig.
Cognitive Styles	0.64**	0.01**
Academic Achievement		

Table 4 shows that the correlation coefficient between cognitive styles and academic achievement in traditional instructional environment is 0.64 ($p < 0.01$). Therefore, the relationship between the two variables is statistically significant. Thus H_{04} , “There exists no significant relationship between cognitive styles and academic achievement of 9th grade students in traditional instructional environment” is **rejected**.

Table 5: Pearson correlation coefficient between field independent cognitive style and academic achievement in traditional instructional environment

Variables	Correlation coefficient	Sig.
Field Independent Cognitive Style	0.59*	0.05*
Academic Achievement		

Table 5 shows that the correlation coefficient between field independent cognitive style and academic achievement in traditional instructional environment is 0.59 ($p < 0.05$). Therefore, the relationship between the two variables is statistically significant. Thus H_{05} , “There exists no significant relationship between field independent cognitive style and academic achievement of 9th grade students in traditional instructional environment” is **rejected**.

Table 6: Pearson correlation coefficient between field dependent cognitive style and academic achievement in traditional instructional environment

Variables	Correlation coefficient	Sig.
Field Dependent Cognitive Style	0.50*	0.05*
Academic Achievement		

Table 6 shows that the correlation coefficient between field dependent cognitive styles and academic achievement in traditional instructional environment is 0.50 ($p < 0.05$). Therefore, the relationship between the two variables is statistically significant. Thus H_{06} , “There exists no significant relationship between field dependent cognitive style and academic achievement of 9th grade students in traditional instructional environment” is **rejected**.

IV. DISCUSSION OF RESULTS

There was a significant relationship between field independence and academic achievement. This is in line with the findings of Yaghubi (2006), Hosseininasab et al. (2002), and Mokhtarian (2003). Yaghubi (2006) concluded that field independent students are better in learning and comprehension. Mokhtarian (2003) demonstrated a significant relationship between the harmony between high school students' and teachers' cognitive styles (field dependence/independence) and students' academic achievement. Robinson and Pink found that field dependent students' memory has a weaker performance in comparison to that of field independent students when the homework assigned to them is increased. Sarko demonstrated that students' cognitive style and their grade at school are significantly related and field independent students have more academic achievement. In general, field independent students can take out a concept from a text and understand it, or they can use the field to analyze that concept. Moreover, field independent students can perceive the separate elements of a general pattern and analyze the pattern from different perspectives. In contrast, field dependent perceive a pattern without separating its elements. They can only understand one aspect of a concept and are not able to discern details.

Furthermore, Homayooni et al. (2006), found a significant association between cognitive style and achievement, they found that those individuals who have gained more academic achievements tend to be field independent in comparison to those who are less successful in their studies. Field independent is more inclined to analysis and are more successful in majors such as math. In other words, students' cognitive style affects their approach to academic achievement. Field independent students are self-motivated in math, sciences, law, analysis of complicated and unorganized materials, and have a better performance in assignments requiring logical solutions. They are less likely to be affected by others in their judgment. In contrast, field dependent students are respond to social signs and heavily depend on others' attitudes and judgments and are greatly accustomed to social relations. Mokhtarian (2003) demonstrated that students' cognitive style and their grade at school are significantly related and field independent students have more academic achievement. Finally, Angeli et al. (2009) found that field independence and success in English language are positively correlated. It should be noted that field dependent students make more use of external social resources in important circumstances. Using such resources, they gain information helping them resolve ambiguities. In other words, they are more attentive to social signs. In contrast, field independent students show more independence in vague circumstances.

All in all, cognitive styles produce differences, such as being analytic or holistic, in learners. Therefore, students with field independent cognitive style tend to be analytic, have intrinsic motivation for learning social issues, are not receptive to criticism, are not often influenced by the environment, and play an active role in the learning process. Conversely, field dependent students have a holistic approach to learning, are extrinsically motivated to learn social issues, are receptive to criticism, are more influenced by the environment, learn social issues better, and are passive in the learning process. The differences between field dependence and field independence do not mean that one of the two styles is better than the other. Students having one of these two styles have their own strengths and weaknesses. The important fact is that students whose cognitive style does not match the methods of instructional materials are penalized, negatively affecting their academic achievement. Higher education organizations are recommended to attach importance to students' cognitive style and design instructional material accordingly, so that they can prevent the decline in students' academic achievement.

V. REFERENCES

- [1] Abdollahpoor, M. (2004). *Investigating the association among cognitive styles (field dependence/independence), cognitive styles (cognitive and metacognitive), and academic achievement in high school students in Tehran*. Unpublished master's thesis, Teacher Training University.
- [2] Adegoke, B.A. (2011). *Effect of multimedia instruction on senior secondary school students' achievement in physics*. *European Journal of Educational Studies*, 3(3), 537-550.
- [3] Aloraini, S. (2012). *The impact of using multimedia on students' academic achievement in the College of Education at King Saud University*. *Journal of King Saud University - Languages and Translation*, 24(2), 75-82.
- [4] Angeli, C., Valanides, N., & Kirschner, P. (2009). *Field dependence-independence and instructional design effects on learners' performance with a computer-modeling tool*. *Computers in Human Behavior*, 25(6), 1355-1366.
- [5] Homayooni, E., Kadivar, P., & Abdollahi, M. (2006). *The relationship between cognitive styles, learning styles, and deciding fields of study*. *Iranian Journal of Psychologists*, 10, 137-144.
- [6] Hosseini, N.V. (2002). *The relationship between field dependence/independence, self-regulated learning, and third students of guidance schools*. *Shahid Chamran University Research quarterly*, 3 & 4.
- [7] Khodabakhsh, R. (2011). *The relationship between primary students' field dependence/independence*. *Daneshvar Behavior*, 11(4), 35-41.
- [8] Maree, T.J., Van Bruggen, J.M., & Jochems, W.M.G. (2013). *Effective Self-Regulated Science Learning through Multimedia-Enriched Skeleton Concept Maps*. *Journal Research in Science and Technological Education*, 31(1), 16-30.
- [9] Mokhtarian, M. (2003). *Investigating the effect of the harmony in students and teachers cognitive styles on the academic achievement of first-year students of Shahrood, Iran*. Unpublished master's thesis, Allameh Tabatabaei University.
- [10] Noroozi, D. (2003). *Cognitive styles and their relationship with learning*. Tehran: Islamic Azad University, the South Branch.
- [11] Samavati, A. (2001). *Examining the association between cognitive styles (convergent, divergent, absorptive, and adaptive) and locus of control (internal and external)*. Unpublished master's thesis, Tabriz University.

- [12] Satyaprakasha, C.V., & Sudhanshu Y. (2014). *Effect of Multi Media Teaching on Achievement in Biology. International Journal of Education and Psychological Research*, 3(1), 41-45.
- [13] Sharma, H.L., & Priyamvada (2017). *Multimedia: Instructional Strategy to Enhance Achievement of Senior Secondary School Students in Business Studies. International Journal of Research*, 4(13), 1332-1342.
- [14] Taghvaei, (2006). *The relationship among cognitive styles, math anxiety, and math performance in first year students of high schools in Region 7, Tehran. Unpublished master's thesis, Teacher Training University.*
- [15] Witkin, H.A., Donald, R., Goodenough, D.R., Philip, K., & Oltman. (1979). *Psychological differentiation: current status. Journal of personality and Social Psychology*, 37(7), 1127-1145.
- [16] Yaghubi, A. (2006). *The effect of teaching metacognitive strategies on improving reading performance in students suffering from dyslexia. PhD dissertation, Allameh Tabatabaei University.*
- [17] Zokaei, M. (2007). *The sociology of Iranian youths. Tehran: Agah.*