Investigating Relationship between Cognitive Style and Study and Learning Strategies of High School Students

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ABSTRACT

The main objective of this study is investigating relationship between cognitive style and study and learning strategies of high school students of Charoymagh city, Iran. The study is descriptive-correlational. Statistical society of study include all students of Charoymagh city (Ghara Aghaj) (384 individuals), selected using multi-level cluster sampling method. The data was collected using Kolb's standard inventory of cognitive styles and study and learning strategy questionnaire that their reliability and validity were approved. For data analysis, unidirectional variance analysis test is used. Results of the study indicate that there is no meaningful difference in using learning and study strategies between students with absorbing cognitive structure, while students with converging, accommodating and diverging cognitive structure are different in using study and learning strategies and there is meaningful difference between learning and study strategies.

KEYWORDS: Cognitive Styles, Learning And Study Strategies, Learning, Educational Progress

1. INTRODUCTION

Learning is one of the main educational tools to confront current social challenges and its application has distinctive importance, so that international commission of education for 21 century under the control of previous manager of European Commission, Jacques Delors, in his report mentioned that learning for living, learning for knowing, learning for performing and learning for coexist, are the four basic principal constituting education infrastructure and enable all communities to go toward utopia where all talents of humans are used [1]. Hence, all human thoughts are formed by learning. In the past, it was believed that innate intelligence of learner inherited from parents is important factor of learning. Bu the results of study indicate that not only intelligence, but other factors are influential in learning that could not be ignored due to their high impact. Currently, it is believed that cognitive function constitutes the main part of intelligent behaviors and cognitive functions are considered acquisitive and changeable. Flavell [2] stated that all current explanations about cognitive can be summarized in two approaches of information process, Jean Piaget approach and theories related to his thoughts or neo-piagetian theory. Data process approach considers mental processes such as receive, abstraction, classification, organization, experience, analysis and data recycling, while Piaget approach considers the importance of interaction between individuals and environment and emphasizes how this interaction leads to the cognitive growth.

In education, it is tried to evaluate predicted objectives at the end of curriculum. Unfortunately, regardless of high costs, educational failure is also happen and this damage is not only economic, but includes spiritual and social aspects and influences all aspects of their life. Therefore, to overcome these challenges, educational psychology researchers have studied various factors such as educational ability, cognitive factors such as general intelligence, self-adjusted strategies, educational self-efficacy, educational motivation, class structure, ability of learners, training teachers, and characteristics of learners, but because these factors and variables are mixed and interacted, possibility of determining role of each of them is difficult. However, results of the study indicate that among these factors, educational and individual factors with cognitive and social nature, has the most impact on learning. Therefore, at the late 1970s, studying learning and cognitive styles in educational psychology is considered for overcoming learning problems that are often called learning styles or so-called cognitive styles; there are differences in viewpoint between psychologists and teachers. Wool Folk stated these two terms are usually used synonymously, while teachers prefer to use the term "learning style" while psychologists prefer "cognitive styles".

There are various definitions presented for learning and cognitive styles, some of the most important one of them include: different methods of receiving and organizing data [3]. In methods individuals use to organize data and experiences, Palayeshgar highlights a similar definition. Dumbo and Wool Folk state cognitive styles are individual differences influencing learning in class [4]. Jackson and McClelland believe cognitive styles are individual differences in studying depending on central data process not surrounding sense process [5]. Tennant define cognitive style as individual characteristic and stable quality in data organization and processes [6]. Cognitive styles include believes, preference and behaviors that people acquire in learning process [7]. Di Ceko

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and Crawford quoted by Saif [5] define cognitive styles as individual methods that people use to process data in learning concepts and principals. Hooman [6] stated that the term cognitive style refers to believes, preference and behaviors of individuals that help their learning in specific situation. There are different types of cognitive style recognized by researchers. Unlike different viewpoints about cognitive styles, they can be divided to three general groups [7]: a) cognitive styles: they state how individuals understand, remember, think and solve the problems, b) effective styles: include emotional features of learner such as perseverance, working alone or with others, accepting or rejecting external amplifiers, c) physiological styles: refer to biological aspects of learner and include reaction of individual to physical environment influencing the learning.

Montague [9] in studying the effect of cognitive and metacognitive strategy instruction on mathematical problem solving of middle school students with learning disabilities concluded that students who using cognitive and meta-cognitive training have better performance in solving mathematical problems than the control group. In another study, Berkowitz and Cicchelli [10] find that the NY adolescent students with different talent acquisition or talent training were compared in the use of metacognitive reading strategies.

Although the results did not showed a specific difference, but the repeated use of ways in particular for method of control, revealed that the most of top talented students used the convergent method and most of less talented students used the divergent methods. There are many studies in this context including: Hickson and Baltimore [11], Kadivar [12], Fujii [13], Gackson and Jones [14], Witkin and Goodenough [15], Kolb [16], Kord Noghaei [17], Rezaei [3], Rahmani [4], and Hoseini Lorgani [7]. Results of studies about relationship between cognitive styles and education, gender, learning, educational level are sometimes in contrast with each other and has not achieved definitive results.

The second variable studied in this study is learning and studying strategies that are generally reviewed from cognitive and metacognitive aspect. Cognitive strategies are any behavior, think or action that learner use during learning. It aims to assist learning, organizing and saving knowledge and abilities and facilitating their use in the future [5, 17], the main of these strategies include: repetition, organization or classification, and semantic expansion. Farmer Wolf in another classification classified learning strategies in four groups of organization strategies, spatial learning strategies, interface strategies, general strategies. Metacognitive strategies are generally classified in 5 groups of design, attention, codifying, reviewing and evaluation. Design strategies include: selection (of learning target), preparation (activities appropriate with mental schemas), criteria (determining difficulty of homework and deep involvement in process), estimation (evaluating together and equality of information requested in homework). Attention strategies include focusing on issues, searching (relation with memory data), comparison (evaluating together and equality of memory information) and validation (approving presented data with memory knowledge). Codification strategies include: skillful creation (relating provided information with existing knowledge; in another word, elaborate practice in relating new and prior information), quality description (relating provided data with depth of existing knowledge). Revising strategies include confirmation (using new information), repetition (reminding practice and performance method), and revising. Evaluation strategies include: testing (determining stability of new information), and judging. In general, cognitive and metacognitive are two complementary concepts. Cognitive is learning and understanding. While metacognitive are called cognition or awareness of learner of how to learn. There are many studies in this context: Ibrahimi, Ghavam Abedi [19], Ababaf [20].

Results of studies about relationship between cognitive styles and learning strategies are often in conflict on biographic elements such as educational course, gender, learning, educational level, and there is no definitive conclusion yet. On the other hand, these studies are performed in foreign countries and its statistic society include students, therefore this study select his statistic society from high school students, hence, this study was carried out to approve previous researcher or findings or find lack of meaning in relationship between cognitive styles and learning and study strategies. Thus, results of this study can be important for principals, teachers and education system planners of the country and guide them to make proper decisions.

2. MATERIALS AND METHODS

Society, sample and sampling method
The current study is descriptive-applicative survey aims to investigate relationship between cognitive styles and learning and study strategies of high school students in Charoymagh. Statistical society of study includes all students of Chaoymagh city (Ghara Aghaj). Due to extensive target society of research, multi-level cluster sampling method was used to select statistical sample. Based on Cochran's sample volume determination formula, 384 individuals were selected as statistical sample.

Research tools and data collection method
To collect data, two questionnaires were used: Kolb's cognitive style [16] and learning and study strategies.

a) Learning and study strategies questionnaire: include three parts (introduction, demographic variables, and research questions) and 50 questions scaled based on 4 degree range and some of the questions had negative point. Validity of applied tools was approved using nominal method and alpha Cronbach method was used to approve reliability of study that was reported $\alpha=0.75$ after primary test on 30 individuals.

b) Cognitive style inventory: developed by Kolb in 1985, including three parts (introduction, demographic variables, and research questions), 12 questions and 4 sub-scales (reflective observation, abstract conceptualization, active experimentation and concrete experience) adjusted based on 4 degree range. Validity of applied tools was approved using nominal method and alpha Cronbach method was used to approve reliability of study that was reported α=0.88-0.60 after primary test on 30 individuals.

3.   RESULTS

According to table 1, participants of this study are 385 individuals: 191 (49.6%) female and 194 (50.4%) male, selected as statistic sample. Table 2 indicate that in total statistic sample, 49 people (12.23%) have converged style, 64 people (17.02%) accommodating style, 190 people (50.54%) with divergent style and 76 people (20.21%) absorption style. According to table 3, average number of converged style is 125.64, accommodating style 139.49, divergent style 139.48 and absorption style 132.12. Hence, accommodating cognitive style has the maximum average (139.49) and converged cognitive style the minimum average (125.64).

According to Table 4, and because of F statistic and meaningful level, there is meaningful difference between cognitive style and learning and study strategy questionnaires of respondent. In another word, since F statistic is 10.44 and meaningful level is 0.000, meaningful level is less than type one error in 0.05 levels, therefore, there is meaningful difference between cognitive styles and learning and study strategies of students. Thus, since the number of people in group is not equal, Scheffe test was used for multiple comparisons; the results are reported in Table 4.

According to Table 5, level of cognitive style with meaningful difference is specified with "*". As indicated in table, there is no meaningful difference between learning and study strategies of people with absorbing cognitive style, while there is meaningful different in learning and study strategies of people with divergent, accommodating and convergent cognitive style.

Table 1. Frequency distribution of statistical sample students according to gender

Gender	Frequency	Percent	Compression frequency
Female	191	49.6	19.6
Male	194	50.4	100
Total	385	100	-

Table 2. Frequency distribution of statistical sample students according to base

Cognitive styles	Frequency	Percent	Compression frequency
Convergent	46	12.23	12.23
Accommodating	64	17.02	29.25
Divergent	190	50.54	79.79
Absorbing	76	20.21	100
Total	376	100	-

Table 3. Descriptive statistics of learning and study strategies

Cognitive styles	Number of observations	Average	Standard deviation
Convergent	34	125.64	14.94
Accommodating	139.49	139.49	16.21
Divergent	139.48	139.48	14.90
Absorbing	132.12	132.12	14.48
Total	136.45	136.45	15.75

Table 4. Unidirectional variance analysis for relationship between research variables

Change source	Total squares	Degree of freedom	Mean squares	F	Meaningfulness
First intergroup	7131.26	3	2377.08	10.449	0.000
Intragroup	69841.98	307	227.49		
total	76973.24	310			

Table 5. A summary of Scheffe test for multiple comparisons

Cognitive styles		Mean difference	Standard deviation	Sig.
Convergent	Accommodating	*-13.844	3.24	0.001
	Divergent	*-13.845	2.85	0.000
	Absorbing	-6.977	3.20	0.253
Accommodating	Convergent	*13.840	3.24	0.001
	Divergent	*4.512	2.30	1.00
	Absorbing	7.362	2.75	0.064
Divergent	Convergent	*13.840	2.85	0.000
	Accommodating	-4.512	2.30	1.00
	Absorbing	*7.362	2.24	0.014
Absorbing	Convergent	6.477	3.20	0.253
	Accommodating	-7.366	2.72	0.064
	Divergent	*-7.362	2.74	0.014

DISCUSSION AND CONCLUSION

This study aims to investigate the relationship between cognitive styles and learning and study strategies of high school students, Charoymagh city. Results of the study show there is no meaningful difference in learning and study strategies of students with absorbing cognitive style, while there is meaningful different in learning and study strategies of people with divergent, accommodating and convergent cognitive style. The study is in accordance with findings of Goodenough et al. [21], and Frank [22], who find learners with different styles perform different in learning process, and students with independent cognitive style perform better in learning and comprehension than dependent students. Goodenough et al. [21] also found that learners with F1 style are capable of cognitive restructuring and reorganizing experiences and information. Studies of Rahmani Shams [4] and Rezaei [3], indicated that there is meaningful difference between learning and study strategies of students based of their educational status; students with lower educational improvement have weak educational habit and lower educational skills than students with higher educational improvement. Results of this study and aforementioned studies indicate that learning and study styles of students have significant role, and powerful students benefit further from this strategy.

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