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**Study and investigation of the problems and learning disorders of
students by various cognitive styles in mathematics course at Rasht
shahid chamran higher education center**

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Abstract

The purpose of design investigating the interaction and effectiveness are the student's cognitive style FI and FD in solving mathematics problems and concepts and skills disorders in this course. In fact we would see how students with different learning styles appear in scene .The populations studied at this research are the entire student at Rasht shahid chamran central.

The sampling at had been carried out multistep randomly. Statistical analyzing had been carried out on 64 sample group on 70% of individuals who had answered to both test, GEFT(group embedded figures TEST) and mathematic test .The tool of this research, group embedded figures test(GEFT) as independence variable and mathematics researcher-made test consisted of 50 questions in the cognitive areas“ Knowledge, understanding ,comprehension, application, analyzing, combination and evaluation and judgment” are learning concerning pre-entering to university which had been introduced as dependent variables and the main result are as follow:

- 1- Students in FI cognitive style have enjoyed more favorable course states in mathematics lessons comparing to the students with FD cognitive style in various cognitive areas.
- 2- Students with unclosed field cognitive style (FI) will express more effective performance in solving mathematics problems than students with closed field (FD).
- 3- Students with cognitive styles FD have suffered more from learning disorders in mathematics concepts and skills at education period comparison to students with cognitive style FI.

4- Both group of FI and FD had been the least improvement in combined cognitive area, on the other hand, both of this group have the least disorder in function area.

5- Student with cognitive style in all Bloom's cognitive area has disorder working area of mathematics.

Keywords: independent, dependent, cognitive, disorder, mathematical Bloom's domain.

1. Introduction

The examination of conception of learning disorders is one of the needs of to the students who failed in their homework in order to distinguish the contents and to give an evaluative definition from learning disorders. Authorities have studied for many years, they also have gradually tried to give clear criteria between learning disorders and mental deficiency. The authorities have assigned the conception of learning disorders in a certain disorder/action in the teaching materials, difference between potential ability and real action, problems in the education and studying, tongue disorders, connective disorders, specific learning disorders, ultra cognitive disorders enacted, memory, social effective problems. We must be very serious to them. If we are in scope of view more daily life, we should be attentive in the case of learning disorders corresponding to their ages. Authorities have differentiated learning disorders in different ages. One of these disorders is misunderstanding in the learning of Math subject which some have them. This basic source comes back to high school or technical one. Testing and distinguishing disorders are very important to recognize the one who may/have one of them.

Each of the two is an evaluation in the field of learning. It should be a standard criterion testing which have differences in difference subjects. While misunderstanding term is very difficult, teachers should try to reform according to scientific approaches and student's efforts.

Teachers should transfer those clear and comprehensive conceptions in mathematics. The role and function of memory in the learning of mathematical terms, cognition and ultra cognition, cognitive approaches about mathematics, mathematic psychology are important subjects to use, And may have the key function in uprising of mathematical conception. Quality and quantity of mental processing in individual are important in the meaning of cognitive styles. In fact, each person uses specific cognitive styles. So, s/he may add them to use those useful and up to date knowledge. S/he can do it if collect and organizes this knowledge. Researchers have studied many styles specially learning styles and their effectiveness in educational system in different sciences like math, in open field and closed field, the researcher tries to study and survey the shahid chamran center technical college student's function in learning styles and its effectiveness in education. He proves dependence field students shows more effectively than independence field students in solving mathematic problems.

2. Statement of the problem

Researchers have studied a lot of comprehensive and concussed efforts and studied about existing individual differences in learning and teaching skills and scientific knowledges. They have developed their experiments to create teaching styles and upgrade teaching planning

psychologists and teachers understood their students have found expressive styles or the best way to solve their problems.

Some of them learn their lesson by reading many times, some by hearing or listening and some by doing. Some of them learn better by doing in group and some individually. Some of students learn their lessons for the sake of passing in the examinations. There are some students who learn their lessons by announcing a dead line. Finally, there are some who are weak. Those who are weak in learning or those students who have learning disorders/disabilities have been called "learning disability students/lads". These students have natural figure but their growth is abnormal and their goals are natural, they act naturally, also, their behavior are normal. However, when they go to school, they have serious

Problem in writing and reading mathematic conceptions, distinguishing about disabilities are very hard and sensitive, so most of the time, their distinctions for concealing the cause, people cannot distinguish them clearly. Anderson (1970) has called this kind of learning disability "hidden disability".

Kuhem (1961) has called this kind of learning disability in mathematics and disorder in quantitative learning, "dyscalculia". [15]

Buyer (1998) has showed that 7%-8% four students have learning disability. Also, Bartel (1975) believes that the basic reason in being disability is uncorrected teaching [5] and its spreading in disabilities is not the same between different levels in students. [9] There are some students that have never understood the basic mathematical conceptions meaningfully. They could not know them. Most students have misunderstanding conceptions in mathematics. It is very hard for them to solve mathematical problems. One of the most important subjects which have a very comprehensive effect in raising mathematical conception is cognition styles. They show mental process in people.

In fact, we may say that each uses its specific cognitive styles. By using them, one may change and use those collected and organized information in applied knowledge. [18]

Music (1976) has called those organizing styles, processing information and experiences "cognitive styles/learning styles". Researchers have studied in (FD) and (FI) category to survey learning styles and its function in educating sciences like mathematics.

Knowing the cognitive styles may support student's teachers, tutors, inductors, planners, authorities and those who have jobs in scientific profitability and technology in fluently. It also can support them in places where they may use well corresponding to their mental structure or cognitive styles. Field independence (FI) cognitive learning styles in field independence (FI) and end field dependence (FD) are what the researcher wants to study. Witcan 1981, 1987 believes that individuals in field independence have an analytical approach to subjects and they can be successful in base sciences and engineering. But individuals in FD have a general approach; they have a difficulty in learning based science and engineering. Alamal hodaiei and Jafari (2002) have found that the mean marks in FI students in general/ total mathematic and analytical mathematics and algebra are higher than students in FD. [22]

Smith Loren (1970) found that the performance of mathematics is conceptually related to cognitive styles FI and FD. FI students have more efficient behavior in compaction whit FD's in base of math. (9)

Alamal hodaiei (2002) has found those students who educate in cognitive styles of FI are much better than the others in FD work in solving verbal problem. [13]

Also, Esra Enteva (1997) has proved that successful students with a high mark of conceptual mathematics (FI) belong to cognitive styles are more than students in FD's. [9]

Studying the interaction and effectiveness of cognitive styles among students in shahid chamran center technical colleges in solving math problems and many difficulties and disorders in learning skills and their math conceptions and putting forward to suitable approaches for lessening disorders in a period of time are some of the other subjects which may be very important in researcher's veins. So, we can say that the key question in this research is: A. How does cognitive styles students (FI) do in companson to FD's students?

B.How is the situation of disorder in learning math subject in FD's student comparing to others? [10]

The purpose of design

The main purpose is the studying of interaction and effectiveness of cognitive styles among students in solving math problems and disorders and their learning about math concept.

The other purposes:

- 1- Dishing wishing on what cognitive field each student is related to \problems and what skills in disorders ability field need to be careful studying?
- 2- Giving useful solution in order to lessen disorders and necessary suggestions for their compensations.

The research hypothesis

1. The students in cognitive style field independence (FI) show more useful appliance in solving Math problem in comparsen to the students in cognitive styles field dependence
- 2-The students in cognitive style field dependence have more problem in mathematics concept when studying in comparison to field independence ones.

Definition of terms

1. The subjection of field independence (FI) is those who are simply able to interchange the structure of a field/environment/ organization and reconstruct them easily and they can separate the related and interrelated FD their elements. They are thinking analytically.
2. The subjection of field dependence (FD) is those who mostly accept a field or an environment the same as they are. They have difficulty in separating these elements which are bothering thun

They cannot reconstruct a situation or an environment easily. They cannot analyze an organization or a system easily. They have problems in doing them. They think generally universally.

3. The learning disorders and problems have been called idiomatically “the learning disorders”. They are continuously field in their lessons while they cannot be traditionally called exceptional children. Because their intelligence ratios are normal and they don’t have any failure in hearing or seeming but their appliance/function in math is lower than their old level and education.

4. The key point in this article is math problems and disorders we want to say expressively that what a mental disorder in normal students is. We believe that they are unreal concept from Math conceptions. For example when they want to solve potencies, radicals, equation, in equations, limit, continuity and etc, they have unreal mental concepts/ pictures. We believe that this unreal mental concepts/ pictures are the main reason for solving them incorrectly.

Statistical universe

In this research the under study population is Rasht shahid chamran higher school students connecting to education organization in the education year 2006-2007 and include accepted students who started to studingin 2006-2007 and had been collected in chamran center of higher education in rasht, [10]

Statistical samples

a) 70 questionnaires no (1) (GEFT test) were distributed as sample in higher school of the center in the courses, electronic, and computer from rasht shahid chamran center, who have been selected as sample and after collecting the questionnaires, 70 questionnaires were extracted for operations. [10]

b) 70 questionnaires no (2) of mathematics test redistributed a week after for the same sample which had been distributed for questionnaires about 64 questionnaires were extracted after collecting for the next activity [10].

Research instrument

In order to collect data, the researcher used two kinds of questionnaires as follows:

1- Questionnaire no (1) of GEFT which includes (1) page as follow:

pages first, second and third are descriptive and familiarity with the kind of test, and the question designed from the text-book high school and industry school and for some question in addition to one correct option,2-3correct options had been included so that their responsiveness power and action power are better measured and reached the to minimum guessing and random answers.[10]

With regard to perfect justifying of respondents and also due to evident descriptive in the introduction of questionnaire, only about 10 had been illustrated the cause of selecting the options.also, the highest score in this questionnaire is 50 scores. [10]

3. Validity and reliability of research instrument

In order to determine the validity of questionnaire which was the certain interest of researcher to minimize the measuring error so that all terms and concepts for respondents have a single meaning? In order to formulate self-making questionnaire if consulted with some mathematics experts and researchers frequently. And the questionnaire No (2) tested on some students who were from available sample.

Forth test which always have reliability to be valid so far validity of test which is the main variable it is used from halving method (second section of standard test GEFT as one half) and third section of standard test GEFT as the other half and Spirman-Brown correlation method, That is, in order to calculate total test reliability coefficient, We located correlation coefficient between the halves into the following formula, these-called as Spirman-Brown formula. The result will be reliability coefficient of total test.

Where: r_{tt} = reliability coefficient of total test

$$r_{\frac{11}{22}} = \text{Correlation coefficient between the halves of test [15]}$$

In order to reach the above correlation, researcher selected 30 GEFT questionnaires again from the whole sample randomly and tested them as retest. To exchange new questionnaire to the old one.

According to individual comparing, there were not any significant difference between them and they almost had been took the same score so, finally, the researcher with coordination of respected guidance professor excluded the section which student had not seen them at all, for example, they had been answered just to one of the second or third section and had not answered and zero score had been put for them. And they took correlation questionnair, and the following result was reached of:

Correlation ($r = 77/9$)

Distributing between testing the the main variable is in two parts. [10]

4. Statistical methods

In order to analyze data and hypothesis test it had been used various test and parametric / nonparametric data which of course this two pieces of data had been identified in statistical applications

A) Parametric data: these data are measured data and according to assumption of parametric test, distributing of this data is natural or near the natural. Parametric test applied in data with interval scale and impassive scale.

B) No parametric data: this data are accountable or they can be ranked. No parametric tests which sometimes have been identified as test free from distributing are not very unnatural default of universal distribution.

Since the score from (GEFT) test had been used as independent variable and mathematics test score as dependent variable it compares the independent and dependent variable of the people who are FD or FI or flnt. So at first, mathematics test scores of students investigated in normality. After that Colmogroph-Smiroof test it is wed to identify that distribution of the scores are as natural. Of course, normality of scores by $p > \%5$ evaluated. After this research had been used from parametric test of one way variance (ANOVA).

- **Tables** No (1), (2) and (3) indicate normality situation separately.

Table (1) score table of group embedded figures test (GEFT) from total student (68)

Mean 11/34
Standard deviation 4/68
Minimum score 1
Maximum score 18

Table (2): distributing correct answer in mathematics scores of shahid chamran center higher school students with (FI) independence field cognitive style comparing with (FD) field dependence students in various.

Cognitive area forms 50 scores

<i>group</i>	<i>mean</i>	<i>Standard deviation</i>	<i>minimum</i>	<i>Maximum</i>
FI(N=25)	20/4	4/91	11	34
FD(N=28)	19/57	7/49	4	42

In form action from table(2) indicate that student who have FI style , their score in mathematics is higher than the mean of total class and the mean of students with FD style and have more effectiveness and show more effective action in learning .

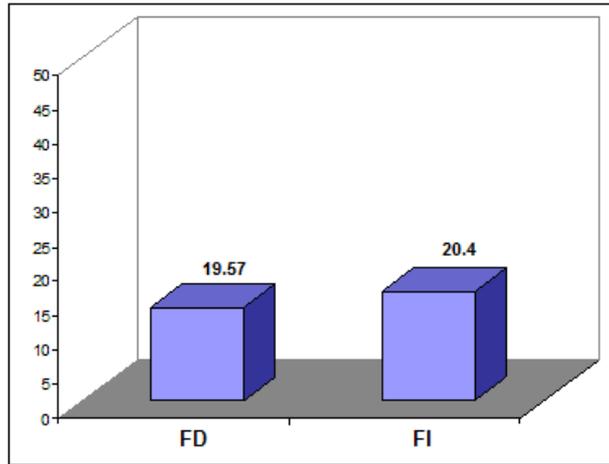


Diagram (1): Distributing correct answers of FI & FD styles

Table3: analyzing one way variance (one-way) ANOVA

<i>change</i>	<i>Sum of squares</i>	<i>Degrees of freedom</i>	<i>Variance mean squares</i>	<i>F</i>
Within group	43/59	2	21/79	./501
Inter group	10377/26	62	43/5	

Because the obtained F (. /501) from table F with degrees of freedom (62& 2) that is. /60with significance level 0.05 is less,

So the difference between subjects or means is not significant, then zero assumption is satisfying with percent 95percent confidence

We conclude that there are not significant deferentia between comparable variances.

Also in order to reorganization of FI & FD student, it had used the following algorithm:

1- If the score of students are more than $\bar{x} + \frac{1}{4} SD$ then they have FI cognitive style.

2- If the scores of students are less than $\bar{x} - \frac{1}{4} SD$, then they have FD cognitive style.

3- If the scores of students are between the $\bar{x} + \frac{1}{4} SD$ and $\bar{x} - \frac{1}{4} SD$ then they are flnt (mean).

Table4: table of distributing various cognitive styles of shahid chamran technical higher schools a model all for group embedded figures test.

(GFFT)

<i>group</i>	<i>FD</i>	<i>FLNT</i>	<i>FI</i>
Total (N=64)	N=28	N=11	N=25
100%	43/8	17/2	39

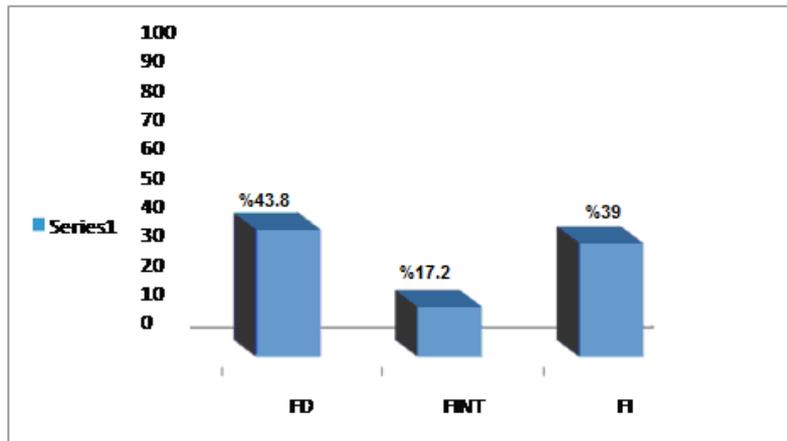


Diagram (2): Distribution of various cognitive styles.

It is worthy to say that, in order to recognize the normality of mathematics scores, it had used a formula with natural distribution features. If we increase the test number in binomial distribution so that n incline to infinite, polygonal figure of binomial distribution will close to a symmetric continuous curve which is called normal/natural curve, where $x = \mu$ symmetry axis and the function of this curve is symmetry axis and the function of this curve is as follow:

5. Results

Some partial results which come from analyzing data and statistical observation are as follow [10].

1- The performance student with cognitive style in answering the correct questions in companion wrong answer enjoy more suitable course situation in mathematics in all BLOOM domin table(5)

Table (5) distrubutingwrong/didtrurbceanswer in alldomains

	<i>total</i>	<i>knowledge</i>	<i>understanding</i>	<i>applied</i>	<i>analyzing</i>	<i>combination</i>	<i>comperhention</i>
<i>Correct answer (%)</i>	39/28	37/62	40/62	58/5	31/5	30/87	35/8
<i>Wrong answer (%)</i>	23/84	28/5	30/38	20/12	27/37	19/87	18

2- In replying to the hypothesis that "students with FI cognitive style compare to the student with FD cognitive style express more effective performance in solving mathematics problems, data and analyzing from tables satisfied this hypothesis. Table (6).

Table (6) distribution answer9CORRECT/WRONG) FROM50SCORE

Group	Average	SD	min	max
FI	20.4	4.91	11	30
FD	19.5	7.49	4	42
Flant	21.9	7.46	10	34
total	20.30	6.54	4	42

Above table (6) indicates that students with FD cognitive style have misunderstanding and have more incorrect and vague answers in mathematics comparing to the students with FI cognitive style.

3- In reply to this hypothesis that " students with FD cognitive style compared to the students with FI cognitive style suffer more from learning disorders in mathematics concepts in their school ' according to analyzing at the data from tables this hypothesis is tested. Table (7)

4- Data from table (7) indicate that the students with FI cognitive style in all of the cognitive domain such as, understanding·knowledge, analyzing, comprehension· application, and combination and in comparing to the students with FD cognitive style indicate more suitable performance.

5- According to the data from table indicate that the students with FD cognitive style in various cognitive domain, knowledge, understanding, analyzing, comprehension, combination, and applications have more learning disorder in mathematics. Table (7)

6- Tables indicate that the students with FI style in replying to combination cognitive style' comparing to the other domain were more successful and had the least disorder in application domain. Table (7)

7- Students with FI cognitive style had the most performantire style correct answering the question application cognitive domain and least performance in combination order of performance influence are as follow respectively: applied, understanding, comprehension, knowledge, analyzing, combination table(7)

	knowledg e	understand	applied	Analy zing	combination	comprehention	total
FI	3/04	3/95	5	2/87	2/56	3/86	20/ 4
FD	2/7	3	4/6	2/69	2/5	4/3	19/ 57

TABLE (7)

8- The students with FD cognitive style had been most performative and correct answering the questions in application of cognitive domain and the least performance in combination cognitive domain. The orders of performantire influence are as follow: respectively, Application, understandingly comprehension, knowledge, analyzing and combination. Table (7)

TABLE (8)

	knowledge	understand	applied	analyzing	combination	comprehension	total
FI	2/56	2/6	1/8	2/5	1/78	2/08	12/23
FD	2/66	2/57	1/57	2/23	1/67	1/76	12/4

9- The students with FI cognitive style suffered from the most disorder in understanding cognitive domain and the least disorder in application domain. The orders of disorder from the most to the least in various domains are as follows: Understanding, knowledge, analyzing, comprehension, application and combination table (8)

10- The students with FD cognitive style have the most disorder in knowledge and the least disorder in application. The orders of this disorder from the most to the least are as follows: Knowledge, understanding, analyzing, comprehension, combination and application. Table (8)

11- Both group FI & FD had the least performance in combination cognitive domain and both of them had the least disorder in application domain. Table (8)

12- According to the result only 5% percent of the students had replied up to 50 percent of the mathematics question correctly, in entry university test in higher schools.

13- The students of technical higher schools believe that only 26% percent of mathematics teachers in teaching mathematics in high school are very high and high effective.

14-97%of the students of chamran center technical higher school believe that method the teachers teaching in learning mathematics is effective and 78/4% of them believe that providing note by teacher is effective in learning mathematics.

15-15% of the students of in high school or industrial school have ascore of up to 17mathematics and 43% have some score between 14-17 and just 9% have the scores less than 12.

16-45%of the students in chamran center technical higher school believe that mathematics is a very difficult problem.

17- Just 25 % of the family of the student in chamran center higher school have mathematics diploma.

6. Discussion

since the main goal of this research is to study the interaction and effectiveness of the student cognitive style in problem solving of mathematics and learning disorder of mathematics concepts and skill, the finding of this research indicate that the student with FI cognitive style (independent field individual) compared to the student with FD (dependent field individual) appear to have more effective performance in mathematics problem solving. And the results have shows direct relationship with research aims. Also this study indicates that the students with FI cognitive style in mathematics cognitive knowledge have the highest performance and in combination domain have the lowest performance.

But in appraisal and functional domain they have the most and the least disorder, respectively. In this line, the student with FD cognitive style have the most performance in functional domain and have the worst performance in combination domain and they have the most disorder in comprehension and the least disorder in function domain. An interesting point is that both FI and FD have the lowest performance in combination cognitive domain and have the least disorder in function domain. In this research girl student with FI style compare to boy student with FI style, have lowest disorder in all the cognitive domain, also the male students with FD style compare to the female student with FD style have more disorder.

The result of this research satisfies the results from past research (Alamal Hodae-Jafari, 2002) which carried out on 10 mathematics students of Sabzevar teacher training university. Also it satisfies the results from smith loren (1970) research and research plan of Vitkin (1997 and 1989). Where the individual with FI have analytic approach to the issues and they are interest in theoretical and abstract material and have more ability in learning the concepts and scientific

definition, interests to learning and heuristic education, ability to learning basic sciences and engineering and such a knowledge. In contrast, the students with FD are holism and lack of sufficient interest to the cortical and abstract material and have problem in symbolic exhibition. They have weaknesses in learning concepts and have tendency to exhibition education and have problem in learning basic sciences and engineering and alike but them susceptible in social science, trade business management and social work. The information from table indicate that in all domain except appraisal, the individual with FI have more suitable performance than FD and also the FD individual in all cognitive domain have more disorder in learning and have more unsuitable performance than FI individual . And most of them in high school or industrial school have average between 12-14.

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