

Structure Model of Correlation between Cognition Learning Style (Intuitive, Analytical) and Mathematics Anxiety: The Intermediary Role of Basic Mathematics Skills

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Abstract: The purpose of this study is to investigate the relationship between cognitive learning styles (Analytical and intuitive) and math anxiety with the intermediary role of basic math skills among bachelor students. To measure cognitive styles we used cognitive learning index styles (Cognitive Learning Index). Which includes two subscales of analytical and intuitive cognitive style. Also to measure math anxiety, the math anxiety scale of Fenma – Sherman was used. The final score of general math is considered as the basic math skills. Correlation test shows that there is a positive relationship between intuitive cognitive style and math anxiety. The correlation between basic math skills and math anxiety indicate a significant negative relationship. There is no significant relationship between the cognitive styles and the basic math skills.

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1. Introduction

The study of effective factors in learning mathematics have been the case of interest by many critics and professionals of education technology in recent decades. Various studies show that understanding mathematics learning is not only dependent on cognitive structures but are also related to motivational and emotional factors such as beliefs, attitudes and anxiety. McLeod (1992) argues that in the field of teaching mathematics "efforts to reform mathematics curriculum should care about the role of interest. If the research on teaching and learning is supposed to maximize its impact on students and teachers, it is necessary to have a central position in the minds of researchers on emotional issues.

Math anxiety is a feeling of tension and anxiety that prevents working with numbers and solving mathematical problems at different stages of life and academic positions (Richardson and Suinn, 1972). Studies show that there is a significant relationship between math anxiety and achievements in math, in other words, there is a significant relationship between math performance and math anxiety and high math anxiety is associated with low scores in mathematics (Ma, 1999). Different factors are effective in math anxiety among which we refer to: disliking school, poor self-concept of math skills, teacher's attitude and emphasis on learning math through practice and homework (Norwood, 1994).

Allinson and Hayes' Cognitive Style Index Model is based on intuitive and analytical aspects. Intuitionism is formed based on feelings and emotions and is an instantaneous reaction, intuitionism is done on the right hemisphere of brain and is willing to take

an overall view and is formed based on feelings and emotions and is an instantaneous reaction and in comparison analytic analysis is a judgments based on reason and logic. Analytic analysis is done on the left hemisphere and focuses on the details (Allinson and Hayes, 1996).

It is claimed that the mathematical analysis are done on the left hemisphere, so it seems that it is possible to reveal a causal relationship about simple math skills and math anxiety based on Ellison and Hess's theory of cognitive learning. There is evidence showing that the knowledge of cognitive styles in guiding the individual in choosing a job, work design, system integration and supervision and management, and training and development is valuable. CSI must show that is helpful in each of these programs.

In this paper, multiple linear regression was used to test whether using intuitive and analytical cognitive style of Ellison and Hess, is able to make a relationship with the basic skills and math anxiety. The main research question is as follows:

Do cognitive styles have correlation through the effect on basic math skills with math anxiety?

2. Material and Methods

According to the main purpose of this applied research and according to the data collection method the descriptive research is a correlational study. The population is consists of students of Islamic Azad University of Abadan who are studying in the second semester of the academic year. Sampling method is cluster sampling. The study's sample consists of 134 students, 71 of whom are males and 63 of whom are females. The age range of participants in the sample is

between 17 to 42 years old with a mean age of M=23.01 years old, and standard deviation is SD= 5.88 years.

In this study, data collection tools are questionnaires, respectively, the mathematical anxiety questionnaires Fenema - Sherman, general math scores are index of cognitive learning styles. The Cognitive Learning Styles index Questionnaire, CSI, is made of 38 questions which is a self-report whose responses are true, false and unknown. From these 38 items, 17 items are related to intuitive cognitive style with the scores of the reverse numbering, that is the true option scores 0, unknown option scores 1 and false option answer scores 2, and the remaining 21 items are related to analytical cognitive style, the true option scores 2, unknown option scores 1 and false option scores 0. Scores close to the maximum total score of 76 shows that the person is analytical, and scores close to the minimum total score of 0 shows that the person is intuitive. Also to measure math anxiety, math anxiety scale Fenema - Sherman will be used. Mathematics Anxiety Scale of Fenema - Sherman consists of 12 items, each of which has been investigated by Likert scale (1 = strongly disagree to 5 = strongly disagree). Reliability has been obtained using Cronbach's alpha. For the subscales of the intuitive and analytical cognitive learning styles Cronbach's alpha values were respectively calculated as 0.51, 0.46 and for the math anxiety scale of Fnma-Sherman, the value of Cronbach's alpha was obtained as 0.897.

Data analysis using descriptive methods, correlation analysis, and multiple linear regression. For data analysis, SPSS version 13 was used.

3. Results

Table 1 summarizes the descriptive statistics of the variables of the present study. Skewness and kurtosis index values are important in this table because the normal distribution are 0 and 3 respectively. As can be seen skewness index for the endogenous or dependent variable of math anxiety and preparatory math skills are respectively, -0.11 and 0.39 which indicate normal approximate distribution for these two variables. The non-parametric test of Kolmogorov - Smirnov was done for all variables where for each 4 variables the null hypothesis which indicates normality of the data is not rejected at 5% error level.

Table 1: Summery of descriptive statistic

Variable	Mean	Standard Deviation	Skewness	Kurtosis
Math Anxiety	38.96	10.15	-0.11	-0.45
Math Skills	11.63	3.88	0.38	-0.42
Intuitive	10.31	4.34	0.69	1.49
Analytical	30.07	4.27	-0.78	2.45

The correlation between variables are reported in Table 2. As it can be seen in the table there is an inverse correlation between variables of math anxiety and basic math skills in the level of 5% error. It means with the increase in the math anxiety, basic math skills of students decreases. There is a positive significant relationship between math anxiety and intuitive cognitive style, in 5% error level. It means with increase in the intuitive cognitive style, math anxiety also increases. There is no significant relationship between basic math skills and intuitive and analytical cognitive styles. Also there is an inverse correlation between intuitive and analytical cognitive style in 1% error level.

Table 2: Matrix correlation of variables

Variable	Basic Math	Intuitive	Analytica
Math Anxiety	-0.18*	0.19*	-0.04
Math Skills		-0.11	-0.06
Intuitive			-0.42**

To check the assumptions of the research first multiple regression model was fitted with the independent variables of analytic and intuitive cognitive styles and math anxiety as the dependent variable. The results of this model were dramatically indicating the fitting of the weak model. The multiple correlation coefficient in this model was equal to 0.004. The amount of multiple correlation coefficient of the model increased to 0.22 by the inclusion of the basic math skills. The final regression model is fitted to the data in table 3. The statistical measure of Durbin Watson is equal to 1.75 and the fitting of the multiple linear regression model in the error level of 10 percent has an appropriate fitting to the data (F(3, 130) =2.19 and p<0.1). According to table 3 when the relations of the independent variables of cognitive styles and basic skills of math anxiety is investigated by math anxiety, only the basic math skills are significant in 5% error level (T=-2.56, p<0.05).

Table 3: Regression coefficients for research question

Variable	Coefficients	Std. Error	T	Sig.
constant	49.08	8.81	5.57	0.000
Analytica l	-.088	0.224	-0.393	0.695
Intuitive	-0.068	0.219	-.312	0.756
Math	-0.582	0.227	-2.56	0.012

4. Discussions

This study found that there is no significant relationship between students' basic skills and intuitive and analytical styles of learning. However it should be noted that the learning style refers to the manner of

learning not to whether one is able to learn well or not. That's why we refer to these characteristics of people learning style not learning abilities. Students have different learning styles that these styles affect their academic progress. There is a significant relationship between the intuitive style of leaning and math anxiety, it means the more intuitive the person the more anxious he will be. Also, according to the previous studies math anxiety is related to the basic math skills.

There is a significant relationship between mathematics anxiety and teaching methodology, so that for the students who have high anxiety, descriptive method and for students who have a little anxiety exploratory method was more useful (Clut, 1984).

The way of categorizing styles of learning is not acceptable to all educative psychologists and professionals in teaching and learning, as an example Felder and Brent (2005) have said, mere mention of the term learning styles lead to roust emotional reaction in many scientific communities which claim that they do not have proper theoretical learning models, and tools used to assess the validity of them do not have enough validity. On the contrary, those who support Learning styles, believe that students learn more when they are taught in situations appropriate for them. But researcher like Woolfolk (2004), citing to the failure of the investigations to show that the assessment of student learning styles and matching teaching methods with different styles have no effect on student's learning, the advocates claims put learning styles into question, he also states: before trying to coordinate your activities with different styles, all the students should remember that the students and specially the younger ones could not be a good judge in that how they should learn. Sometimes, the students, especially those who have problems, prefer to learn what is really easy that may be difficult and uncomfortable. There are situations that students prefer to learn in a certain way because they have no alternative, this is the only way they can encounter learning task. Such students may benefit from learning new ways to learn (Saif, 2005).

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