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*Original Article*

# Investigating the Relationship between Cognitive Style (Filed Dependence/Independence) and Academic Achievement in Male and Female Students of Behbahan Islamic Azad University

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**ABSTRACT**

This study purports to examine the association between cognitive style (field dependence/independence) and academic achievement in male and female students of Behbahan Islamic Azad University. With regard to objectives, this research is applied and in terms of data gathering, it is correlational. The population of this study consists of 7500 students entering this university in 2010-2011 academic years. The sample used in this project consists of 1009 students selected by means of cluster sampling. The latent patterns test developed by Vikin et al. was used to measure cognitive style (field dependence/independence). In this research, criterion validity coefficient was 82% for men and 63% for women. Test-retest method was utilized to measure the reliability of the latent patterns test which was .82 for both men and women. In order to describe the sample, descriptive statistics were used and in order to answer the research questions, inferential statistics, such as Pearson correlation coefficient, independent samples t-test, one-way ANOVA, and Scheffe post hoc test were run. The findings of this research project showed that there is a significant positive relationship between male and female students' field dependence and field independence and their academic achievement. In addition, regression analysis revealed that cognitive style is a significant predictor of academic achievement. Finally, it was found that girls outperform boys as regards to academic achievement.

**Key words:** Academic Achievement, Cognitive Style, Feld Dependence, Field Independence.

## 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 these 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 [1]. 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 [1]. It should be noted that cognitive styles influence preferences for dealing with the environment, social relations, and personality types. Juice held that 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. Juice asserted 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 [2]. There are individual differences among university 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 [2]. These differences are rooted in many various factors, one of which is cognitive style. University professors' 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 universities are aimed at enhancing students' academic achievement, it seems necessary to conduct research projects to offer university professors with effective guidelines in giving academic tasks to students in similar courses in different majors or in one course in which students have different cognitive styles. The assignment given to each student should match his or her cognitive style as much as instructional regulations permit.

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 dependence/independence) and academic achievement in male and female students of Behbahan Islamic Azad University. 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 in basic sciences and field dependent students have been reported to be more successful in humanities. Some of such studies are reported here. Yaghubi [3] investigated the relationship between field dependence/independence and success in language learning in students of English at Teacher Training University. Yaghubi [3] concluded that field independent students are better in learning and comprehension.

Faramarzi investigated cognitive styles of students at University of Tabriz, Iran and how they deal with mental pressure. Results showed that students who are more field independent are more capable of coping with mental pressure. Similarly Beigi found that cognitive styles and creativity are significantly correlated in students of guidance schools in Arak, Iran. Mokhtarian [2] demonstrated a significant relationship between the harmony between high school students' and teachers' cognitive styles (field dependence/independence) and students' academic achievement. Samavati [4] 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.

Zokaei [5] investigated students' attitudes towards educational values. It was revealed that girls are significantly more interested in studying, they are more likely to have personal choices for entering universities, significantly more keen on continuing their studies regardless of employment opportunities, and are more motivated to obtain high academic ranks. Khodabakhsh [6] concluded that students' math scores are significantly related to their cognitive styles (field dependence/independence). Daniel et al 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 [7]. Ferstin 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 are [7]. 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 [6]. Rozkaveski et al. [7] 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. [8] found that field independence and success in math are positively correlated.

This study purports to examine the association between cognitive style (field dependence/independence) and academic achievement in male and female students of Behbahan Islamic Azad University. Therefore this research tries to answer the following questions:

1. Is there a significant relationship between field dependence and academic achievement in students of Behbahan Islamic Azad University?

2. Is there a significant relationship between field independence and academic achievement in students of Behbahan Islamic Azad University?

## MATERIALS AND METHODS

With regard to objectives, this research is applied and in terms of data gathering, it is correlational. In order to answer the research questions descriptive and inferential statistics have been calculated. Pearson correlation coefficient has been run to answer the main research questions, to measure differences as regards to major, independent samples t-test have been calculated, and to measure the differences in terms of field of study one-way ANOVA and post hoc test have been utilized .

Statistical Population, Sample Volume and Sampling Method:

The population of this study consists of 7500 students entering this university in 2010-2011 academic years. The sample used in this project consists of 1009 students selected by means of random sampling. In this project the following tool were applied for collecting information:

Data collection instruments and scoring procedures: The latent patterns test developed by Vikin et al. [9] was used to measure cognitive style (field dependence/independence) [2]. 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 latent 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 [10]. 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. In this research, criterion validity coefficient was 82% for men and 63% for women. Test-retest method was utilized to measure the reliability of the latent patterns test which was .82 for both men and women. These are line with coefficients calculated by Vikin et al. [9].

## RESULTS

Six hundred and four male university students (59.9%) and 405 female students (40.1%) took part in this study. There are 179 students (17.7%) whose GPA ranges from 10 to 12.5 (out of 20), 413 students (40.9%) whose GPA ranges from 12.51 to 15, 304 students (30.1%) with GPA ranging from 15.01 to 17.50, and 113 students (11.2%) with GPA ranging from 17.51 to 20. There are 57 students of physical education (5.6%), 53 students of metallurgy (5,3%), 30 students of economics (3%), 17 students of midwifery (1.7%), 59 students of mechanical engineering (5.8%), 20 students of agriculture(*2%), 63 students of primary education (6.2%), 208 students of electrical engineering (20.6%), 100 students of law and banking affairs (9.9), 52 students of counseling (5.2%), 25 students of psychology (2.5%), 20 students of geology (2%), 130 students of accounting (12.9%), and 135 students of computer (13.4).

First question: Table 1 shows that the correlation coefficient between field dependence in men and academic achievement is 0.45 ($p<0.01$). Therefore, the relationship between the two variables is statistically significant in men.

**Table1.** Pearson correlation coefficient to answer the first research question

| Variable | Correlation coefficient | Sig. |
|---|---|---|
| Field dependence (men) | 0.45* | 0.01 |
| Academic achievement | | |

Table 2 demonstrates that the correlation coefficient between field dependence in women and academic achievement is 0.52 ($p<.01$). Therefore, the relationship between the two variables is statistically significant in women.

**Table 2.** Pearson correlation coefficient to answer the second research question

| Variable | Correlation coefficient | Sig. |
|---|---|---|
| Field dependence (women) | 0.52* | 0.01 |
| Academic achievement | | |

Second question: Table 3 illustrates that the correlation coefficient between field independence in men and academic achievement is 0.67 ($p<0.01$). Therefore, the relationship between the two variables is statistically significant in men.

**Table 3.** Pearson correlation coefficient to answer the third research question

| Variable | Correlation coefficient | Sig. |
|---|---|---|
| Field independence (men) | 0.67* | 0.01 |
| Academic achievement | | |

Table 4 depicts that the correlation coefficient between field independence in women and academic achievement is 0.56 ($p<0.01$). Consequently, the association between the two variables is statistically significant in men.

**Table 4.** Pearson correlation coefficient to answer the fourth research question

| Variable | Correlation coefficient | Sig. |
|---|---|---|
| Field independence (omen) | 0.56* | 0.01 |
| Academic achievement | | |

As Table 5 shows, the correlation coefficient between cognitive style and academic achievement is .31. On the whole, cognitive styles predict one percent of variance in academic achievement. Moreover, β is .31 and the Constant value is 1.94.

**Table 5.**Regression coefficients, correlation coefficient, and coefficient of determination

| Variable | Constant | β | T | Sig | R | $R^2$ |
|---|---|---|---|---|---|---|
| Cognitive style | 1.94 | 0.31 | 10.4 | 0.01 | 0.31 | 0.1 |

Analysis of variance was run to ensure the significance of regression. Considering F (107.7, p<.01), we can conclude that the regression analysis was significant and the results are valid and dependable. Furthermore, the difference between men and women with regard to academic achievement is significant. The mean score of academic achievement in men is 2.26 and that of women is 2.48. The standard deviation of academic achievement in men is .85 and that of women is .94.

## DISCUSSION

There was a significant relationship between field dependence and academic achievement in men. This is in line with the findings of Yaghubi [10], Hosseininasab et al. [11], and Mokhtarian [2]. Yaghubi [10] concluded that field independent students are better in learning and comprehension. Mokhtarian [2] 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, there was a significant association field dependence and academic achievement in females. This is in line with findings of Homayooni et al. [7], Abdollahpoor [13], and Abdollahpoor [13]; found that field independent students are more interested in math than field dependent students. 7. Homayooni et al. [7], found a significant association between cognitive style and achievement and math. ) 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.

Furthermore, there is a significant relationship between field independence and academic achievement in men. This provides support for Taghvaei [12], Yaghubi [10], and Robinsonet al. [2]. Yaghubi [10] concluded that field independent students are better in learning and comprehension. Rozkavski concluded that there exists a significant positive relationship between field independence and academic achievement, particularly when intelligence – as a variable – is controlled. . Alsandro et al. explored individual differences in deductive problem solving. They concluded that field independent participants are more capable of deductive problem solving than field dependent participants are. In general, field independent students prefer to organize instructional materials in person, while field dependent students are more successful in group situations, such as group discussions with their classmates. They are keen on being admired and are fond of external reinforcement. In contrast, field independent students prefer individual instruction, and have personal motivation for their studying, and do need external reinforcement .

Finally, field independence in women is significantly related to their academic achievement. This finding is in agreement with that of Hosseini Nasab and Valinejad [11] Mokhtarian [2], Hosseini Nasab et al. [11], found that male and female students are not significantly different with regard to their cognitive style (FD/ID) and that field independence and their performance in math are significantly associated. Homayooni et al. [7] demonstrated that field independent students are more interested in math than field dependent students are. 2. Mokhtarian [2]

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. [8] found that field independence and success in math are positively correlated. University students who are field dependent are interested in educational and occupational activities that are interpersonal. They are particularly successful in activities that do not call for analytical abilities. However, field independent students are more successful in activities requiring analytical abilities. They are particularly more successful in activities in which social relations are not very salient. 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 dependent 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 learning 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.

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