



## **Studying the interaction of gender and self-efficacy [high and low] on the academic achievement of students in third grade**

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### **ABSTRACT**

*We studied the interactive relationship between gender and self-efficacy [high and low] and its impact on academic achievement in math and science. It consisted of 200 students [100 boys and 100 girls] who were selected from Shiraz School in first zone. Self-efficacy questionnaire of Pintrich and D. Groot [1990] was used to assess the self-efficacy and student's math and science scores as indicators of academic achievement collected from the schools' Archive. Research questions include:*

- 1 - Are gender and self-efficacy [high and low] engaging in academic achievement and mathematics?*
- 2 - Are gender and self-efficacy [high and low] engaging in academic achievement and science?*

*To answer these questions, we used two-way analysis of variance. The results showed that:*

- 1 - there is no significant difference between male and female students in terms of academic achievement in mathematics.*
- 2 - School girls compared with boys are more advanced in Science class.*
- 3 - Students with high self-efficacy, compared to students with low self-efficacy, had greater progress in both lessons.*
- 4 - There is no meaningful interaction between gender and self-efficacy [high and low] in math and science lessons.*

**Key words:** self efficacy, interaction - Gender - Academic Achievement

### **INTRODUCTION**

From the early days of the emergence of psychology, so many different theories have been offered to understand the human and way of behaving. One of the new theories in this field is Bandura's social learning theory. Bandura [1977] identifies both Antecedents and aftermath for any action. One of the indicators of behavior Antecedents is self-efficacy.

Bandura [1977] calls self-efficacy as one of the cognitive processes by which we go through many social practices developed a lot of personal characteristics. He also states that concept of self-efficacy refers to the belief of person that he can do a work successfully or start an efficient relationship with others [4]. Shank [1998] states that self-efficacy is a collection of students' believes about their ability to perform their task. Bandura [1986] calls self -efficacy as judgments of people about their ability to undertake their required roles in connection with a future position. One of the issues related to self-efficacy is its relationship with various processes in the field of education. Social - theorists argue that social self-efficacy beliefs of students, including their judgments of their capabilities to perform specific academic tasks, are important determinants of motivation, choices and actions [33, 13].

1-1. Effects of self-efficacy on behaviors and characteristics of individuals with high and low self-efficacy:

Bandura [1977] calls self -efficacy as one of the cognitive processes through that we can develop many social behaviors and personal characteristics. That either people will able to cope successfully with situations or not depends on their self efficiency. People fear from situations in which they are not capable coping them so they prevent these situations, while in other situations, they act decisively.

Perceived self efficiency not only decreases the level of fear and the excepted preventions but also affects adoption with the situation through expecting the probable success. Self efficiency determines how far those efforts will continue and how far it will resist in the face of obstacles experiencing the problem. The more self efficiency expectations, efforts will be more active [6].

Self-efficacy refers to the depth of our confidence about our own performance. If people see themselves unable in different situations, they may imagine the problems more difficult than the real one.

Inappropriate or non-adaptive behavior, in these situations, may verify the person's perception from themselves as unworthy, powerless and passive person. It makes the person to avoid problematic

situations or decrease their effort to solve them, thus creating a vicious circle which will always be continued [6].

Bandura [1977] divided people, in terms of their personal efficiency, into two categories: those who have high personalized self efficacy and people with low self-efficacy. He believes that people with high self efficacy have more perseverance experience and less fear, because they have more control on the affairs and rarely experience low confidence. People, with high self efficacy, show more persistence and resistance in their tasks and have motivational orientation, while a person, with low self efficacy, have probably punitive orientation and a do their tasks imperfectly.

Another issue related to self-efficacy is its impact on the success or lack of success. Successful people believe that they can successfully act and actually do the same. Self-efficacy influences on the difficulty of goals chosen by people so that people with high self-efficacy try to choose more challenging and difficult targets.

In addition, self-efficacy affects the amount of effort or activity that a person shows and Strength and endurance of person in the face of difficult tasks and assignments. A strong sense of self-efficacy will facilitate not only doing the works, but it helps person to stand against failures. Moreover, the judgment of individuals about their own abilities influences on how they think and feel about a task or how it will end [6].

Bandura [1977] made a real distinction between self-efficacy and perceived self-efficacy. A person may feel that his self efficacy is low, while its level is really high, vice versa. The Best situation is when there is a harmony between wishes and aspirations of the people and their abilities.

On the one hand, people constantly try to do things beyond their ability and if they cannot succeed, they will be disappointed and lose everything. On the other hand, if people with high efficiency do not try seriously, their personal development will stop.

Pintrich [1986] believes that studying the cognitive aspects, regardless of their motivational and interactive effect on learning outcomes does not seem very logical because in learning process, in addition to cognitive factors, motivational factors are also involved. So in the school situation, in addition to the cognitive approach, motivation believes should also be considered. He also says that motivational factors influencing learning are offered in the form of a three-component model of motivation associated with the self-regulation components. These factors include: self-efficacy, intrinsic value, emotional reactions.

In relation with cognitive and motivational factors, researches suggest that there is a linear relationship between motivational factors [self-efficacy, intrinsic value] and self regulating components [meta-cognitive strategies, cognitive strategies, measures and efforts of students]. That is, along with increased feelings of self-efficacy and intrinsic value, the use of cognitive and meta-cognitive strategies also increases [12].

### **Self Efficacy and gender differences**

Gender is one of the most stable features that humans are born with it and whether or not based on it, the humans are classified. That is why the humans' classification to male and female, over the other possible differences between different groups of humans, is discussed and prejudiced. A large group of psychologists and education specialists from many years ago have tried to study and compare the biological behavior, mental and personality characteristics of both genders. One of the variables is self-efficacy. The researchers' efforts have led to the emergence of research findings related to the impact of gender on self-efficacy. Among these researchers are Pintrich and Groot [1990]. They reported that boys and girls of school age have the same self- assurance level but [secondary school], boys' self efficiency is more than girls. Some researchers, including Prichen [1990] expressed that gender differences in self-efficacy were not significant.

### **Importance of the issue**

One of the main reasons, among the complex causes of the failure in education, is the students' view towards their own abilities which was used as a basis for Bandura's theory. Since people's beliefs and judgments about their ability is based on their successful experience and verbal persuasion and vicarious experiences, so through modeling, educating, meeting successful people, or combination of these cases, we can motivate the sense of efficacy in the students. Bandura called is "efficacy induction" [4]. Since Bandura believes that self-efficacy is related to academic achievement, through recognizing people with low self-efficacy, remedial education and arranging the assignments from simple to difficult ones, we can make them feel ability of doing their homework and affect their education performance.

According to the above mentioned issues on the impact of gender differences in self-efficacy and academic performance and also the gender differences in self efficacy, and recognition of people and their effort for improving their view towards their own abilities, the main question of the research is as follow:

Do gender and self-efficacy [high and low] and academic achievement have interaction with math and science?

## **literature Research**

Adams [1991] studied the relationship between self-efficacy expectations and academic performance in 208 first-year law students. They filled out an 11-point efficacy scale and a 12-point visual data questionnaire. The results showed that there was a positive and significant relationship between self-efficacy and academic performance in first year law students and efficacy variable is a predictor of academic achievement in law students. Zimmerman, Bandura, and Martinez-Ponz [1992] using path analysis, tried to examine the relationship between self-efficacy and academic achievement. They reported that academic efficacy can directly explain 20% of academic achievement of students. It can also indirectly through increasing the students' desire and effort level, explain 36% of academic achievement variance.

Norwich [1987] studied the relationship between self-efficacy and academic achievement in mathematics. His subjects were 38 boys and 34 girls from four coeducational schools in London. The results showed that 37 % of mathematics variance was predicted by self-efficacy. Malpass [1996] studied the relationship between self-efficacy, goal orientation, self-regulation, learning and achievement in mathematics among 144 students of 10 - 12 grades. The results showed that there was a positive and moderate correlation between the efficacy and mathematical development. Smith [1996] also evaluated the relationship between self-efficacy in science, documents and attitudes toward science among 411 high school students. The overall results indicated that there was a significant relationship between self-efficacy and science. This study also revealed the reasons of women reluctance and minorities to the professional jobs which roots in their negative attitude towards science and their low self efficacy about performance in science.

Janice [1996] examined the relationship between self-efficacy, test anxious and academic performance of students among primary and secondary school students in four areas of math, science, English and reading. Results indicate that there was a relationship between self-efficacy and performance in science. The above mentioned studies show that there is relationship between academic performance, self efficacy and student performance mathematics, but it seems according to the gender differences and self efficacy, we cannot firmly say that which gender has higher self efficacy. The results are inconsistent. According to the fact that cultural issues affect the self efficacy, one of the main goals of this research is to find out that whether self efficacy affect the academic achievement by itself or is there a relationship between self efficacy and gender influencing the academic achievement?

## **Research Questions**

Based on the above mentioned studies about the relationship between self efficacy and academic achievement and also considering the gender in self efficacy for comparing the cultural issues and that if this fact covers Iran students or not, we ask the following questions:

1 – Is there an interaction between the gender of third-year students, and self-efficacy [high and low] and the academic achievement of Students in mathematics?

2 - Is there an interaction between the gender of third-year students, and self-efficacy [high and low] and the academic achievement of Students in science?

### **1-6. Operational Definition of Research Variables**

This study which examines the interactive relationship between self-efficacy and gender with academic achievement, words expressing the variables are defined as follows:

1-6-1. students with high self-efficacy:

student, whose score, in Pintrich efficacy test, is over 40% of distribution of research subjects.

2-6-1. students with low self-efficacy:

student, whose score, in Pintrich efficacy test, is lower than 40% of distribution of research subjects.

3-6-1. Academic Achievement:

The final round scores of students in math and science is considered as their academic progress index.

## **MATERIALS AND MEHODS**

The sample of study includes 200 students [100 boys and 100 girls] from the secondary schools in first zone of Shiraz. They were chosen through cluster sampling method and test the efficacy Pintrich and d.Groot self efficacy test [1990], in which one of the subscales of the Motivational Strategies for Learning questionnaire [m s l q] was performed on them. This questionnaire was built for assessing the self-regulatory strategies and motivational beliefs. It initially had three components then it has been diminished to two components: cognitive strategies and self-regulation. The questionnaire consists of three components: the motivational efficacy, intrinsic value. Motivational dimension of this questionnaire includes anxiety, self efficacy and intrinsic value. The questionnaire had 46 questions out of which 9 questions were used to assess efficacy. It was set in five grades [from totally agree to totally disagree].

## **Test Validity**

As mentioned before, the main scale of motivational Strategies for Learning Questionnaire includes subscales such as self-efficacy, self-worth, self-regulated learning and using strategies that Pintrich and d.Groot [1990] offered for examining the validity of self-efficacy scale. They reported that self-efficacy scale correlation with intrinsic value is 48 % and with self-regulated learning is 46 %.

Alborzi and Samani [1999] in their study aimed to investigate and compare the self-regulated learning strategies and motivational beliefs among boys and girls in gifted centers using this method. They stated that correlation between self-efficacy and using the strategies is 36 %, with the self-regulatory strategies scale is 52 % and with intrinsic value is 52%. In This study, since its validity was obtained by the researchers, its report seems sufficient.

### Reliability

Pintrich and d.Groot [1990] measured the reliability of the main scale through Cronbach's alpha. It was calculated 89%. Alborzi and Samani [1999] also, in a study using test-retest reliability, reported the coefficient as 76% [ $p < 0.005$ ]. In this study, to identify the test reliability, using Guttman Bisection method, reliability coefficient was 0.81, through Cronbach's alpha, it was 83%, through test-retest method, it was 77% which was significant in 0.0001 level.

### Procedure

After selecting schools and classes, we prepared two versions of test completed based on two lessons [science and math] given to the subjects. Also after announcing the results of final exams in June, their scores in math and science courses taken from schools and after encoding by the computer, using two-way analysis of variance was examined. In this statistical method, gender [girls and boys] and self efficacy [high and low] were chosen as independent variables and academic achievement was chosen as dependent variable. Their main and interactive effects were assessed.

## RESULTS

According to the research questions and after collecting and statistical analysis of the data, academic achievement scores in math and science, and also due to the lack of norms for identifying the self-efficacy [high and low], 40% of scores which, were above and below the distribution scores, were analyzed.

**Table 1: Mean and standard deviation of girl and boy subjects in mathematics based on high and low self efficacy**

Gender	Boys	Girls	
High Self-Efficacy	$\bar{x} = 15/8$ ; 2/3 = SD 34 =N	$\bar{x} = 16/7$ 8/2 = SD 37 =N	$\bar{x} = 16/2$ 71 =N
Low Self-Efficacy	$\bar{x} = 12.26$ 3.97 =SD 41 =N	$\bar{x} = 13.2$ 3.65 = SD 38 =N	$\bar{x} = 12.74$ 79 =N
	$\bar{x} = 13.87$ 75 =N	$\bar{x} = 14.95$ 75 =N	

**Table 2. variance analysis of high/ low self efficacy and its impact on progress in mathematics**

Variance source	Total square	Df	Square mean	F	Sig.
Gender	33/09	1	33/09	2.77	N.S
Self efficacy	456.40	1	456.40	38.23	0/0001
Gender × self efficacy	0.123	1	0.123	0.010	N.S
Within group	1743.11	146	11.94	-	-
Total	2243.37	149	15.06	-	-

Two-way analysis of variance [Tables 3-1 and 3-2] to answer the first research question [interactive relationship between gender and self-efficacy on mathematics achievement of students] showed that gender has no significant difference in advancing mathematics [ $p > 0.05$   $df = 1.146$ ,  $f = 2.77$ ].

In addition, the results indicate that there is a significant relationship between self-efficacy and mathematics achievement. This means that students with high self-efficacy have greater progress in mathematics, compared with e students having low self-efficacy [ $p < 0.0001$ ,  $df = 1.146$ ,  $f = 38.23$ ]. Results of interactive relationship between two variables show the lack of meaningful interaction between them [ $p > 0.05$ ,  $df = 1.146$ ,  $f = 0.010$ ].

**Table 3: Mean of standard deviation scores of girl and boy subjects in science based on high and low self efficacy**

Gender	Boys	Girls	
High Self-Efficacy	$\bar{X} = 15/4$ = 2/39SD =44N	$\bar{X} = 17/0$ = 1/83SD =42N	$\bar{X} = 16/2$ =86N
Low Self-Efficacy	$\bar{X} = 14/0$ = 2/82SD =43N	$\bar{X} = 14/7$ = 2/4SD =42N	$\bar{X} = 14/4$ =85N
	$\bar{X} = 14/76$ =87N	$\bar{X} = 15/9$ =84N	

**Table 4. Variance analysis of gender and high/low self efficacy impact on the progress in empirical science**

Variance source	Total square	Df	Square mean	F	Sig.
Gender	56.28	1	56.28	9.86	0.002
Self efficacy	135.99	1	135.99	23.82	0.0001
Gender × self efficacy	8.09	1	8.09	1.42	N.S
Within group	953.55	167	5.71	-	-
Total	1152.91	170	6.78	-	-

To answer the second question, the two-way analysis of variance [Tables 3-3 and 3-4] was used. The results showed that the gender impacts on academic performance in Science class. There was significant difference between boys and girls so that girls were better than the boys [ $p < 0.002$ ,  $df = 1.167$ ,  $f = 9.86$ ].

Efficiency also impacted on advancement of science. That is, students with high self-efficacy had further progress in science than students with low self-efficacy [ $p < 0.0001$ ,  $df = 1.167$ ,  $f = 23.82$ ].

Statistical results of interactive relationship between gender and self-efficacy in science progress showed that these two factors had a significant interaction on academic achievement in science [ $p > 0.05$ ,  $df = 1.167$ ,  $f = 1.42$ ].

## DISCUSSION AND CONCLUSION

In answer to the first question, the results show that there was no significant interaction in the development of mathematics between boys and girls, but there was significant difference between the mathematics score of students with high and low self-efficacy. That is, students with high self efficacy had better performance in mathematics. There was also no significant interaction between gender and self efficacy [high and low] in mathematics progress.

In explaining these results, it should be noted that lefrancois [1996] argues that gender difference, due to shared interests and creating equal opportunities for both genders, has declined in recent years. Also Drake [1998] argues that behavior of people is mainly controlled by defined roles and expectations rather gender roles. About significant relationship between high and low self-efficacy, we should mention Bandura's ideas about the characteristics of people with high and low self-efficacy.

Bandura [1977] argues that individuals with high self-efficacy have much more activities, are more successful, and in comparison with people having low level of efficiency, they have greater persistence, experiencing lower fear. In explaining the superiority of people with high self efficacy in mathematical performance, we should refer to Pintrich and Groot report [1990]. They noted that self-efficacy acts as a facilitator or mediating role in connection with the cognitive engagement. Improvement of self-efficacy leads to higher cognitive and meta-cognitive strategies and finally increased academic performance. In answer to the second question, the results showed no significant differences between girls and boys in science lessons which means that girls are better than boys in science. There was also significant difference between people with high and people with low self efficacy in science. That is, people with high self efficacy had better performance.

There is no interaction between gender and self-efficacy [high and low] in science progress. In explaining the better performance of girls in science, we can say that due to social changes, socialization processes, changing cultural contexts and creating equal opportunities for both genders, the male dominance has been reduced in several areas [9]. Here we can also point to some cases such as unsafe structures like schools, parent-teacher expectations, instructional practices, teachers' attitudes towards girls and boys.

In explaining the lack of interaction between gender and self- efficacy in academic achievement, we can refer to Schunk [1984]. He noted that self-efficacy, through direct and indirect effects on academic

achievement, has such strength that even without interaction with other factors, it can influence the academic achievement. In addition, due to the advances in recent years in the field of equal opportunities for both genders, changing attitudes towards women and loss of stereotypes about women, gender does not affect their performance by itself. Therefore, the strong relationship between self-efficacy with academic achievement and weak relationship of gender with performance caused the self-efficacy impact on the performance of students. Finally, we could not find an interactive relationship between these two cases.

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