

# A STUDY OF SELF-CONCEPT IN RELATION TO ACADEMIC ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS IN MATHEMATICS

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## Abstract

The study aimed to investigate the relationship between self-concept and Academic Achievement of Secondary School Students (Grade VI-VIII) in Mathematics as well as the influence of gender on self-concept and Academic Achievement in Mathematics. A sample of 300 Secondary school students (male=150, female=150) were used for the study. They were selected from 10 secondary schools (urban=5, rural=5) situated in District Gautam Budh Nagar of U.P. Stratified Random Sampling technique was used to select the schools and the participants. Data were collected using a 20-item self-concept questionnaire and a 30-item multiple-choice Mathematics Achievement Test with reliability coefficients of 0.74 and 0.83 respectively, and analysed using Pearson's product moment correlation and t-test statistics, tested at 0.05 level of significance. The results showed that self-concept moderately correlated with Academic Achievement in Mathematics, while gender had no significant influence on self-concept and Academic Achievement in Mathematics. However, the mean scores of male and female students in Mathematics were below average. It was suggested that teachers should develop in their students' positive self-concept towards Mathematics and pleasant teaching experiences to enhance higher self-concept and better Academic Achievement in mathematics.

## Introduction

Everyone has a concept of what they are and who they are. Some people are more aware of this than others, because there are individuals who go through a day of work or social interaction without considering who they really are or how they fit into the world around them. It's not as easy as knowing the person we see in the mirror, because self concept is much more an internal factor in our lives, separate from how we look to others. Certainly, what we see of our face and body is part of the concept, but it is, according to psychologists, psychologists and counselors, only a part. The literature on psychological assessment is flooded with studies on self-concept and its related constructs designated as self-esteem, self-efficacy, self-image and others. Intriguingly, there seems to be diverse opinions on the definition of self-concept. While some authors refer to it as a construct closely related to personality, that is, a relatively stable and distinctive patterns of behaviour that characterise an individual and his or her reactions to the environment (Kossowka, 2002; Kaplan & Saccuzzo, 2005; Anastasi & Urbina, 2007), some others view it as domain-specific evaluations of the self (Santrock, 2005; Whiston, 2005).

However, in the context of this study, self-concept is defined as the way an individual thinks, feels, acts, values and evaluates himself or herself in relation to Academic Achievement in Mathematics. Several studies have examined the relationship between self-concept and Academic Achievement. Most of these studies support the belief that self-concept is a strong facilitator of academic achievement and that a positive or negative change in self-concept tends to produce a commensurate change in academic achievement or Academic Achievement (Yara, 2010; Valentine, Dubois & Cooper, 2004; Hamachek, 1995). For example, in a meta-analysis of 128 studies, Hanford & Hattie (1982) found the overall correlation between general self-concept and achievement to range from -0.77 to 0.96 with a mean correlation co-efficient of 0.21. However, the 95 percent confidence interval also spanned 0, indicating a positive relationship. In another large scale study of 4,500 college students, Pascarella, Terenzine & Wolfe (1986) concluded that pre-college academic self-concept generally has a unique, positive and direct influence on collegiate academic achievement even when other factors such as high school achievement and degree aspiration were taken into consideration. Similarly, Wheat, Turnell & Monday (1991) found that students' self-concept in Mathematics significantly relates to high grades in a college algebra course. Interestingly, House (1993) found that academically under-prepared students with higher academic self-concept obtained higher grades in college course after controlling for the effects of prior academic achievement. Some more recent studies in this area also support the existence of relationship between self-

concept and academic achievement. For example, in a study involving 500 pupils randomly selected from primary schools in Kebbi State of Nigeria, Kamba (2009) found a correlation co-efficient of 0.695 (0.70) between self-concept and academic Academic Achievement, indicating a positive moderately significant relationship. On this premise, it could be conjectured that students who think positively about their mathematics abilities feel highly delighted in solving mathematical problems, act promptly in learning mathematics, place high value on the benefits accruable to them in having good grades in mathematics and evaluate themselves as being capable of performing favourably in Mathematics, are likely to perform creditably in the subject. Moreover, students with high and positive self-concept may likely develop internal motivation to strive for excellence in mathematics rather than being indifferent and passive. From the foregoing, it appears the question of whether relationship exists or does not exist between self-concept and Academic Achievement in Mathematics has not been concisely answered because both the theoretical and empirical studies reviewed in this study have produced diverse and contradictory results. Similarly, the issue of gender difference in self-concept and Academic Achievement in Mathematics has not been resolved and therefore subject to further investigation. Consequently, there emerge three questions in the present study:

#### **Research Questions**

1. Does self-concept relate to Academic Achievement in mathematics?
2. Does gender difference influence self-concept towards mathematics?
3. Does gender difference influence Academic Achievement in Mathematics?

#### **Hypotheses**

1. Self-concept and Academic Achievement in Mathematics are not significantly related.
2. Gender has no significant influence on self-concept of students towards Mathematics.
3. Gender has no significant influence on Academic Achievement of students in Mathematics.

#### **Methodology**

##### **Method**

The study was a survey design in order to describe the degree of relationship between students' self-concept towards Mathematics and their Academic Achievement in Mathematics as well as the influence of gender on self-concept and Academic Achievement in Mathematics.

##### **Sample and Sampling Technique**

The sample for the study consisted of 300 Senior Secondary School students (male=150, female=150) selected from 10 schools (urban=5, rural=5) situated in district Gautam Budh Nagar (U.P). Stratified random sampling technique was used to select the schools and the selected participants.

##### **Tools**

Two Tools were used for data collection. The first was a 20-item self-report questionnaire titled, "Self-concept towards Mathematics" in which the students were asked to rate how they think, feel, act, value and evaluate themselves in Mathematics on a four-point scale, namely: Strongly Agree=4, Agree=3, Disagree=2 and Strongly Disagree=1. The face content and construct validity criteria were ensured using experts in Educational Psychology as well as those in Tests and Measurement. The reliability coefficient of the instrument was estimated at 0.74

The second tool was a 30-item multiple choice Mathematics Achievement Test (MAT) drawn from the First Term syllabus of senior secondary school (Grade VI-VIII) Mathematics, based on three levels of cognition

namely, knowledge, understanding and application . The difficulty indices of the items ranged from 0.42 to 0.91 using 27% upper and lower total score (Tetrachronic- while the reliability coefficient was estimated at 0.83 using Kuder-Richardson-21 (1937).

### Analysis and Interpretation

**Hypothesis-1** Self-concept and Academic Achievement in Mathematics are not significantly related.

**Table - 1**  
Significance level of students' self-concept and Academic Achievement in Mathematics

Variables	N	r (calculated value)	r (Table value)
Self-concept	300	0.569*	0.195
Academic Achievement (Mathematics)	300		

P<0.05 (significant result)

Table-1 shows that r-calculated was 0.569 while its corresponding table value at 0.05 level of significance was 0.195. Since  $r_{cal} > r_{tab}$ , it implies that significant relationship existed between self-concept and Academic Achievement in Mathematics.

**Hypothesis-2** Gender has no significant influence on self-concept of students towards Mathematics.

**Table - 2**  
Significance level of self-concept of male and female students towards Mathematics

Variables	N	Mean	SD	df	r (calculated value)	r (Table value)
Male	150	67.9	8.18	298	1.30	1.96
Female	150	66.7	8.30			

Maximum score=80, P>0.05 (not significant)

Table-2 shows that the mean scores of male and female students in self-concept towards Mathematics were 67.9 (84.9%) and 66.7 (83.4%) with standard deviations of 8.18 and 8.30 respectively while the t-test calculated was 1.30 and its corresponding table value at 0.05 level of significance was 1.96. By comparison, t-calculated was less than the t-table. Hence the hypothesis of no significant influence of gender on self-concept was accepted.

**Hypothesis-3** Gender has no significant influence on Academic Achievement of students in Mathematics.

**Table - 3**  
Significance level of Academic Achievement of male and female students in Mathematics

Variables	N	Mean	SD	df	r (calculated value)	r (Table value)
Male	150	13.7	4.72	298	-0.831	1.96
Female	150	14.1	3.85			

Maximum score=30, P>0.05 (not significant)

Table-3 shows that the mean scores of male and female students in Mathematics were 13.7 and 14.1 with standard deviations of 4.72 and 3.85 respectively while t-calculated was -0.831 and its corresponding table value at 0.05 level of significance was 1.96. By comparison, t-calculated was less than the t-table. Hence, the hypothesis of no significant gender influence on Academic Achievement in Mathematics was accepted.

### **Findings**

In this study, the relationship between self-concept and Academic Achievement in Mathematics as well as the influence of gender on self-concept towards Mathematics and Academic Achievement in Mathematics were investigated.

- 1) The result in table-1 showed a positive and moderate significant relationship between self-concept and Academic Achievement in Mathematics with a correlation coefficient of 0.569 (0.57). The moderate correlation between self-concept and Academic Achievement in Mathematics in the present study is an indication that the way the students thought of, felt about, acted towards, valued and evaluated themselves in Mathematics moderately related to their Academic Achievement in Mathematics.
- 2) The result in table -2 showed no significant gender influence on self-concept towards Mathematics as the difference in the mean scores was not significant. The lack of gender influence in self-concept is not surprising because the sample for the study was selected from co-educational schools with similar learning environment and common quest for academic achievement.
- 3) The result in table-3 also showed no significant gender influence on Academic Achievement in Mathematics as the t-calculated was less than the t-table. However, a re-examination of tables 3 indicated that the mean scores of males (13.7) and females (14.1) in Mathematics test were slightly below the average of 15. Sampled opinion on this results showed that the students probably attached little or no importance to the outcome of the test since it neither formed part of their class-based assessment scores nor end-of-term assessment score. Notwithstanding, it is expected, from a theoretical viewpoint, that high and positive self-concept should match high Academic Achievement in Mathematics which is slightly lacking in this study.

### **Conclusion and Recommendations**

Based on the findings of this study, it could be concluded that self-concept moderately related to Academic Achievement in Mathematics and that gender had no influence on self-concept towards Mathematics and Academic Achievement in Mathematics. On the bases of the findings and conclusion of this study, the following suggestions were made:

- 1) Mathematics teachers should develop in their students' positive self-concept towards Mathematics so as to pay more attention to problem solving skills for better Academic Achievement in the subject.
- 2) Students should be encouraged to match positive self-concept towards Mathematics with high Academic Achievement in Mathematics.
- 3) Teachers should provide the male and female students the enabling environment to learn and solve mathematical problems cooperatively in order to maintain equity in mathematics Academic Achievement.

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