Effect of Intelligence, Self-Concept and Study Habits on Achievement in Mathematics of Secondary School Students

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Abstract:

This research paper attempts to find out the relationship between Intelligence, Self-concept and Study habits with Achievement in Mathematics. The dependent variable is Achievement in Mathematics and independent variables are Intelligence, Self-concept and Study habits. The sample of 300 secondary students of 9^{th} grade has been selected from secondary school from the district of Purba Medinipur under West Bengal Board of Secondary Education. To analysis the data the research has been used 't' test and correlation coefficient. The major findings are i) there is no significant difference of Self-concept between secondary boys' and girls' students ii) there is significance difference of Intelligence, Study habits and Achievement in Mathematics between secondary boys' and girls' students and iii) Achievement in Mathematics of secondary students correlated with Intelligence (r=0.683), Self-concept (r=0.282) and Study habits (r=0.316). Boys are better performed in Achievement in Mathematics and Intelligence but girls have better Study habits than boys. The dependent variable Intelligence strongly correlated with Achievement in Mathematics.

Keywords: Achievement in Mathematics, Intelligence, Self- concept, Study habits

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Introduction:

Mathematics is an important discipline for the subject's science, technology, engineering, economics and other related fields. No doubts, it is regarded as an important gateway to adult life and occupational opportunities for many **(Forgasz and Leder, 2017)**. Mathematics is a compulsory school subject for basic and secondary levels in many parts of the world because of the important role it plays in the socio-economic development of a nation **(Noureen and Sheikh, 2016)**. Every educator believed that adequate knowledge in mathematics is very important for students' successful completion of their study. For that cause, most of the institution insist students take mathematics course in their initial stage. Normally, the institution defined mathematics performance as the score by obtained the students at the end of year mathematics examination.

Achievement in Mathematics:

Every student has the level of intellectual ability, that level of intellectual is individual for every student. The academic achievement indicates the level of intellectual ability of individual. According to **Kinkas and Khair** "Academic Achievement is an aspect of behaviours and an important aspect to studentswho are engaged in the process of education and since it depends on its degree of effectiveness for maximum performance." According to **Kulkarni (1970)**, "Mathematical achievement refers to understanding to mathematical concepts, application of knowledge to new situations and logical reasoning as involved in interpretation of data, interpretation of missing links, etc." **Good (1959)** defines achievement in mathematics as "knowledge attained or skills developed in the school subject usually test scores or by marks assigned by teachers".

Intelligence:

Intelligence is an important concept of psychology. Generally, intelligence positively correlated with achievement in mathematics. It is also a mental ability. Many psychologists described intelligence in different way. According to **Thorndike (1921)** intelligence is the power of good responses from the point of view of truth and fact. According to **Wechsler (1939)** intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with the environment. **Thurston (1921)** define

intelligence as the capacity to inhibit instinctive adjustments, flexibly to imagine different responses, and realize modified instinctive adjustment into overt behaviour.

Logical-mathematical intelligence is most important type of intelligence. This type of intelligence deals with numbers and logic, and this kind of intelligence that scientists, accountants and computer programmers often use in their profession **(Armstrong, 1993)**. According to **Armstrong (1993)** logical- mathematical type of intelligence "includes the ability to reason, sequence, think in terms of cause-and-effect, create hypotheses, look for conceptual regularities or numerical patterns, and enjoy a generally rational outlook on life." (p. 10)

Self-concept:

Self-concept is a psychological term, it discussed in the domain of personality of psychology. Self-concept is an individual assessment of his or her status. Self-concept some time called self-identity. It is the total knowledge or understanding of his or her self. Self-concept beliefs determine how people feel, think, motive themselves and behaves **(Bandura, 1994)**. According to **Burns (1993)** "the self-concept encompasses self-esteem, self-worth, or self-acceptance that includes all beliefs and judgements about ourselves, it will define who we are in our own mind, what we can do in our minds and what we become in mind." According to **Hurlock (1979)** "self-concept is the composition of the picture of perception, that perception it is belief, feelings, and attitudes about the values that are recognized by the individual as his traits."

Study habits:

Study habits of students are one type of habits. It is very important for learning and improving academic achievement of students. It also a well-planned pattern of study. It is pattern of behaviour of students which adopting during their studies that is learning. According to **Crow & Crow (1992)** the effective habits of study include place a definite time table and taking brief of well-organized notes. According to **Azikiwe (1998)** good study skills are good asset to learners because good study skills assist students to gain proficiency in areas of specialization and subsequent wonderful presentation while the opposite constitute restricts to learning.

Review of Related Literature:

Das and Singhal (2017) revelled that the average score of secondary students for mathematics were better for boys than girls. By the regression analysis, he was found that gender gap was prominent for all parts of mathematics.

Horne (2004) observed that significant gender difference in favouring males of students emerged during the 1st three years of primary schooling for number but there was no difference in other domain of space and measurement.

Katyal (2005) assessed relationship between gender difference and intelligence among 150secondary students and summarised that girls were found to higher intelligence than that of boys.

Naghavi (2012) studied on the relationship between gender and adolescent's intelligence with 234 students in Iranian. The study indicated that the girls' intelligence is better than boys.

Kaur (2013) observed that the gender difference on different components of intelligence such as competency, sensitivity, maturity. Generally, female significantly higher scored on sensitivity and maturity but male higher scored on competency.

Lee and Kung (2018) studied the relationship between mathematics achievement and mathematics self-concept of the high school students. They concluded that there was a gender difference on mathematics self-concept and mathematics achievement of the students. Girls have higher mathematics achievement than that of boys but boys have higher self-concept than that of girls.

Statement of the study:

The present study entitled as, "**Effect of Intelligence, Self-concept and Study habits on Achievement in Mathematics of secondary school students**"

Objective of the study:

The objectives of this study to find out the relationship between Intelligence, Self-concept and Study habits with achievement in Mathematics of secondary school students. So, the study has the following objectives:

1. To measure the Intelligence score of the secondary school students.
2. To measure the Self-concept score of the secondary school students.
3. To measure the Study habits, score of the secondary school students.
4. To measure the achievement in Mathematics score of secondary students.
5. To find out the relationship between Intelligence and Achievement in Mathematics score.
6. To find out the relationship between Self-concept and Achievement in Mathematics scores.
7. To find out the relationship between Study habits and Achievement in Mathematics scores.

Hypothesis of the study:

To follow the above objectives the researcher formulated the following hypothesis

H_{01}: There is no significant difference of Intelligence between secondary boys' and girls' students.

H_{02}: There is no significant difference of Self-concept between secondary boys' and girls' students.

H_{03}: There is no significant difference of Study habits between secondary boys' and girls' students.

H_{04}: There is no significant difference of Achievement in Mathematics between secondary boys' and girls' students.

H_{05}: There is no significant correlation between Intelligence and Achievement in Mathematics score for the secondary students.

H_{06}: There is no significant correlation between Self-concept and Achievement in Mathematics scores for the secondary students.

H_{07}: There is no significant correlation between Study habits and Achievement in Mathematics scores for the secondary students.

Tools used:

The researcher is used the following tools to collect the data for the study.

(i) Achievement in Mathematics (developed and standardized by the Investigator)
(ii) Intelligence test (developed and standardized by the Investigator)
(iii) Self-concept Questionnaire (Developed and Standardized by R. K. Saraswat)
(iv) Study habits Inventory (developed and Standardized by Investigator)

Sample:

The sample consisted of 300 students of 9^{th} grade (150 boys and 150 girls) taken from different secondary school of District Purba Medinipur under the West Bengal Board of Secondary Education.

Analysis and Findings:

Analysis of data pertaining to H_{01} (H_{01}: There is no significant difference of Intelligence between secondary boys' and girls' students.)

Table-1

Showing 't' distribution table of Intelligence score of secondary students

Intelligence	N	M	σ	SED	df	't'	Level of Significance
Boys	150	21.72	6.484	0.540	298	11.468	Significant at both level
Girls	150	15.53	6.308				

The above table indicated that the calculated value of 't' is 11.468 which is greater than the critical value of 't' at 5% and 1% level. So, null hypothesis rejected at both levels. Therefore, there is significant difference of Intelligence score of the secondary boys' and girls' students.

Analysis of data pertaining to H_{02} (H_{02}: There is no significant difference of Self-concept between secondary boys' and girls' students).

Table-2

Showing 't' distribution table of Self-concept score of secondary students

Self-concept	N	M	Σ	SED	df	't'	Level of Significance
Boys	150	162.79	20.977	2.364	298	.492	Not significant at both level
Girls	150	161.63	28.431				

The above table indicated that the calculated value of 't' is 0.492 which is less than the critical value of 't' at 5% and 1% level. So, null hypothesis accepted at both levels. Therefore, there is no significant difference of Self-concept score of the secondary boys' and girls' students.

Analysis of data pertaining to H_{03} (H_{03}: There is no significant difference of Study habits between secondary boys' and girls' students.)

Table-3

Showing 't' distribution table of Study habits score of secondary students

Study habits	N	M	Σ	SED	df	't'	Level of Significance
Boys	150	83.45	14.371	1.232	298	4.284	Significant at both level
Girls	150	88.73	11.919				

The above table indicated that the calculated value of 't' is 4.284which is greater than the critical value of 't' at 5% and 1% level. So, null hypothesis rejected at both levels. Therefore, there is significant difference of Study habits score of the secondary boys' and girls' students.

Analysis of data pertaining to H_{04} (H_{04}: There is no significant difference of Achievement in Mathematics between secondary boys' and girls' students.)

Table-4

Showing 't' distribution table of Achievement in Mathematics score of secondary students

Achievement in Mathematics	N	M	Σ	SED	Df	't'	Level of Significance
Boys	150	24.48	6.958	0.587	298	10.961	Significant at both level
Girls	150	18.04	6.788				

The above table indicated that the calculated value of 't' is 10.961 which is greater than the critical value of 't' at 5% and 1% level. So, null hypothesis rejected at both levels. Therefore, there is significant difference of Achievement in Mathematics score of the secondary boys' and girls' students.

Analysis of data pertaining to H_{05}(H_{05}: There is no significant correlation between Intelligence and Achievement in Mathematics scores for the secondary students.)

Table-5

Showing 'r' distribution of Achievement in Mathematics and Intelligence score of secondary students

Variables	N	'r'	df	Critical value of 'r' at 5% level	Critical value of 'r' at 1% level	Level of Significance
Achievement in Mathematics	300	0.683	298	0.126	0.1652	Significant at both level
Intelligence	300					

From above table the value of 'r' is 0.683 which is grater then the critical value of 'r' at both levels. So, null hypothesis rejected. Therefore, there is correlation between Achievement in Mathematics and Intelligence scores of secondary students and the value of 'r' is 0.683.

Analysis of data pertaining to H_{06} (H_{06}: There is no significant correlation between Self-concept and Achievement in Mathematics of secondary students.)

Table-6

Showing 'r' distribution of Achievement in Mathematics andSelf-concept score of secondary students

Variables	N	'r'	Df	Critical value of 'r' at 5% level	Critical value of 'r' at 1% level	Level of Significance
Achievement in Mathematics	300	0.282	298	0.126	0.1652	Significant at both level
Self-concept	300					

From above table the value of 'r' is 0.282 which is grater then the critical value of 'r' at both levels. So, null hypothesis rejected. Therefore, there is correlation between Achievement in Mathematics and Self-concept scores of secondary students and the value of 'r' is 0.282.

Analysis of data pertaining to H_{07} (H_{07}: There is no significant correlation between Study habits and Achievement in Mathematics of secondary students.)

Table-7

Showing 'r' distribution of Achievement in Mathematics and Study habits score of secondary students

Variables	N	'r'	df	Critical value of 'r' at 5% level	Critical value of 'r' at 1% level	Level of Significance
Achievement in Mathematics	300	0.316	298	0.126	0.1652	Significant at both level
Study habits	300					

From above table the value of 'r' is 0.316 which is grater then the critical value of 'r' at both levels. So, null hypothesis rejected. Therefore, there is correlation between Achievement in Mathematics and Study habits scores of secondary students and the value of 'r' is 0.316.

Conclusion:

Following above analysis, the study concludes that there is no significant difference of Self-concept between secondary boys' and girls' students but there is significance difference of Intelligence, Study habits and Achievement in Mathematics between secondary boys' and girls' students. Achievement in Mathematics of secondary students correlated with Intelligence (r=0.683), Self-concept (r=0.282) and Study habits (r=0.316). Intelligence strongly correlated with Achievement in Mathematics compression to Self-concept and Study habits.

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