

# Effect of the levels of intelligence on problem solving ability of higher secondary students of English and Hindi medium schools

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## Abstract

The study was under taken to study the effect of the levels of intelligence on problem solving ability of higher secondary students of English and Hindi medium schools. The study was conducted on 600 higher secondary students of English and Hindi medium schools of district, Dehradun. For the collection of data questionnaire on General Mental Ability Test by Roma Pal and Rama Tiwari ( Hindi / English) for age group 13 to 17 years and for problem solving ability Problem Solving Ability Test by Roop Rekha Garg ( Hindi / English) for age group 12 to 19 years were taken.

**Key words:** *Levels of intelligence, Problem solving ability, Higher secondary students, High level of intelligence (High I.Q.), Low level of intelligence (Low I.Q.), English and Hindi medium students.*

## 1. Introduction:

Intelligence is defined as general cognitive problem-solving skills. A mental ability involved in reasoning, perceiving relationships and analogies, calculating, learning quickly etc. Investigating the concept of intelligence first, it was found that intelligence is the premier attribute of human species. It is a term mostly used by all of us in our life but even the experts of this field finds it difficult and come up with views as to what it is. Yet most of us agree that intelligence allow us to profit from our experience and adapt to our surrounding. Intelligence is a property of mind that encompasses many related abilities such as capacity to (1) acquire knowledge (i.e. learn & understand) (2) apply knowledge (solve problem) & (3) engage in abstract reasoning. It is the power

of one's intellect and as such is clearly a very important aspect of one's overall well being.

Before Gardner's research, many people believed that intelligence was a single inherited entity. Binet (1916) was one among them who conceptualized intelligence as a single, integrated but a complex mental process. Earlier it was believed that there was one underlying general factor at the intelligence base (the **g-factor**), but later psychologists maintained that it is more complicated and could not be determined by such a simplistic method. Some psychologists have divided intelligence into subcategories. For example according to **Howard Gardner** intelligence is classified into nine categories which are as follows:

1. Naturalist Intelligence ("Nature Smart")
2. Musical Intelligence ("Musical Smart")
3. Logical-Mathematical Intelligence ("Number/Reasoning Smart")
4. Existential Intelligence
5. Interpersonal Intelligence ("People Smart")
6. Bodily-Kinesthetic Intelligence ("Body Smart")
7. Linguistic Intelligence ("Word Smart")
8. Intra-personal Intelligence ("Self Smart")
9. Spatial Intelligence ("Picture Smart")
- 10.

### Concept of I.Q. or intelligence quotient:

This term was initiated by the German psychologist, William Stern and put into wide practice by Terman. I.Q. is defined as the relationships or ratio between one's mental age and chronological age. The ratio was given the name of

intelligence Quotient. To do away with the decimal point way again multiple by 100 and thus the formula to calculate I.Q. is as follows:

$$\text{I.Q.} = \frac{\text{Mental Age (M.A.)}}{\text{Chronological age (C.A.)}} \times 100$$

In order to understand the concept of I.Q. following terms need classification.

**Chronological Age:**

This is the real age of a person which is counted from time and date of birth. It may be counted from time and date of birth. It may be counted in years, months and hours.

**Mental Age:**

Mental age expression of a child’s performance on an intelligent various items of the test we added and the total is converted into mental age.

For e.g. :  $\text{I.Q.} = \frac{12 \times 100}{10} = 120$

Where chronological age = 10  
Mental age = 12

**On the basis of the I.Q. the individual can be classified as shown in the table:**

Intelligence level	I.Q. Range	Intelligence level
Higher I.Q.	140 and Above	Genius
	130 -139	Gifted
	120-129	Superior
	110-119	Bright
	90-109	Average
Lower I.Q.	80-89	Dull
	70-79	Border line defective
	Below 70	Feebleminded

In the present study the students are distributed on the levels of Intelligence which are higher and lower levels of intelligence. This categorization is done on the basis of General Mental Ability Test by **Roma Pal** and **Rama Tiwari** where the maximum score is 70. The I.Q. calculated from these scores categorized them in two levels i.e. ( I.Q. below 89 as Lower I.Q. and I.Q. above 90 as higher I.Q. levels.

**Higher level of Intelligence:** I.Q. more than 90% is taken as higher levels of intelligence (I.Q. > 90 %).

**Lower level of Intelligence:** I.Q. less than 89% is taken as lower levels of intelligence (I.Q. < 89 %).

**Problem Solving Ability:**

Problem-solving is a mental process that involves discovering, analyzing and solving problems. The ultimate goal of problem-solving is to overcome obstacles and find a solution that best resolves the issue.

According to **Kantowski (1980)**: “A problem is a situation for which the individual who confronts has no algorithm that will guarantee a solution. That person’s relevant knowledge must be put together in a new way to solve the problem”

According to **Woodworth and Marquis** : “ Problem –solving behaviour occurs in novel or difficult situations in which a solution is not obtainable by the habitual methods of applying concepts and principles derived from past experience in very familiar situation.”

According to **Skinner**: “ Problem –solving is a process of overcoming difficulties that appear to interfere with the attainment of a goal. It is a procedure of making adjustment in spite of interferences.

The Concise Oxford Dictionary (1995) defines a problem as:

“A *doubtful or difficult matter requiring a solution*”

and  
“*Something hard to understand or accomplish or deal with.*”

**All problems have two features in common: goals and barriers.**

**1. Goals**

Problems involve setting out to achieve some objective or desired state of affairs and can include avoiding a situation or event.

Goals can be anything that you wish to achieve, where you want to be. If you are hungry then your goal is probably to eat something, if you are a head of an organisation (CEO) then your main goal may be to maximise profits.

**2. Barriers**

If there were no barriers in the way of achieving a goal, then there would be no problem. Problem solving involves overcoming the barriers or obstacles that prevent the immediate achievement of goals.

Following our examples above, if you feel hungry then your goal is to eat. A barrier to this may be that you have no food available - you take a trip to the supermarket and buy some food, removing the barrier and thus solving the problem. Of course for the CEO wanting to increase profits there may be many more barriers preventing the goal from being reached. The CEO needs to attempt to recognise these barriers and remove them or find

other ways to achieve the goals of the organisation.

**Stages of Problem Solving**

Effective problem solving usually involves working through a number of steps or stages, such as those outlined below:

**1. Problem Identification:**

This stage involves: detecting and recognizing that there is a problem; identifying the nature of the problem and defining the problem.

**2. Structuring the Problem:**

This stage involves: a period of observation, careful inspection, fact-finding and developing a clear picture of the problem.

**3. Looking for Possible Solutions:**

During this stage you will generate a range of possible courses of action, but with little attempt to evaluate them at this stage.

**4. Making a Decision:**

This stage involves careful analysis of the different possible courses of action and then selecting the best solution for implementation.

**5. Implementation:**

Implementation means acting on the chosen solution. During implementation more problems may arise especially if identification or structuring of the original problem was not carried out fully.

**6. Monitoring/Seeking Feedback:**

The last stage is about reviewing the outcomes of problem solving over a period of time, including seeking feedback as to the success of the outcomes of the chosen solution.

The final stage of problem solving is concerned with checking that the process was successful. This can be achieved by monitoring and gaining feedback from people affected by any changes that occurred. It is good practice to keep a record of outcomes and any additional problems that occurred.

**Higher Secondary students:** Higher Secondary students are the students who are studying in class IIX.

**English medium schools:** Schools in which medium of instruction is English.

**Hindi medium schools:** Schools in which medium of instruction is Hindi.

**EMERGENCE OF THE PROBLEM:**

The review of literature revealed that most of the studies were found conducted in all the countries **Biswajit Behera (2009), Jayesh (1999), Swarnalekha (1997), Feltovich and Glaser (1980), and Keskar, P.U. (1980)**. The researcher has chosen the present study because being a lecturer I found out that the students face so many problems in class and how they apply their intellectual skills to solve them, this area attracted me to do the research in. Solving problem is a complex cognitive skill that characterizes one of the most intelligent human activities. In the present research the researcher has found out how

intelligence level influences problem solving ability of higher secondary students studying in English and Hindi medium schools of district, Dehradun.

**OBJECTIVES:**

1. To check the effect of high level of intelligence (High I.Q.) on problem solving ability of higher secondary students of English and Hindi medium schools.
2. To check the effect of low level of intelligence (Low I.Q.) on problem solving ability of higher secondary students of English and Hindi medium schools.
- 3.

**HYPOTHESES :**

1. There will be no significant difference in the effect of high level of intelligence (High I.Q.) on problem solving ability of higher secondary students of English and Hindi medium schools.
2. There will be no significant difference in the effect of low level of intelligence (Low I.Q.) on problem solving ability of higher secondary students of English and Hindi medium schools.
- 3.

**METHOD:**

The present study is of the descriptive survey method is used.

**SAMPLE:**

For the present study, the sample size taken is 600 higher secondary students studying in English and Hindi medium school of District, Dehradun. The sample comprises of students from English and Hindi medium schools of Dehradun. The sample will contain 300 English medium students and 300 Hindi medium students. The total numbers of students are 600 in the field of investigation.

**TOOLS:**

1. General Mental Ability Test by Roma Pal and Rama Tiwari ( Hindi / English) For age group 13 to 17 years.
2. Problem Solving Ability Test by Roop Rekha Garg( Hindi / English) For age group 12 to 19 years.

**Results:**

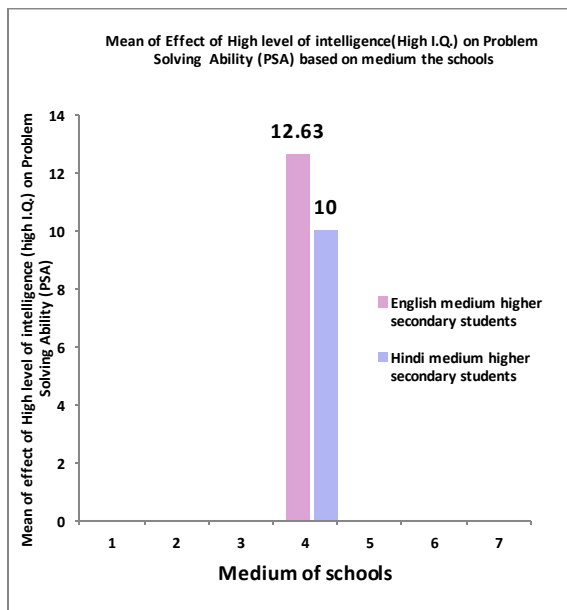
For the calculation of results t-test was used to study the effect of levels of intelligence on problem solving ability of English and Hindi medium higher secondary school students.

Table No.1.: Effect of high level of intelligence (High I.Q.) on problem solving ability (PSA) of English and Hindi medium higher secondary school students:

Variables	High level of Intelligence (High I.Q.)			df	t-value	p	Significance
	N	Mean	Std.Dev.				
Problem Solving Ability (PSA) of English medium higher secondary students	46.00	12.63	2.69	51.00	2.52	0.01	S
Problem solving Ability (PSA) of Hindi medium higher secondary students	7.00	10.00	1.29				

\* Significant at 0.05 level of significance

Figure No.1.1.



FigureNo.1.2.

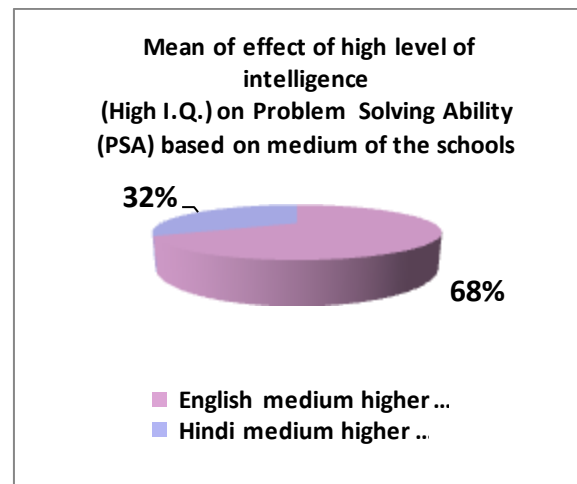


Figure No.1.3.

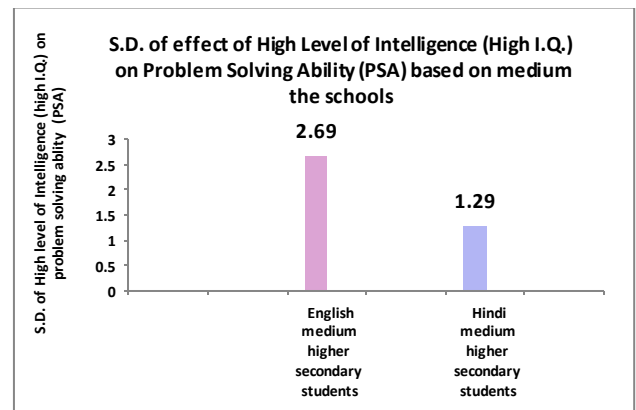
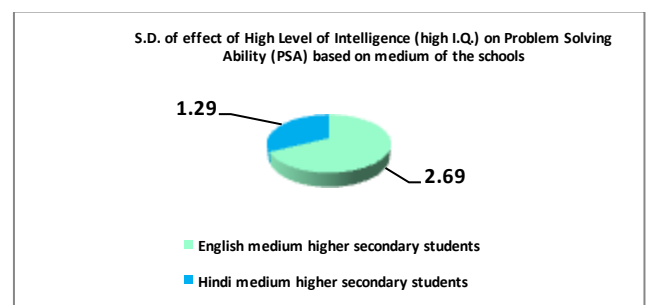


Figure No.1.4.



According to the **Table No.1.** , the mean score of High level of intelligence ( High I.Q. ) on problem solving ability of English and Hindi medium higher secondary school students is 12.63 and 10.00 .Standard deviation of high level of intelligence ( High I.Q.) on problem solving ability are 2.69 and 1.29. The t-ratio between the two groups comes out to be 2.52 and p value 0.01., which is significant at 0.05 level.

In the comparison of the mean scores high level of intelligence ( High I.Q. ) on problem solving ability of English and Hindi medium higher secondary students shows that there is significant effect of high level of intelligence ( high I.Q. ) on problem solving ability of English and Hindi medium students. It is revealed through the results that the mean scores of high level of intelligence ( High I.Q. ) on problem solving ability of English medium is more than the mean scores of high level of intelligence ( High I.Q. ) on problem solving ability of Hindi medium higher secondary students. It shows that the English medium students with high level of intelligence (High I.Q.) are good at problem solving ability than Hindi medium higher secondary students. The Mean and S.D. for both the mediums are plotted in the form of bar graphs and pie charts in **Figure No.1.1. , 1.2. , 1.3. and 1.4.**

Therefore, the hypothesis (No.1.) which predicted that, *“There will be no significant effect of the high level of intelligence (High I.Q.) on problem solving ability of English and Hindi medium higher secondary school students”*, is rejected.

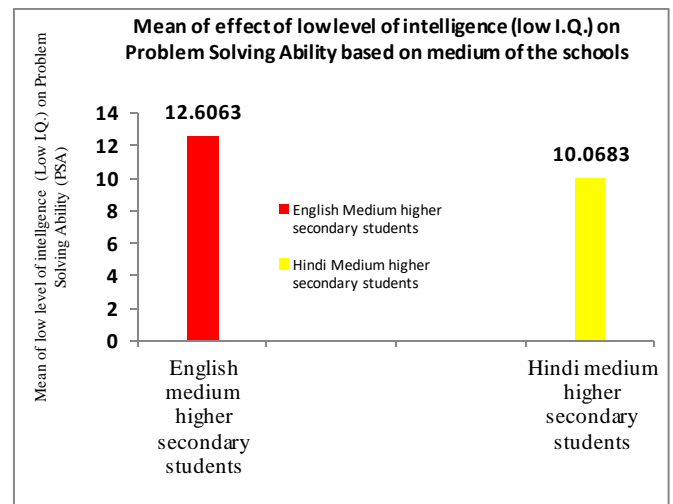
**2. There will be no significant effect of the low level of intelligence (Low I.Q.) on problem solving ability of English and Hindi medium higher secondary school students.**

Table No. 2.:Effect of low level of intelligence (low I.Q.) on problem solving ability (PSA) of English and Hindi medium higher secondary school students:

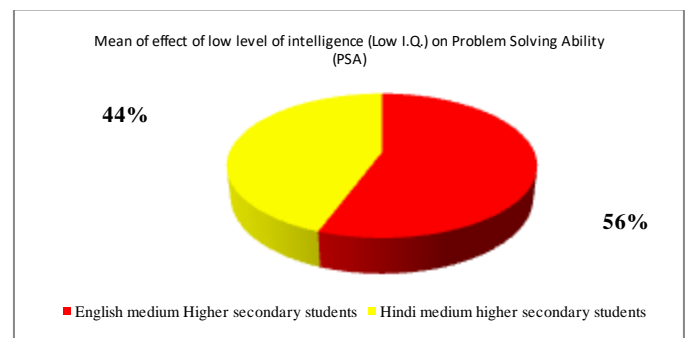
Variables	Low level of Intelligence (Low I.Q.)			t-value	p	Significance
	N	Mean	Std.Dev.			
Problem solving Ability(PSA) of English medium higher secondary students	254	12.6063	2.5090			
Problem solving Ability (PSA) of Hindi medium higher secondary students	293	10.0683	1.8363			

\* Significant at 0.05 level of significance

**Figure No.2.1.**



**Figure No.2.2.**



**Figure No.2.3.**

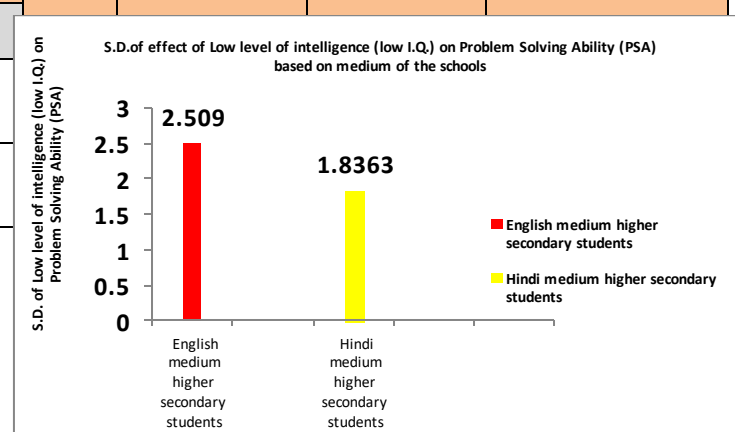
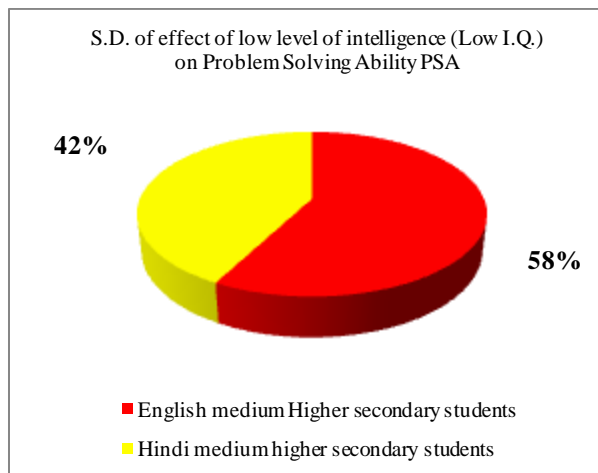


Figure No.2.4.



According to **Table No. 2.**, the mean scores of low level of intelligence ( Low I.Q. ) on problem solving ability of English and Hindi medium higher secondary school students is 12.6063 and 10.0683. Standard deviation of low level of intelligence ( Low I.Q.) on problem solving ability are 2.5090 and 1.8363. The t-ratio between the two groups comes out to be 13.61364 and p value 0.000000 which is significant at 0.05 level.

In the comparison of the mean scores of low level of intelligence ( Low I.Q. ) on problem solving ability of English and Hindi medium higher secondary students shows that there is significant effect of low level of intelligence ( Low I.Q.) on problem solving ability of English and Hindi medium students. It is revealed through the results that the mean scores of low level of intelligence ( Low I.Q. ) on problem solving ability of English medium is more than the mean scores of Low level of intelligence ( Low I.Q. ) on problem solving ability of Hindi medium higher secondary students. It shows that the English medium students with Low level of intelligence (Low I.Q.) are good at problem solving ability than Hindi medium higher secondary students. The Mean and S.D. for both the mediums are plotted in the form of bar graphs and pie charts in **Figure No.2.1.**, **2.2.**, **2.3** and **2.4.** Therefore, the hypothesis (**No.2**) which predicted that, *“There will be no significant effect of the low level of intelligence (low I.Q.) on problem solving ability of English and Hindi medium higher secondary school students,”* is rejected.

### Conculsion:

Therefore it is concluded from **Table No. 1** and **2** that there is a significant difference in the effect of the levels of intelligence on problem solving ability of higher secondary students of English and Hindi medium schools. English medium higher secondary students are more intelligent in problem solving

ability than Hindi medium higher secondary students. The influence of I.Q. on problem-solving abilities is proposed by **Breckenridge and Vincent**, which states that intelligence is a person's ability to learn, adapt and solve new problems, **Prabu (1993)**. With regard to the impact of I.Q. on problem-solving abilities as a result of learning reinforced by the results of **Deary and Johnson (2015)**, which concluded that high I.Q. has a strong influence on learning outcomes rather than vice versa. In addition, the results of research **Karsim, Suyitno and Isnarto (2017)**, that there is a positive influence of I.Q. on the ability of problem-solving of learners. This means that for every increase in I.Q. there will be an increase in problem solving ability of learner. Similarly **Dutt. S.(1989)** asserting the role of cognitive structure revealed that high intelligent students, irrespective of the strategies of training, scored higher on problem solving ability test than low intelligent students. Moreover cognitive styles and intelligence contribute significantly to the total variance in problem solving ability. Therefore, there will be significant difference in the effect of the levels of intelligence on problem solving ability of higher secondary students of English and Hindi medium school of district, Dehradun.

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