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Influence of Demographic Factors on Metacognition and Its Relationship with Critical Thinking of Higher Secondary Students: Foundation for Learning

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Abstract: Education is a central part of any society. For the advancement in education, it is essential to develop “how to think” process, the consciousness and regulation of learning strategies. Sometimes students experience difficulties in acquiring these competencies and behaviors due to their inability to make use of knowledge and thinking skills. Thus, the present investigation was undertaken to study the influence of demographic factors i.e. gender, academic stream, socio-economic status mainly family income and parents’ education on metacognition of higher secondary students. The study was conducted on the sample of 280 higher secondary students studying in CBSE affiliated schools of Allahabad city. The Meta-Cognition Inventory (MCI) developed by Dr. Punita Govil and Critical Thinking Test constructed by researcher has been used as a measure of metacognition and critical thinking of students. Mean, Standard Deviation, ‘t’ test and Analysis of Variance have been employed to analyze the data. The results of the study reveal that gender has no significant impact on the metacognition of higher secondary students. However, no significant difference was found in the metacognitive level of higher secondary students on the basis of their academic streams. Family income does not make significant influence on the metacognition of students. Moreover, mothers’ education has significant impact on the metacognition of the students in comparison to fathers’ educational qualification. Further positive correlation was found between the metacognition and critical thinking of higher secondary students. This study suggests learners to understand and regulate their own thinking process for resolving the real life challenges and complexities. Further the present study also recommends some metacognitive strategies for parents and teachers to promote critical thinking skills in learning among students at school level.

Keywords: Demographic factors, Metacognition, Critical Thinking

I. INTRODUCTION

The ultimate goal of education is to make the learning process more effective. Many learning methods and teaching strategies were introduced to achieve this goal. However, in order to be a successful learner an awareness of own knowledge is required. Such awareness referred as Metacognition. This psychological concept involves the learners’ cognitive ability to reflect and analyse thought so as to draw the conclusions by applying into practice. It is essential for learners to be metacognitively aware because the knowledge about one’s cognitive process can guide in arranging circumstances and selecting strategies to improve future cognitive performance.

Metacognition is an instructional approach which emphasizes the development of thinking skills and process as a means to enhance learning. This objective is to enable all students to become more strategic, self reliant, flexible and productive in their learning endeavors. Baker and Brown (1984) decoded metacognition into two categories: knowledge about cognition and regulation of cognition. Knowledge about cognition refers to one’s own awareness about his capabilities and appraisal of cognitive process while regulation of cognition takes into account of self-regulation and strategies leading to the learning achievement. It is based on the assumption that there are identifiable cognitive strategies, previously believed to be utilized by only the best and the brightest students which can be taught to most students. Use of these strategies has been associated with successful learning and to find what the question means and how it may be dealt with.

Kirsh (2005) proposed that metacognitive equipment offer students with some strategies that can construct them more active information processors and allow them to examine and control their learning activities. Thus, metacognition improves the learning

skills and regulates own pace of learning. Metacognition also defined as 'one's knowledge and beliefs about one's own cognitive processes and one's resulting attempts to regulate those cognitive processes to maximize learning and memory' (J. E. Ormrod, 2006). Cornoldi (1998) emphasized the role of learners' beliefs about thinking and pointed that if students feel confident that they can solve problems, they tend to do better work. It has been observed that students with poor metacognition tend to perform poorly. Coutinho (2006) concluded that students with good metacognition tend to be successful learners. Therefore, the use of metacognitive strategies is crucial to enhance the learning outcome of students and for self-reflection of their thought process. According to Meyer (1976) the aim of education is to nurture the individual, to help, to realize the full potential that already exists inside him or her. It should show the way to students about what and how to learn. When students evaluate what they learned and their learning methods, they manifest their critical thinking abilities (Emir, 2009). Critical thinking includes the component skills of analyzing arguments, making inferences using inductive or deductive reasoning, judging or evaluating and making decisions or solving problems. It is a goal-directed and purposive thinking aimed at forming a judgment where the thinking itself meets standards of adequacy and accuracy (Bailin et al., 1999). Thus, it is necessary to develop critical thinking skills among learners to enhance academic performance.

II. NEED OF THE STUDY

To become a good learner, students need to acquire the application of knowledge for problem solving. Sometimes students experience difficulties due to lack of control on their learning. This inability of self-regulation often results in poor academic performance. Annavirta and Vauras (2006) stated that children's ability to regulate their academic performance is influenced by environmental variables, social interaction, child's own regulatory skills and adult's role in problem solving processes. They emphasized that in order to measure accurately young children's metacognition, researchers need to consider the effects of such variables. Schunk & Zimmerman (1994) as cited by Pithers (2000) proposed that self-regulation of thinking is an important element of critical thinking. Hence, the present study attempted to find out the influence of certain demographic variables such as gender, academic streams and socio-economic status i.e. family income and parents' education on the metacognition of higher secondary students. Further the relationship between metacognition and critical thinking has been examined.

III. OBJECTIVES

The objectives of the study are as follows:

- A. To find out the difference in the metacognition of higher secondary students with respect to their gender.
- B. To find out the difference in the metacognition of higher secondary students with regard to their academic stream.
- C. To find out the difference in the metacognition of higher secondary students with respect to the family income.
- D. To study the difference of metacognitive level of higher secondary students whose parents are either illiterate, primary, secondary or university educated.
- E. To find out the relationship between the metacognition and critical thinking of higher secondary students.

IV. HYPOTHESES

The following hypotheses were framed to achieve the objectives:

- A. There is no significant difference in the metacognition of female and male higher secondary students.
- B. There is no significant difference in the metacognition of Art, Science and Commerce stream higher secondary students.
- C. There is no significant difference in the metacognition of higher secondary students with respect to the family income.
- D. There is no significant difference in the metacognition of higher secondary students with regard to the parents' education.
- E. There is no significant relationship between the metacognition and critical thinking of higher secondary students.

V. METHODOLOGY

The present study falls in the domain of descriptive study. Survey method was used to study the Metacognitive awareness of higher secondary students.

A. Sample:

For the purpose of present study, cluster sampling method was used. The sample consisted of 280 students of Class-XII studying in CBSE affiliated schools of Allahabad city. There were 145 female and 135 male higher secondary students in the sample.

B. Tools used

Meta-Cognition Inventory (MCI) developed by Punita Govil was used to collect the data. There are 30 items in the inventory related with the two components of meta-cognition named meta-cognitive knowledge and meta-cognitive regulation. The value of reliability coefficient was found to be 0.82 for the inventory. Critical Thinking Test constructed by researcher has been used as a measure of critical thinking of students. For other information i.e. gender, academic stream, family income, fathers’ and mothers’ educational qualification, a personal data sheet had been used and required entries were filled up by the respondents.

C. Statistical Techniques used

To analyze the data mean, standard deviation, ‘t’ test and Analysis of variance (ANOVA) were employed.

VI. ANALYSIS AND INTERPRETATION OF DATA

According to the hypotheses, the details of analysis and interpretation are as follows:

Variables	Groups	N	Mean	S.D.	t-ratio	Level of significance (0.01)
Gender	Female	142	73.52	8.91	1.08	Not significant
	Male	138	69.84	10.16		
Academic stream	Art	91	67.72	9.47	1.06	Not significant
	Science	97	70.54	10.23		
	Commerce	92	68.15	9.70		
Family income	Less	80	79.69	9.28	1.09	Not significant
	Average	102	84.56	8.76		
	High	98	83.98	8.54		

Table-1: Descriptive statistics of metacognitive level of higher secondary students with respect to gender, academic stream and family income

The table-1 depicts that the mean score of female higher secondary students (73.52) is higher than the mean score (69.84) of their male counterparts on the variable of metacognition. The value of t-ratio (1.08) indicates that gender has no significant effect on the metacognition of higher secondary students.

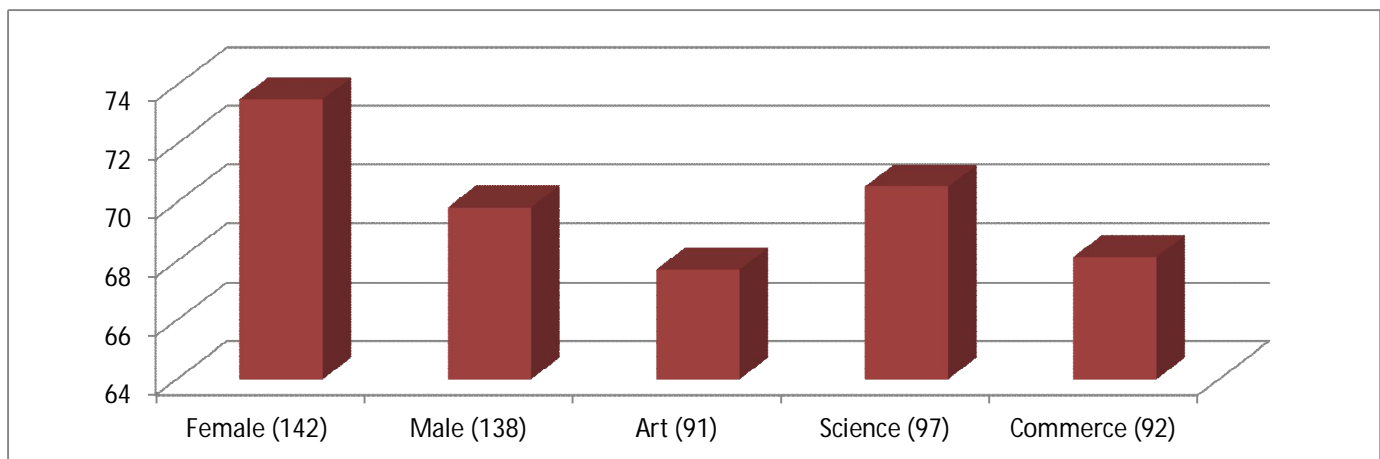


Figure 1: Distribution of mean scores on metacognitive level of higher secondary students based on gender and academic streams

The observation of Academic stream in the above figure-1 represents 91 higher secondary students of Art stream, 97 students of Science stream and 92 higher secondary students of Commerce stream in the sample. The t-ratio for the mean difference among Art, Science and Commerce stream was 1.06, which was not significant at 0.01 level. It reflects that higher secondary students of different academic streams (Art, Science and Commerce) show statistically similar metacognitive level.

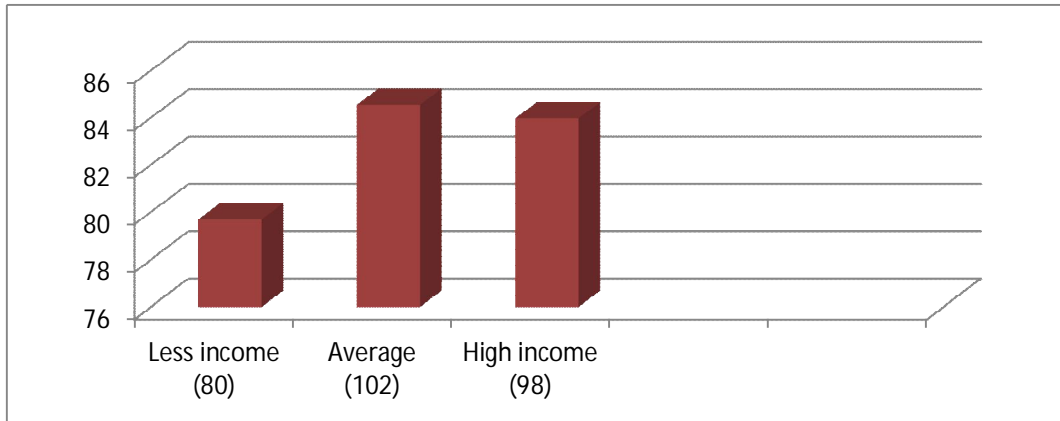


Figure 2: Distribution of mean scores on metacognition of higher secondary students based on family income

The difference between the mean scores of low, average and high family income was not significant. As shown the table-1, t-ratio (1.09) has not been found significant at 0.01 level. This implies that family income does not influence the metacognition of higher secondary students.

Groups	N	Mean	S.D.	F-value	Level of significance (0.01)
Illiterate	35	91.78	10.85	.276	.874 (Not significant)
Primary Education	47	92.43	8.76		
Secondary Education	81	92.67	8.94		
University Education	117	92.98	8.97		

Table-2: Descriptive statistics of metacognition of higher secondary students in relation to their fathers' educational qualification

From the table-2, it is clear that the mean score of students whose fathers are illiterate is 91.78 with S.D. 10.85 while mean scores of students for primary, secondary and university educated fathers' are 92.43, 92.67 and 92.98 with S.D. 8.76, 8.94 and 8.97 respectively. The F-value computed to compare these means is 0.276 indicating no significant difference in the metacognitive level of higher secondary students on the basis of their fathers' educational level. This finding indicates that fathers' educational qualification does not contribute significantly to the metacognition of their wards.

Groups	N	Mean	S.D.	F-value	Level of significance (0.01)
Illiterate	86	91.86	10.12	3.582	.021 (Significant)
Primary Education	42	88.29	6.47		
Secondary Education	80	92.48	7.54		
University Education	72	93.95	8.62		

Table-3: Descriptive statistics of metacognition of higher secondary students on the basis of their mothers' educational qualification

The above table shows the mean scores of students' metacognition in relation to their mothers' educational qualification i.e. 91.86, 88.29, 92.48 and 93.95 with standard deviation 10.12, 6.47, 7.54 and 8.62 for illiterate, primary, secondary and university educated mothers' respectively. The mean scores were compared to know the significance of difference among them. The F-value was found 3.582 which is significant at 0.01 level. The figure 3 given below describes the difference in the mean values based on the data shown in table-2 and table-3.

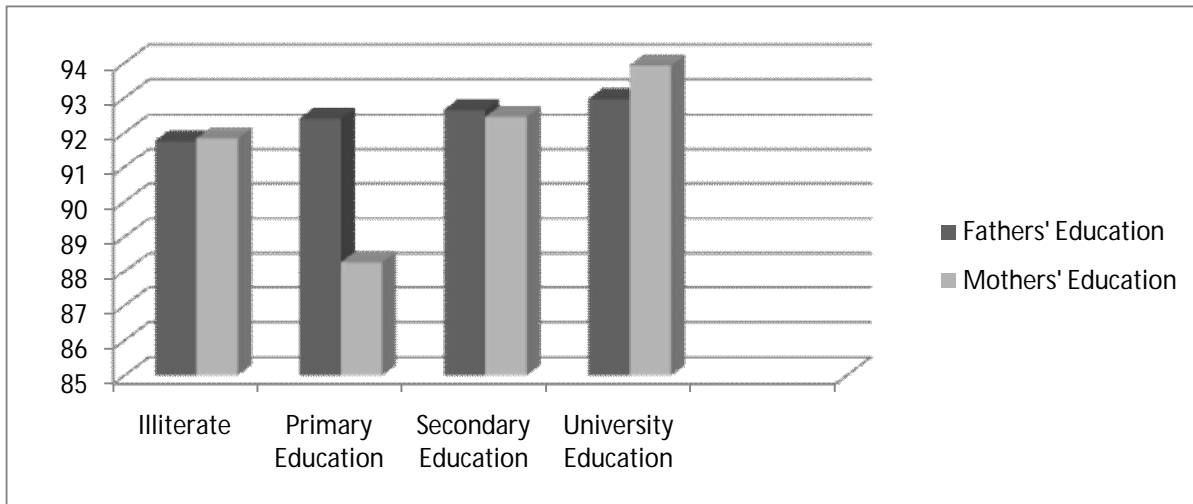


Figure 3: Distribution of mean scores on metacognitive level of higher secondary students based on fathers' and mothers' educational qualification

On the basis of findings it may be conclude that fathers' educational qualification has no significant impact on the metacognition of higher secondary students. These findings may be due to the fact that fathers, generally pay less attention to the studies of their children. Moreover, interaction and communication of students with their fathers is comparatively less in comparison to mothers. It may be the cause of less understanding among them.

It has been observed that the students whose mothers were highly educated were having better metacognition than those whose mothers were less educated. It shows that mothers' educational qualification significantly influence the metacognition of students. Surprisingly students whose mothers are illiterate also have high metacognitive level than those whose mothers are primary educated. This is because of the fact that mothers are more devoted for their family and for the education of their children. They are more concerned about the studies of their wards. If they are educated and aware enough they may contribute much to develop overall personality of their children and it will significantly improve the metacognitive level of their young ones. The above findings are supported by the studies of Annevirta and Vauras (2006), Mustafa and Ozgul (2009), Rani and Govil (2013) who concluded that parental education level is positively correlated with metacognition of their children.

Variables	N	r	Level of significance (0.01)
Metacognition	280	.46	Significant
Critical Thinking	280		

Table-4: Correlation between metacognition and critical thinking of higher secondary students

The results in Table-4 shows that the Pearson correlation coefficient 'r' between the metacognition and critical thinking of higher secondary students was 0.46, which is statistically significant. This finding is supported by the study of Nemat and Erfani (2014) that there is a significant relationship between metacognitive learning strategies and critical thinking of learners. Thus, a significant positive correlation exists between the metacognition and critical thinking of higher secondary students.

VII. FINDINGS OF THE STUDY AND CONCLUSION

The results of the study revealed that there is no significant difference found in metacognitive awareness of the higher secondary students on the ground of gender difference. Female higher secondary students are found similar in metacognitive level to the male counterparts. It was also found that there is no difference in metacognitive level of Art, Science and Commerce stream higher secondary students. All students of different streams show the similar metacognitive level. It means the academic stream does not influence the metacognition of higher secondary students. Further there was no significant difference in the metacognitive awareness among higher secondary students with regard to their family income. Parental education especially mothers' education plays a significant role in enhancing the metacognitive level of their wards. The results also show that there is positive correlation between the metacognition and critical thinking of higher secondary students.

Therefore, as evident from the above findings it is crucial to create a metacognitive learning environment in the classroom. Organizing orientation and training programmes for all the students make them aware about the use of metacognition in learning process to achieve better academic outcomes. Thus, the development of metacognitive strategies helps to resolve the upcoming challenges and complexities to achieve success in learning. The role of teachers is very important in this regard. With the metacognitive awareness, learners can better construct their knowledge through experiences. Parents and the family environment play a vital role in enhancing the metacognitive level of the students. In this way, development of metacognition skills is the core foundation for learning. To promote critical thinking, metacognition should be explicitly addressed in a curriculum. Emphasizing metacognitive strategies within an environment intended to foster critical thinking not only increases students' thinking skills but also prepares learners with a lifelong ability to help them productively manage new situations in our fast changing world.

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