RESEARCH REVIEW JOURNALS
Volume-04
Issue-08
August-2019

ISSN: 2455-3085 (Online)
RESEARCH REVIEW International Journal of Multidisciplinary
www.rrjournals.com[Peer Reviewed Journal]

Mediating Role of Academic Emotions in Determining Metacognitive Ability in Higher Secondary Students: An Investigatory Research

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ARTICLE DETAILS

Article History
Published Online: 16Aug 2019

Keywords
Academic Emotions, Metacognitive Ability.

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ABSTRACT

Education is a core of any social culture. For the advancement in education, it is essential to develop "how to think" process, the management and regulation of learning strategies therefore it is indeed important for learners to strengthen these competencies and behaviour to make use of knowledge and thinking skills. Thus, the present investigation was undertaken to study the mediating role of affective domain in determining the metacognitive abilityin higher secondary students. The study was conducted on the sample of 1000 higher secondary students studying in co-ed CBSE affiliated schools of Agra city. The Meta-Cognition Inventory (MCI) developed by Dr.PunitaGovil and self-constructed measure of Academic Emotions has been used to measure the valence of positive and negative emotions of students. Mean, Standard Deviation, CR valueandANOVA have been employed to analyze the data. The results of the study reveal that gender has a significant impact on the experience of academic emotions in higher secondary students. However, no significant difference was found in the metacognitive level of higher secondary students on the basis of their gender. Academic emotions have real life effects on the metacognitive ability of higher secondary students. This study suggests learners to understand and regulate their own thinking process for resolving the real life challenges and complexities and to serve this purpose they should be facilitated with the sound emotional ground which can fertilize the potential to regulate and manage their thinking process. Further the present study also acclaims some recommendation for parents and teachers to promote metacognitive thinking skills in learners through the pillars of emotions among students at school level.

1. Introduction

Education being modelled as smart education in the coming scenario demands smart learners to handle knowledge domain. Therefore thinking about their thinking process becomes imperative for learners, to handle and regulate their critical thinking in order to achieve the desired goals. It is the primary enabling state for students to be able to work independently and flexibly. Metacognition helps the people to perform many cognitive tasks more effectively. It refers to a level of thinking that involves active control over the process of thinking that is used in learning situations. Individuals with a high level of metacognitive knowledge and skills identify blocks to learning as early as possible and change 'tools' or strategies to ensure goal attainment. The person who have the awareness of metacognitive knowledge, he is able to know about his own strengths and weakness, the nature of task at hand, and available 'tools or skills'.

Metacognition has a critical role to play in successful learning means it is important that it be demonstrated by both students and teachers. Students who demonstrate a wide range of metacognitive skills perform better in their learning and complete work more efficiently. Planning the way to approach a task, monitoring, comprehension and evaluate the progress towards completion of a task: these are the metacognitive skills may help the students to improve their academic competency.

The metacognitive knowledge is used to monitor and regulate cognitive processes of reasoning, comprehension, problem-solving and learning. This enables the students to be successful learners. Effective learning involves planning and goal-setting, monitoring one's progress and adapting as needed. All of these activities are metacognitive in nature. **Everson and Tobias (2001)** report that research shows there is a difference in the metacognition of effective learners and ineffective learners. The effective use of metacognition has been shown to predict learning performance **(Pintrich&DeGroot, 1990).** Thus, meta-cognitive learningis needed to be motivated and therefore in the present study effect of academic emotions will be studied with reference to metacognition of higher secondary students.

Emotion and cognition, feeling and thinking, combine together in all social practices in complex ways**.** Emotions are an integral part of education and of organizations more generally. Teachers, learners and leaders all, at various times, worry, hope, enthuse, become bored, doubt, envy, brood, love, feel proud, get anxious, are despondent, become frustrated, and so on. Such emotions are not peripheral to people's lives; nor can they be compartmentalized away from action or from rational reflection within these lives. Emotion, cognition and action, in fact, are integrally connected. With the realization that emotions have the potential to influence teaching in both positive and negative ways, there is a great need to study emotions in educational contexts and its influence on higher cognitive and metacognitive learning. Thus, it is important to foster the process of metacognitive skill development in

students and the mediating role of negative and positive emotions in determining the metacognitive ability.

2. Relevance of the study

"There can be no knowledge without emotion." This statement by British novelist Arnold Bennett affirmed the intimate link between learning (knowledge) and feeling (emotion). Thus it was surprising that educational researchers have mostly neglected the role that feelings or emotions play in the classroom with most of their attention being devoted to cognitive and motivational constructs **(Pekrun&Frese, 1992**; **Schutz&Lanehart, 2002).** There have been a few exceptions; however, in the form of studies on test anxiety **(Zeidner, 1998)** and research on how attributions affect emotions following success and failure **(Weiner, 1985).** It was only recently that researchers have become increasingly aware of the role that emotions play a significant role in the school settings. In introducing a special issue of the Educational Psychologist (2010) on emotions in the educational setting, **Schutz and Lanehart (2002, p. 67)** wrote:

As motivation, cognitive, developmental, and educational psychologists have continued to contextualize their inquiry within the schools; it has become clear that emotions are an integral part of educational activity settings. In the 2000s, researchers interested in teaching, learning, and motivational transactions within the classroom context can no longer ignore emotional issues. Emotions are intimately involved in virtually every aspect of the teaching and learning process and, therefore, an understanding of the nature of emotions within the school context is essential.

Teaching and learning are not only concerned with knowledge, cognition and skill. They are emotional practices. This does not mean that they are solely emotional practices. Emotion and cognition, feeling and thinking, combine together in all social practices in complex ways. **(Gross,** 1**999)** Emotions are an integral part of education and of organizations more generally. Teachers, learners and leaders all, at various times, worry, hope, enthuse, become bored, doubt, envy, brood, love, feel proud, get anxious, are despondent, become frustrated, and so on. Such emotions are not peripheral to people's lives; nor can they be compartmentalized away from action or from rational reflection within these lives. Emotion, cognition and action, in fact, are integrally connected. With the realization that emotions have the potential to influence teaching in both positive and negative ways, there is a great need to study emotions in educational contexts and its influence on higher cognitive and metacognitive learning.

3. Objectives

The objectives of the study are as follows:

1. To study Academic Emotions of male and female Higher Secondary students.
2. To study Metacognitive level of male and female Higher Secondary students.
3. To analyze the real life effects of Academic Emotions on meta-cognitive learning in higher secondary students.

4. Hypotheses

The following hypotheses were framed to achieve the objectives:

H_{o1} No difference will be found in the level of Academic Emotions of male and female higher secondary students.

H_{o2} No difference will be found in the level of Metacognitive ability of male and female higher secondary students.

H_{o3}No effect will be found of Academic Emotions on the meta-cognitive abilityof higher secondary student.

5. Methodology

The present study falls in the domain of descriptive study. Survey method was used to study the positive and negative emotions and Metacognitive ability 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 PunitaGovil 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. Self-constructed measure of Academic Emotions was used to obtain data for positive and negative emotions.

C. Statistical Techniques used: To analyze the data mean, standard deviation, 't' test and Analysis of variance (ANOVA) were employed.

6. Analysis and interpretation of data

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

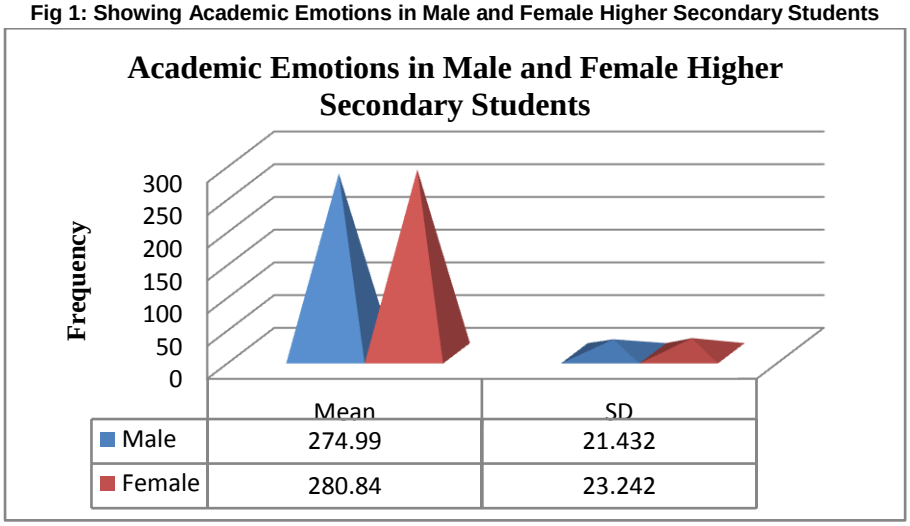
1 Objective.To study Academic Emotions of male and female Higher Secondary Students.

Table 1: Exhibiting Comparison between Academic Emotions of Male and Female Higher Secondary Students

Variable	Unit	N	M	SD	CR-value (df=998)	p-value
Academic Emotion	Male	500	274.99	21.432	4.139	*0.000
	Female	500	280.84	23.242		

***significant at 0.01 level of significance (p<0.01)**

Fig 1: Showing Academic Emotions in Male and Female Higher Secondary Students



To fulfill the requirement of the present objective, the level of Academic Emotions were explored in male and female as well as to know the valence of the emotions experienced by the respondents. Responses are collected from both male and female thus studied their experience of academic emotions separately. Mean value of academic emotions of Male secondary students was 274.99 with SD of 21.432and the mean value of academic emotions of female secondary students was 280.84 with SD 23.242.The outcome of analysis reveals the sensitivity of female students respondents being more emotional as compared to male students respondents in responding to their academic surrounding as it is the universal nature of female being more sensitive, emotional, profound in response to the emotional stimuli. Thus results support the fact of female being more expressive as compared to their counterpart male schoolmates in experiencing varied emotions during academic setting. Further, the obtained SD value indicates the heterogeneity in the scores of female respondents signifying that female have different levels of emotions experiencing in academic setting. The calculated CR value of male and female respondents regarding academic emotions has been found to be 4.139 which signify significant statistical difference in academic emotions of male and female higher secondary students at 0.01 level of significance. Hence, framed null hypothesis “No difference will be found in the level of Academic Emotions of male and female higher secondary students” has been rejected.

2 Objective. To compare the Metacognitive Learning in the male and female Higher Secondary Students.

Table 2: Exhibiting Comparison between meta-cognitive learning of Male and Female Higher Secondary Students

Variable	Unit	N	M	SD	CR-value (df=998)	p-value
Metacognitive learning	Male	500	87.43	11.116	0.295	.768
	Female	500	87.64	11.998		

Fig2: Showing comparison ofMetacognition in Male and Female Higher Secondary Students

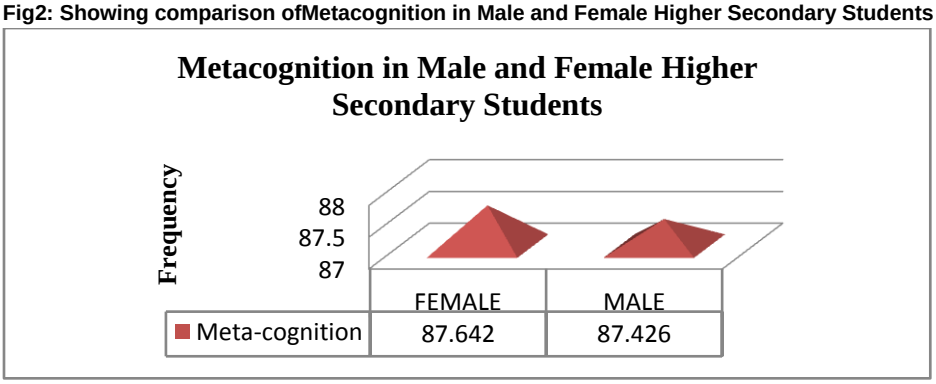


Table 2 illuminates the scores on Metacognitive inventory obtained by male and female respondents showing the comparison of Metacognitive scores of male and female. The calculated CR value came out to be 0.295 which is not found significant on 0.05 level. Results reveal no statistical difference in the Metacognitive level of male and female students. Hence, framed null hypothesis “No difference will be found in the level of Metacognition of male and female higher secondary students” has been accepted due to no significant difference in the scores of male and female respondents.

The reason behind such similarity may be the normality of scores i.e. equal distribution of population in both the genders therefore both male and female lie in all categories viz. high, average and low of Metacognitive Learning scale; causing no significant difference in the Metacognitive Learning of male and female higher secondary students. Metacognitive Learning is

Meta thinking; thinking beyond about the activities performed by an individual. Results disclose that Metacognitive Learning is not related to gender rather a stock of individual difference. The findings are in line with the research by **Rani and Govil (2013)** which revealed that the mean value of metacognition is higher of female respondents than the male respondents.

3 Objective:To analyze the real life effects of academic emotions on Metacognitive ability in Higher Secondary students.

For achieving the present objective the researcher has classified the academic emotions in three categories: High Academic Emotions, Average Academic Emotions, Low Academic Emotions and their corresponding scores on Metacognitive Learning were taken.Further mean and standard deviation of Metacognitive Learning scores were computed which are shown in Table 3.

Table 3: Showing the statistical measures of Metacognitive Learning with respect to high, Average and Low Academic Emotion Group

Groups	Metacognition Scores (N)	Mean	SD
Low Academic Emotion	145	87.496	11.858
Average Academic Emotion	683	86.985	11.326
High Academic Emotion	172	89.744	12.021
Total	1000	87.534	11.560

Table 3 shows number, mean and standard deviation of Academic Emotion with respect to Metacognitive Learning. The mean scores of Low Academic Emotion group, Average Academic Emotion group and High Academic Emotion group are 89.74, 86.98, 87.49 respectively.

Table 4: F-Table showing Independent Effect of Academic Emotions on Metacognitive Learning in Higher Secondary Students with respect to High, Average and Low Academic Emotion groups

S.No.	Values	Sum of Squares	df	Mean Square	F	p-value
1	Between Groups	1045.998	2	522.999	3.937*	.020
2	Within Group	132456.846	997	132.855		
3	Total	133502.844	999			

***significant at 0.01 level of significance (p<0.01)**

The one way ANOVA table obtained for Metacognitive Learning is given in Table 4. The values came out to be obtained as a result of one-way ANOVA is tabulated in Table 4.

The calculated F-value at 2 and 997 degree of freedom i.e. F (2,997) obtained from the table is 3.937 and significance value (p-value) of F-ratio is p=0.020. The p-value of F-ratio for independent effect of Academic Emotion was found to be less than 0.01 which indicates that the alternative hypothesis is accepted at 0.01 level of significance i.e. there is a significant independent effect of Academic Emotions on Metacognitive Learning. Thus the alternative hypothesis is liable to rejection i.e. *there will be no effect of Academic Emotions on the Meta-cognitivelearning* at 0.01 level of significance or 99 percent level of confidence. Since the obtained p-value is lower than 0.01 therefore framed null hypothesis was rejected which indicates that there is some significant independent effect of Academic Emotions on Metacognitive Learning.

For determining the significant effect of different levels of Academic Emotions, Post-hoc test is applied. Tukey HSD Post Hoc test was employed in order to further distinguish that which mean is significantly different from the other mean. It gives additional exploration of the differences among means providing specific information on which means are statistically different from the other. The results are summarized in Table 5 as follows:

Table 5 Summary of Turkey HSD Post Hoc Test

Levels	Groups for Comparison	Mean Difference	Std. Error	Significance
Low	Average	-.511	1.053	.878
	High	-2.247	1.299	.195
Average	Low	-.511	1.053	.878
	High	-2.758*	.983	.014
High	Low	-2.247	1.299	.195
	Average	-2.758*	.983	.014

***The mean difference is significant at the 0.01 level (p<0.01)**

The mean differences of high academic emotion & average academic emotion, average academic emotion & low academic emotion, high academic emotion & low academic emotion are 2.758, .511 and 2.247 and with respect to Metacognitive Learning scores. The scores of Metacognitive Learning lying in high & average academic emotion level being

lower than the p-value (p<0.01)verifies significant difference between groups. The scores of high & low and average & low groups are not significant as calculated p-value for the group came out to be .195 (p>0.05) and .878 (p>0.05) which is higher than the 0.05 level of significance. Hence, mean differences of high & average academic emotion are statistically significant at 0.01 level but no significant difference found in between high & low and average & low groups. The mean differences found to be significant at 0.01 level of significance which inferred that Higher secondary students with high intensity of emotions possess high Metacognitive Learning and on the other side students experiencing low valence of emotions do not hold good Metacognitive Learning.

The reason may be that high valence of emotions stimulate the one being more cognitively active which consequently helps a being to be meta-cognitively active. Higher Secondary students experiencing high intensity of positive and negative emotions are able to control and monitor their own activities. Emotions work as an academic motivator allows respondents to be self-regulatory who can manage, plan and monitor their own academic performance. Emotion is a very powerful aspect of personality that can mold ones thinking process to an extent. Thus it can be construed that emotions has a power to control metacognitive abilities and can influence the thinking management style of Higher Secondary students.

7. Findings of the study and conclusion

The outcome reveals the sensitivity of female respondents being more emotional as compared to male respondents in responding to their academic surrounding signifying significant difference in the level of academic emotions in Higher Secondary students. On the other hand, no statistical difference has been found in the level of Metacognition of male and female students.Some significant independent effect of Academic Emotions on Metacognitive ability was found.From these discussion, guidelines regarding about how teacher can understand students' emotions and what and what they can do to help students develop emotions that promote learning and development, and prevent emotions that are harmful. Higher cognitive learning can be better facilitated if the learner performs with anticipation and satisfaction thus teacher should promote joyful activities which releases the fear from the mind of learners in a stress free environment. Affective factors in learner's life also influence amount of learning. Emotions, feelings and attitude of a teacher plays a major role in arousing right emotional surrounding which promotes positive effect on learning. Students should be made feel anxious during collaborative group activity to stimulate their cognitive response. Parents should not provide situation which are always pleasant instead create some environment which makes their wards curious and anxious to take cognitive actions promptly.

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