Relating Metacognition of Secondary School Students with their Perceived Teacher Competencies

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Abstract

This study investigated metacognition and perceived teacher competencies of secondary school students. Nine hundred twenty Class IX students from schools across Greater Mumbai participated in the study. Gender-wise comparisons were made between the students for the two variables. Female students were found to possess better metacognition and they also perceived teacher competencies more favourably than the male students. The study also aimed at ascertaining the relationship between metacognition and perceived teacher competency scores. Analysis was done for total and component-wise scores for metacognition and perceived teacher competencies. A significant, direct, positive correlation was found between total metacognition and total teacher competency scores. Component-wise analysis revealed technical competency of teachers to be a strong and significant predictor of all the components of metacognition for total sample and for male and female students. This indicates that the metacognition of students is related to teachers' technical competencies such as communication skill, evaluation ability, classroom management, mastery over content and ability to organise information. The study highlights the need for competent teachers for supporting student's metacognition.

Introduction

Education deals historically and contemporarily with the principles and practices of teaching and learning. It also increases skill, knowledge and understanding as a result of training and experiences. The central purpose of education is to help individuals make

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necessary adjustments towards a constantly changing environment. To this end, a large part of educational endeavour involves teaching general skills and strategies that can be applied to a variety of problems and learning situations. Pressley, Borkowski and O' Sullivan suggested in 1984 that strategy instruction should provide students with information about the utility of the strategy and when and how to use it. Put differently, strategy instruction should include a metacognitive component. Metacognition, thus, broadly defined as knowledge that a person has of his own cognitive processes (Husen and Postlethwaite [Eds.], 1985b). Metacognition can be defined as the conscious awareness of one's own cognition and the conscious control of one's own learning (El-Koumy, 2004). Metacognition plays an important role in communication, reading comprehension, language acquisition, social cognition, attention, self-control, memory, self-instruction, writing, problem-solving, and personality development (Flavell, 1979).

Education has two major dimensions. It is a discipline and disseminating tool or process. The second dimension includes the curriculum content, the teacher taught relationship, teacher quality and teaching aids/methods/environment. Transmission of knowledge depends upon teacher quality, commitment and competence. Since school learning takes place in a social context, teachers must obviously be concerned with group and social factors that impinge on the learning process. Apart from general classroom climate, teachers' contribution to the social context in which learning occurs—their role, personality characteristics and teaching style are also important (Ausubel, 1968). Effective teachers provide a clear and empathetic learning environment to facilitate student's understanding. Students should be encouraged to reflect on their own attitudes values and skills in order to assume responsibility for their own learning which can be done with highly competent teachers.

Review of researches on metacognition revealed that metacognition as a construct has been researched in various countries. Importance of metacognition and intervention of metacognitive strategies to promote student learning have been acknowledged by several authors. Effect of age, experience and gender on metacognition has also been researched. Consequently the role of metacognition and self-regulated learning in student achievement, problem-solving skills both in mathematics as well as science-based problems and in various learning environments has been studied too.

Review of related literature on teacher competency suggested that Indian researches aimed at understanding core characteristics of an ideal teacher, teacher effectiveness, qualities of an effective teacher, teacher attitude, personality of teacher, self-efficacy and teaching competency, teacher interpersonal behaviour. These were studied in conjunction with demographic variables, student's achievement to a large extent, and with specific subjects like science or languages. Teacher competency has been studied sparsely in order to

improve the teacher selection process, understand the context with social correlates and identify competencies of pre-service and in-service teachers.

Need of Study

The education system emphasises much on accumulation of knowledge/ information. The ability to think or the cognition domain has been focused upon regularly. However, the ability to regulate one's own thinking and be able to self assess the extent and utilisation of one's own cognitive abilities, would possibly inculcate lifelong learning among the students. Winne and Butler (1995) record that the students' mediation of instructional events and self-regulation of approaches to learning are recognised as potent factors that influence the development of achievements. In other words, metacognition helps student better their learning abilities.

Students found the metacognitive approach supportive of their learning and self-assessment. Students with high achievement were more aware of their learning and thinking processes. Metacognitive awareness, therefore, serves a regulatory function and is essential to effective learning because it allows students to regulate numerous cognitive skills. An important factor that can bring about this change in the student is his teacher. A student interacts with the teacher as a person and not someone who is just efficacious or well behaved in class. The teacher has an overall influence on the student, including her interaction even after class hours. Competent teacher was thus necessitated. A need for wholesome understanding prompted the inclusion of social, technical and affective competencies of a teacher in the present research.

The present paper is therefore, an attempt to study and ascertain the relationship between metacognition of students and teacher competencies as perceived by them.

Design of the Study

Descriptive research method was used for the study. Gender-wise comparisons were made and correlations were ascertained between the variables. Data were collected from 920 Class IX students from schools situated in Greater Mumbai through stratified sampling technique. A 32 item five-point Likert scale, Inventory of Metacognitive Self-Regulation (IMSR) by Howard et al (2000) was used to measure metacognition and a self-prepared 5-point teacher competency tool including 54 items was used to measure perceived teacher competency. Validity and reliability of the tool were established (Kapadia, 2009). Data were analysed using the descriptive techniques and hypotheses were tested using the parametric techniques such as the *t*-test and ANOVA. Correlation between variables was computed using simple correlation coefficient (r) and multiple regression analysis (R); and Fishers' Z for ascertaining the standard error of difference.

Findings, Conclusions and Discussions

The findings of the study are reported under the following headings:

1. Difference in metacognition

2. Difference in perceived teacher competency
3. Correlation between metacognition and perceived teacher competency

Difference in Metacognition on the Basis of Gender

A significant difference for total metacognition (t=4.54, p=0.00) scores between male and female secondary school students was obtained. Mean scores indicated that female students possess higher metacognition than male students, for total metacognition.

A significant difference between genders was obtained for four out of five components of metacognition; knowledge of cognition (t=3.8, p=0.00), objectivity (t=4.37, p=0.00), problem representation (t=3.69, p=0.00) and evaluation (t=2.81, p=0.00). For each of the components, mean scores of female students were higher than male students. This shows that female students are better at understanding their cognitive abilities, objectively thinking about their learning as it proceeds, understanding the problem fully before proceeding to solve it and at double-checking their problem-solving process than male students.

No significant difference was obtained only for the sub-task monitoring scores between male and female students. Thus, monitoring the choice of learning strategies and completing each sub-task is an ability in which male and female students do not differ.

Difference in Perceived Teacher Competencies on the Basis of Gender

A significant difference for total teacher competencies (t=4.26, p=0.00) score between male and female students was obtained. Mean scores indicated that female students perceive total teacher competencies better than male students.

A significant difference between the mean scores for social competency (t=4.25, p=0.00), technical competency (t=2.82, p=0.00) and affective competency (t=5.12, p=0.00) components of perceived teacher competencies for male and female students was obtained. Mean scores indicated that female students perceive social competency, technical competency and affective competency better than male students.

Correlation between Metacognition and Perceived Teacher Competencies

It is discussed under the following heads

a. Correlation between Total Metacognition and Total Teacher Competencies Scores—A significant, positive, direct and substantial relationship between total metacognition and total teacher competencies was obtained for total sample (r=0.44, p=0.00) for male students (r=0.44, p=0.00) and female students (r=0.27, p=0.00).

A significant difference between the coefficients of correlation of total metacognition and total teacher competencies at 0.01 level was obtained on the basis of gender (Z=2.58). The correlation between total metacognition and total teacher competencies was stronger for male students (r=0.44) than female students (r=0.27).

b. Correlation between Total Metacognition and Components of Teacher Competencies Scores—A significant positive, direct and low to substantial correlation between total metacognition and components of perceived teacher competencies was seen for total sample (Refer Table 1) and for male and female students (Refer Table 2).

Table 1

Simple Correlation and Multiple Regression Analyses for Correlation between Total Metacognition and Components of Teacher Competencies for Total Sample

Components of Teacher Competencies	*Metacognition*	
	r	*B*
1. Social Competency	0.376**	– 0.091
2. Technical Competency	0.477**	0.507**
3. Affective Competency	0.378**	0.057
Multiple Correlation R		0.479**
R2		0.229

N=920 ** Correlation is significant at 0.01 level.

Table 2

Simple Correlation and Multiple Regression Analyses for Correlation between Total Metacognition and Components of Perceived Teacher Competencies on the Basis of Gender.

Components of Teacher Competencies	*Group*	*Metacognition*	
		R	*β*
1. Social Competency	Male	0.411**	–0.056
	Female	0.304**	–0.188
2. Technical Competency	Male	0.518**	0.498**
	Female	0.413**	0.575**
3. Affective Competency	Male	0.426**	0.083
	Female	0.291**	–0.001
Multiple Correlation R	Male		0.520**
	Female		0.425**
R2	Male		.270
	Female		.180

N (Males) = 505 N (Females) = 415 ** Correlation is significant at 0.01 level.

Significant multiple correlations (R) for total metacognition and components of perceived teacher competencies for total sample on the basis of gender was also obtained. This strongly supports the conclusion that all the components of teacher competencies are related to metacognition of students.

The standardised regression coefficients (β) revealed the significant predictors for total metacognition. Technical competency was seen to be the only significant predictor of total metacognition for total sample as well as for male and female students.

A significant difference between the coefficients of correlation of total metacognition and social competency (Z=1.96, at 0.05 level) and affective competency (Z=2.25, at 0.05 level) components of teacher competencies were obtained on the basis of gender. A stronger correlation between the total metacognition and, social and affective competencies was seen for male students than female students. It can thus be inferred that male students perceive those teachers who are sociable, motivate them, are tolerant, have gratitude and compassion, are open to new ideas and have good self-esteem, are responsible for development of their metacognition more than perceived by female students.

***c. Correlation between Components of Metacognition and Components of Teacher Competencies Scores*—**A significant positive, direct and low to substantial correlation between components of metacognition and components of perceived teacher competencies was obtained for total sample (Refer Table 3) and for male and female students (Refer Table 4).

Table 3

Simple Correlation and Multiple Regression Analyses for Correlation between Components of Metacognition and Components of Teacher Competencies for Total Sample

Components of Metacognition / *Components of Teacher Competencies*	*1. Knowledge of Cognition*		*2. Objectivity*		*3. Problem Representation*		*4. Subtask Monitoring*		*5. Evaluation*	
	r	*β*	*r*	*β*	*r*	*β*	*r*	*β*	*r*	*β*
1. Social Competency	0.25**	-.003	0.21**	-.103	0.31**	-.04	0.28**	-.10	0.27**	-.05
2. Technical Competency	0.31**	.308**	0.28**	.328**	0.38**	.392**	0.38**	.469**	0.32**	.298**
3. Affective Competency	0.24**	.007	0.22**	.053	0.31**	.042	0.28**	.003	0.28**	.093
Multiple Correlation R		.311**		.289**		.388**		.389**		.331**
R2		.097		.084		.150		.151		.109

N=920 ** Correlation is significant at 0.01 level.

Table 4
Simple Correlation and Multiple Regression Analyses for Correlation between Components of Metacognition and Components of Teacher Competencies on the Basis of Gender.

Components of Metacognition / Components of Teacher Competencies	Group	1. Knowledge of Cognition		2. Objectivity		3. Problem Representation		4. Subtask Monitoring		5. Evaluation	
		r	β	r	β	r	B	r	β	r	β
1. Social Competency	Male	0.21**	-.010	0.17**	-.088	0.29**	-.014	0.31**	-.033	0.24**	-.046
	Female	0.15**	-.023	0.11*	-.159	0.20**	-.129	0.12*	-.255	0.17**	-.087
2. Technical Competency	Male	0.26**	.235**	0.25**	.335**	0.38**	.439**	0.41**	.438**	0.31**	.288**
	Female	0.23**	.434**	0.18**	.369**	0.26**	.375**	0.24**	.542**	0.22**	.337**
3. Affective Competency	Male	0.23**	.107	0.18**	.031	0.28**	-.005	0.31**	.027	0.27**	.120
	Female	0.09*	-.151	0.11*	.037	0.20**	.075	0.12*	-.004	0.16**	.036
Multiple Correlation R	Male		.317**		.293**		.425**		.433**		.351**
	Female		.313**		.271**		.328**		.347**		.293**
R2	Male		.100		.086		.180		.187		.123
	Female		.098		.074		.108		.120		.086

N (Males) = 505 N (Females) = 415 **Significant at 0.01 level *Significant at 0.05 level

Significant multiple correlations (R) for components of metacognition and components of perceived teacher competencies for total sample and on the basis of gender were also obtained. This strongly supports the conclusion that all the components of metacognition are related to components of teacher competencies.

The standardised regression coefficients (β) revealed the significant predictors for components of metacognition. Only technical competency emerged as the significant and strong predictor of every component of metacognition for total sample and on the basis of gender.

A significant difference between the coefficients of correlation of knowledge of cognition and affective competency (Z=2.1, at 0.05 level) of problem representation and technical competency (Z=1.96, at 0.05 level) and of sub-task monitoring and all the components of teacher competencies (Z=3.0, at 0.05 level) on the basis of gender was obtained. It is seen that a stronger correlation between the above components of metacognition and components of teacher competencies exist for male students.

Conclusion and Suggestions

For metacognition on the basis of gender

The above analysis shows that female students possess better metacognition than male students of secondary school, for both total metacognition as well as for four out of five components of metacognition. This result is in conjunction with other studies on metacognition. As seen in previous researches, females are sincere and reflective thinkers. This is extended to their metacognitive self-regulation ability also, as seen from the above results. This implies that while problem-solving, female students utilise their metacognition abilities more than male students. Knowledge of this result can be used by teachers in making homogenous groups in a class with both male and female students. While forming groups for any class, activity teacher should make sure that a good mix of male and female students is provided. The tendency of female students to use their metacognition ability in solving problems would possibly be imbibed by male students during the activity.

For perceived teacher competency on the basis of gender

Results show that female students perceive teacher competency better than male students, both for total teacher competency scores as well as componentwise for social, technical and affective competency scores. Female students perceive teacher to be more sociable, better classroom manager and possessing better gratitude and compassion than perceived by male students. Female students are found to be more attached to their teachers as compared to male students. Female students tend to develop a rapport with their teachers faster than male students. Male students at secondary school level conform to their peers more than adults or teachers. It is possibly for these reasons that such results are obtained.

From the above results it is clear that teacher should be competent enough in order to exert influence on both the genders equally. This is a necessity because the teacher is an important factor in student development. Every student should perceive their teacher to be competent so that desirable changes that a teacher is expected to bring about are obtained. That a teacher interacts with a student even outside the class necessitates that besides having thorough content knowledge, good communication as well as evaluation skills, a teacher should also possess social and affective competency.

For correlation between metacognition and perceived teacher competency

A positive and direct relationship between total metacognition and total teacher competencies scores was obtained for total sample and on the basis of genders. This indicates that teacher competencies would aid in improving metacognition of students. Thus, enhancing students' metacognition necessitates involvement of competent teachers.

The female students showed higher metacognition and perceived their teacher competencies more favourably than the male students. Yet the

correlation between total metacognition and total teacher competencies scores for female students is weaker than the male students. This is possible as the students are taught by several teachers and therefore their competencies may not immediately reflect in students' metacognition. In other words, teacher competencies do have a correlation with students' metacognition, but the teachers should be emphatic in their endeavour towards developing students' metacognition.

Technical competency was seen to be the only significant predictor of total metacognition as well as for each component of teacher competency for total sample and for male and female students. This indicates that the teachers' communication skill, evaluation ability, classroom management, mastery over content and ability to organise information is related to metacognition of students. This clearly indicates that the way in which the teacher transacts the curriculum is strongly related to students' metacognition.

A stronger correlation between the total metacognition and, social and affective competencies was seen for male students than female students. It can thus be inferred that male students perceive that teachers who are sociable, motivate them, are tolerant, have gratitude and compassion, are open to new ideas and have good self-esteem, are responsible for development of their metacognition more than perceived by female students.

REFERENCES

Ausubel, D. 1968. *Educational psychology: A cognitive view.* Holt, Rhinehart and Winston, USA.

Buch, M.B. (Ed). 1997. *Fifth Survey of Research in Education:* 1988-1992 (Vol. II), NCERT, New Delhi.

El-Koumy, A.S. 2004. *Metacognition and reading comprehension: Current trends in theory and research* (ERIC Document Reproduction Service No. ED490569).

Flavell, J. H. 1979. Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist,* 34, 906 - 911.

Howard, B., S. McGee. R. Shia and N. Hong. 2000. *Metacognitive self-regulation and problem-solving: Expanding the theory base through factor analysis.* Paper presented at the annual meeting of the American educational research association, New Orleans, LA. (ERIC Document Reproduction Service No.ED470973).

Husen, T. and N. Postlethwaite. (Eds.) 1985. 'Learning to learn and metacognition', *International encyclopedia of education* (Vol. 2). Pergamon, UK.

Kapadia, R. 2006. *Students' expectation of social and technical competencies of teachers at different levels of education* Unpublished Master's Dissertation. University of Bombay.

Kapadia, R. 2009. *A study of metacognition of secondary school students in relation to their learning environment and teacher competencies.* Unpublished doctoral dissertation. University of Mumbai.

Winne, P. and D. Butler. 1995. 'Student cognitive processes', In L.W. Anderson (Ed.). *International Encyclopedia of Teaching and Teacher Education* (2nd ed.). Pergamon, UK.