Metacognition in Relation to Teacher Competencies as Perceived by Students of Different School Types

Rashida Kapadia**

Abstract

This work is aimed at studying and comparing metacognition and perceived teacher competency of secondary school students. Data was collected from Class IX students of different school types i.e., SSC, ICSE and CBSE schools across Greater Mumbai. Results show that students of all the school types, SSC, ICSE and CBSE, consider that their teachers are equally competent. They consider their teachers to possess social, technical as well as affective competencies. Analysis was done for total and component-wise scores for metacognition and perceived teacher competency. A significant, direct, positive correlation was found between total metacognition and total teacher competency scores. Component-wise analysis revealed technical competency component of teacher competency-to be a strong and significant predictor of all the components of metacognition for total sample and for SSC and ICSE 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. The need for competent teachers for supporting student's metacognition is endorsed.

Introduction

The role of teacher in the teaching-learning process can be understood well through the following quote by Immanuel Kant in his famous *Pedagogy* which highlights the importance of good teachers as, 'Man can become man only by education. He is nothing but what education makes him. It is to be noted that man is educated only by men who have themselves been educated. Hence lack of discipline and

* *Assistant Professor,* St. Xavier's Institute of Education, Mumbai, 400008

instruction on the part of some men makes them in turn bad educators of their pupils'. Teachers are expected to play the role of agents of social change and modernisation. The teacher of the future is expected to perform the roles of planned organiser of curricula, innovator of educational ideas, practices and systems. The role of teacher would have to be shaped in the light of the changing demands on the school. 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. Presently, learning to live together is one of the four pillars which UNESCO wants the various countries of the world to build their edifice of education on. Teachers need to understand the concept and be aware of the various techniques and strategies that would help children develop collaboration and synergy and through them tolerance. Anderson and Ching (1987) suggest that a teacher education programme should be based on the three goals of teacher knowledge, teaching skills (both pedagogical and interpersonal) and teacher feelings and self-awareness. Thus, imply the presence of social, technical and affective competencies in teachers as a necessary tool for student development.

While discussing the aims of education, the national focus group constituted by NCERT recommends, "It is very important that school teaching and learning takes place in an environment that is aesthetically pleasing. It is also essential that children take an active part in creating such an environment for themselves". While Piaget stresses on children constructing knowledge by transforming, organising and reorganising previous knowledge. Vygotsky's emphasis is on knowledge construction through social interaction with others. Education thus increases skill or acquisition of knowledge and understanding as a result of training, study of experiences. 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. Put differently, strategy instruction should include a metacognitive component. Metacognition, thus, broadly defined is knowledge that a person has of his own cognitive processes (Husen and Postlethwaite (Eds.), 1985). 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).

Need of Study

It is evident from the report of the *National Curriculum Framework* of 2005 that education is in a state of flux. The goals of school education have been steadily changing with changing times. In an era where the focus of education is preparing global students, it is unfortunate that our classroom practices have remained

as traditional as ever. This requires to be changed. Teachers should focus on student's development and understanding of their own thought process. In the past few decades in India, research on teaching focused on teacher or the students. In recent years, there is a shift in the focus to the process of interaction (instruction or learning). The cognitive processes are emphasised through multi-way interaction of content, teacher, students and teaching-learning material and teaching competency. The ability to think or the cognition domain has been focused upon regularly. While, 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. It is also suggested under the principles that form the basis of brain-compatible teaching by Caine and Caine (1991), that Learning always involves conscious and unconscious processes i.e., students need time to process 'how' as well as 'what' they've learned. In other words, students need to be aware of their own thought process. Teachers need to inculcate in their students self-regulation skills and thereby make them help themselves. Review of related literature showed that 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. Thus, it can be conclusively said that metacognition is important for the development of lifelong learners. 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 is thus necessitated. A need for wholesome understanding prompted the inclusion of social, technical and affective competencies of a teacher in the present research.

Aims of the Study

1. To study and compare metacognition and perceived teacher competency of secondary school students on the basis of their school types.
2. To ascertain the relationship between metacognition and perceived teacher competency of secondary school students on the basis of their school types.

Design of the Study

The descriptive method was used for the study and comparisons were made between the school types (SSC, ICSE and CBSE) and correlations ascertained. Data was collected from 920 Class IX students from all three types of schools situated in the Greater Mumbai region. Due representation to type of schools was given through stratified sampling technique.

Tools Used

The Inventory of Metacognitive Self-Regulation (IMSR) by Howard et al.

(2000) to measure metacognition for 12-18 year olds was used. The IMSR, a 32 item self-report inventory, measure five factors related to metacognitive skills in the context of problem-solving: knowledge of cognition, objectivity, problem representation, subtask monitoring and evaluation. The IMSR uses a five-point Likert scale. The IMSR has been normed with this age group (9th graders) and there is published reliability and validity data to support it. A self prepared teacher competency tool including 54 items; on technical competency, on social competency and on affective competency was used. This tool also included 5 point response scale ranging from never to always (Kapadia, 2009).

Results after Analysis

Differences between means were calculated using the t-test and ANOVA; correlation between variables through simple correlation coefficient (r) and multiple regression analysis (R); and standard error of difference between Fishers' Z were ascertained. The analysis of the study is reported under three headings:

1. Difference in Metacognition on the basis of school types

No significant difference for the total metacognition scores between SSC, ICSE and CBSE students was obtained. This indicates that total metacognition of students studying in SSC, ICSE and CBSE schools do not differ. Metacognition is thus an all-pervasive ability. This shows that students belonging to different school types possess metacognition to the same extent.

However a significant difference was seen when the scores of SSC, ICSE and CBSE students were tested component-wise for metacognition. This indicates that SSC, ICSE and CBSE students significantly differ in their knowledge of cognition ($F=3.46$, $p=0.03$), objectivity ($F=6.43$, $p=0.00$), problem representation ($F=3.29$, $p=0.03$) and subtask monitoring ($F=4.53$, $p=0.01$). However they did not differ on the evaluation component of metacognition.

A subsequent t-test and mean scores showed that CBSE students scored better than SSC or ICSE students. In other words, CBSE students surpassed the SSC and ICSE students at objectively thinking about their learning as it proceeds ($t=2.57$, $p=0.01$), understanding the problem fully before proceeding to solve it ($t=2.57$, $p=0.01$) and at monitoring the choice of learning strategies ($t=2.57$, $p=0.01$) and completing each subtask ($t=2.57$, $p=0.01$). It was also clear that ICSE students were better at knowledge of their cognitive abilities than SSC students ($t=2.57$, $p=0.01$), while SSC students were better than ICSE students at objectively thinking about their learning as it proceeds ($t=2.57$, $p=0.01$).

2. Difference in Perceived Teacher Competencies on the Basis of School Types

No significant difference for total as well as component-wise teacher competencies scores for SSC, ICSE and CBSE students was obtained. This indicates that SSC, ICSE and CBSE students do not differ in their perception of total teacher competencies or of components of teacher competencies.

3. Correlation between Metacognition and Perceived Teacher Competencies: is discussed as
   a) Correlation between total metacognition and total teacher competencies scores.
   b) Correlation between total metacognition and components of teacher competencies scores.
   c) Correlation between components of metacognition and components of teacher competencies scores.

a) Correlation between Total Metacognition and Total Teacher Competencies Scores

A significant, positive, direct and substantial relationship between total metacognition and total teacher competencies scores was obtained for SSC (r=0.53, p=0.00), ICSE (r=0.38, p=0.00) and CBSE (r=0.29, p=0.00) students. A significant difference between the coefficients of correlation of total metacognition and total teacher competencies at 0.01 level was obtained for SSC-CBSE group of students only (Z= 2.81). The correlation between total metacognition and total teacher competencies was stronger for SSC students (r=0.53) than for CBSE students (r=0.29).

Table 1

Simple Correlation and Multiple Regression Analysis for Correlation between Total Metacognition and Components of Teacher Competencies on the Basis of School Types

Components of Teacher Competencies	*Group*	*Metacognition*	
		r	*β*
1. Social Competency	SSC	.474**	.001
	ICSE	.352 **	.017
	CBSE	.210 **	–.263
2. Technical Competency	SSC	.548 **	.457**
	ICSE	.406 **	.369**
	CBSE	.393 **	.692**
3. Affective Competency	SSC	.473 **	.116
	ICSE	.331 **	.028
	CBSE	.220 **	–.108
Multiple Correlation R	SSC		.553**
	ICSE		.406**
	CBSE		.439**
R^2	SSC		.306
	ICSE		.165
	CBSE		.193

N (SSC) = 433; N (ICSE) = 287; N (CBSE) =200 ** Correlation is significant at 0.01 level.

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 SSC, ICSE and CBSE students (Table 1). Significant multiple correlations (R) for total metacognition and components of perceived teacher competencies for school types 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 technical competency as the only significant predictor of total metacognition for SSC, ICSE and CBSE students.

A significant difference for correlation coefficients was obtained between total metacognition and all components of teacher competencies for SSC-CBSE group of students (Social competency, Z=3.48, at 0.01 level; Technical competency, Z=2.2, at 0.05 level; Affective competency, Z=3.47, at 0.01 level). A significant difference was also obtained between total metacognition and, technical competency (Z=2.35, at 0.05 level) and affective competency (Z=2.22, at 0.05 level) for SSC-ICSE group of students. The coefficients of correlation show that for SSC students there is a stronger correlation between metacognition and components of teacher competencies than for ICSE or CBSE students. The SSC students differ in their correlation with both ICSE and CBSE students.

Table 2

Simple Correlation and Multiple Regression Analysis for Correlation between Components of Metacognition and Components of Teacher Competencies on the Basis of School Types

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*	*β*	*r*	*β*	*r*	*β*
1. Social Competency	SSC	0.33**	.021	0.28**	–.013	0.44**	.071	0.37**	–.010	0.30**	–.047
	ICSE	0.16**	.008	0.24**	.012	0.23**	.030	0.26**	–.064	0.29**	.076
	CBSE	0.22**	–.00	0.02	–.305	0.14*	–.223	0.15*	–.230	0.17*	-.143
2. Technical Competency	SSC	0.37**	.321**	0.35**	.349**	0.48**	.304**	0.44**	.438**	0.34**	.242**
	ICSE	0.17**	.138	0.28**	.265*	0.28**	.330**	0.32**	.332**	0.31**	.212*
	CBSE	0.31**	.426**	0.13	.294*	0.28**	.527**	0.32**	.625**	0.30**	.511**

3. Affective Competency	SSC	0.31**	.052	0.27**	.018	0.44**	.150	0.35**	.018	0.33**	.186*
	ICSE	0.15**	.042	0.23**	.014	0.19**	–.085	0.26**	.055	0.27**	.046
	CBSE	0.19**	–.13	0.09	.112	0.15*	–.076	0.15*	–.148	0.17*	–.113
Multiple Correlation R	SSC		.381**		.351**		.494**		.444**		.364**
	ICSE		.181*		.287**		.293**		.323**		.319**
	CBSE		.326**		.204*		.327**		.377**		.333**
R^2	SSC		.145		.123		.244		.197		.132
	ICSE		.033		.082		.086		.104		.102
	CBSE		.106		.041		.107		.142		.111

N (SSC) = 433; N (ICSE) = 287; N (CBSE) = 200 **Significant at 0.01 level. *Significant at 0.05 level

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 scores was obtained for SSC, ICSE and CBSE students (Table 2). Significant multiple correlations (R) for components of metacognition and components of perceived teacher competencies for school types was 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 only technical competency as the significant and strong predictor of every component of metacognition for school types. Interestingly results revealed that for component of objectivity, affective competency emerges as a significant predictor along with technical competency for SSC students.

Table 3

Difference between Coefficients of Correlation for the Components of Metacognition and Components of Teacher Competencies on the Basis of School Types

Components of Metacognition / *Components of Teacher Competencies*	*Group*	*1 Knowledge of Cognition*		*2 Objectivity*		*3 Problem Representation*		*4 Subtask Monitoring*		*5 Evaluation*	
		r	*Z*	*r*	*Z*	*r*	*Z*	*r*	*Z*	*r*	*Z*
1. Social Competency	SSC	0.33	2.35*	0.28	0.65	0.44	3.13 **	0.36	1.43	0.30	0.13
	ICSE	0.16		0.24		0.23		0.26		0.29	
	SSC	0.33	1.39	0.28	3.13 **	0.44	3.83 **	0.36	2.67 *	0.30	1.62
	CBSE	0.22		0.02		0.14		0.15		0.17	

	ICSE	0.16	0.64	0.24	2.37 **	0.23	0.97	0.26	1.29	0.29	1.40
	CBSE	0.22		0.02		0.14		0.15		0.17	
2. Technical Competency	SSC	0.37	2.87 **	0.35	1.04	0.48	3.00 **	0.44	1.83	0.34	0.39
	ICSE	0.17		0.28		0.28		0.32		0.31	
	SSC	0.37	0.81	0.35	2.78 **	0.48	2.78 **	0.44	1.62	0.34	0.46
	CBSE	0.31		0.13		0.28		0.32		0.30	
	ICSE	0.17	1.61	0.28	1.72	0.28	0.00	0.32	0.00	0.31	0.10
	CBSE	0.31		0.13		0.28		0.32		0.30	
3. Affective Competency	SSC	0.31	2.22*	0.27	0.65	0.44	3.66 **	0.35	1.30	0.33	0.78
	ICSE	0.15		0.23		0.19		0.26		0.27	
	SSC	0.31	1.51	0.27	2.20 *	0.44	3.71 **	0.35	2.55 *	0.33	1.97*
	CBSE	0.19		0.09		0.15		0.15		0.17	
	ICSE	0.15	0.43	0.23	1.50	0.19	0.43	0.26	1.29	0.27	1.18
	CBSE	0.19		0.09		0.15		0.15		0.17	

N (SSC) = 433; N (ICSE) = 287; N (CBSE) =200 ** Significant at 0.01 level. * Significant at 0.05 level
r = Pearsons' Coefficient of Correlation. Z = Difference between Coefficients of Correlation

Difference between coefficients of correlation for components of metacognition and components of teacher competencies for different school types was significant for only certain components within some groups of students. The results showed that for the components of metacognition which differed significantly with certain components of teacher competencies, SSC students have a stronger correlation than ICSE or CBSE students. And CBSE students show a stronger correlation than ICSE students only for objectivity and social competency (Table 3).

As discussed previously for correlation between total metacognition and components of teacher competencies, the above results for components of metacognition and components of teacher competencies also show a stronger correlation between metacognition and teacher competencies for SSC students than ICSE or CBSE students. The results are thus robust and unambiguous.

Conclusion and Suggestions

- For metacognition on the basis of school types

The total metacognition of students did not differ on the basis of school types. However students of different school types differed on the basis of components of metacognition. This is possible, as students of different school types are exposed to different learning environments and taught by different teachers. Therefore, certain components of metacognition may be favoured in some school type while not in the other.

Students of CBSE School possess better metacognition than SSC or ICSE students. The above result indicates that both SSC and ICSE schools should assess the reason for their students falling behind CBSE

students in metacognition ability. Besides, many differences exist between the three school types. The researcher observed that the difference in curriculum could be important for difference in metacognition of CBSE students as compared to the other school types. Both the SSC and ICSE curriculum should be revised regularly and changes that support student's metacognition should be included. Updated syllabus and a challenging curriculum including several co-curricular and extracurricular activities mark a distinction between CBSE and SSC as well as ICSE schools.

- For perceived teacher competency on the basis of school types

Results show that students of all the school types, SSC, ICSE and CBSE, consider that their teachers are equally competent. They consider their teachers to possess social, technical as well as affective competencies. They perceive that their teacher motivates them, is approachable, is tolerant towards them, is unbiased, organises information for presentation, possesses content mastery as well as communication skills, is open to new ideas, appreciates and understands their feelings and has good self-esteem. This reveals that even though students study in different school types, their perception of their teacher is the same. The Indian culture reveres the teacher. This is possibly imbibed by the students even today. This could be the reason for getting such a result on analysis. Keeping this result in mind, teachers should introspect and improve their competencies.

- For correlation between metacognition and perceived teacher competency

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

The SSC students show a stronger correlation than CBSE students between total metacognition and total teacher competencies, possibly because; the SSC students are more dependent on their teachers than ICSE or CBSE students. The SSC school teachers should therefore rise to the occasion and enhance their competencies.

Technical competency was seen to be the only significant predictor of total metacognition as well as for each component of teacher competency for SSC, ICSE and CBSE 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 implies that the way in which the teacher transacts the curriculum is strongly related to students' metacognition.

Another interesting result revealed from multiple regression analyses is that for component of objectivity, affective competency emerges as a significant predictor along with technical competency for SSC students. This reveals that teachers who are open to new ideas, have compassion,

possess self-esteem and are aware of their feelings, influence the ability of students to evaluate, i.e., double check their problem-solving process to see if it is being done correctly. In other words, teachers perceived to possess affective competency, support similar behaviour in students. The teacher with affective competency is more compassionate; as a result the student feels at ease and does not feel scared to admit his mistakes. A mistake occurred can be corrected by trying to reflect and finding out the cause of the mistake. This helps the student to assess his own problem-solving process, furthering the development of metacognition in students.

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