METACOGNITIVE DIFFERENCES AMONG SECONDARY SCHOOL TEACHERS

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ABSTRACT

The present research examined difference between metacognition of English and science teachers in secondary schools. The sample of the study consisted of 100 English teachers and 100 science teachers. Metacognition of the teachers was measured using metacognitive awareness inventory. Results indicated that science teachers performed better than English teachers on metacognitive inventory. Results further indicated that teaching experience of teachers significantly accounted for difference in metacognitive awareness inventory (MAI) score of teachers. The research did not found any significant gender differences in the metacognitive awareness of teachers. It was recommended that more researches may be conducted on metacognition so that a clearer picture of its effects could be determined.

Keywords: Metacognition, secondary school teachers, Metacognitive teaching

INTRODUCTION

Literature

Metacognition can be loosely defined as "Thinking about thinking" but it is important not to be superficial about this complex form of higher-order thought. Metacognition involves not only the ability to think about One's cognitions, but also knowing how to analyze, to draw conclusions, to learn from, and to put into practice what has been learned (King,1999).

Empirical research has shown that metacognition has the potential to increase the meaningfulness of students' learning in different domains. As a result of these studies, educational researchers have investigated ways of teaching students to reflect on their knowledge and to use their cognitive resources strategically through metacognitive control.

Teaching metacognitively involves teaching with and for metacognition. Teaching with metacognition means teachers think about their own thinking regarding instructional goals, teaching strategies, sequence, materials, students' characteristics and needs, and other issues related to curriculum, instruction and assessment before, during and after lessons in order to maximize their instructional effectiveness. Teaching for metacognition means teachers think about how their instruction will activate and develop their students' metacognition, or thinking about their own thinking as learners (Hartman, 2001). Metacognition in Science Teaching and Learning includes both aspects: teaching for and with metacognition (Thomas, 2006).

Metacognition enables teachers to self-regulate their teaching activities, depending upon the specific students, goals and situation. It help the teachers to plan, monitor and evaluate/revise their thinking processes and products, and it also equip the teachers about what information/strategies/skills they have, when and why to use them, and how to use them. To

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teach intelligently, teachers should think metacognitively about instruction so they effectively manage their teaching and use instructional techniques strategically (Hartman, 2001).

Despite its importance the issue of teacher's metacognition is often not addressed explicitly in the literature. The majority of research conducted in relation to metacognition focuses on students thinking and learning process. Thus it would seem obvious that teachers would need to be in touch with their knowledge control and awareness of their own thinking and learning process.

Following the Flavell concept of metacognition, the researchers begin to investigate different aspects of metacognition. Research on metacognition sought to answer questions, such as (Thomas, 2006).

1. How does metacognition develop?
2. Can teaching of metacognition make a difference in learning?
3. Does teaching on metacognition lead to better regulation of one's cognitive activities?

Now a brief review of researches conducted in area of metacognition and teaching is presented as:

Gama (2004) cited that Palinesar and Brown (1984) developed a reciprocal teaching method for improving four metacognitive reading skills i.e; questioning, clarifying, summarizing and predicting. In this method a teacher and a group of students take turns leading discussions about specific segments of text using the metacognitive reading. Research findings revealed that teaching method leads students to eventually, apply the metacognitive reading strategies on their own, performing self regulation on their reading comprehension.

Another researcher, Elliott (1993) explored the effectiveness of metacognitively-rich teaching approach within the context of regular classroom teaching. Results indicated that children who participated in the metacognitively-guided mathematics sessions scored significantly higher on tests of mathematics achievement than children who participated in a "best practice" approach. Of particular interest was the positive effect of the metacognitive approach on children with low scores on a baseline test of mathematics achievement.

Cattell (1999) examined the effects of strategically teaching metacognitive skills to high medium and low achieving fourth grade students, and how it influenced their ability to comprehend grade level tests. Nine children participated in the experimental group, and nine were selected for the control group. A pre/post miscue test and comprehension evaluation was utilized to show individual growth, and gain scores were used to compare between the experimental and control groups. Results indicated that strategic teaching of metacognitive skills influenced a child's ability to comprehend grade level texts. Further analysis revealed that all students in the experimental group used one or more of the metacognitive skills to aid in their comprehension.

Cooper (2004) found no significant difference on metacognitive scores among teachers who teach different grade levels; however, further results indicated that metacognition scores improve with age and years of teaching experience.

Kramarski and Revach (2005) investigated the effects of general vs. specific metacognitive training on teachers' mathematical knowledge. Results indicated that the SMT teachers outperformed the general metacognitive training (GMT) teachers on various skills of solving mathematical real-life task, and pedagogical skills regarding planning a lesson. In addition, the specific meta-cognitive training (SMT) teachers exhibited more student-center discourse.

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It is necessary to design metacognitive activities that can be embedded into teaching context. Lin (2001) suggests that the design of such metacognitive activities should focus on both cognitive and social aspects of student development, including strategy training and creation of a supportive social environment for teaching knowledge about a specific domain and knowledge about the self as learner. Researchers have identified strategies that teachers can use to promote metacognition in the classroom.

OBJECTIVES

The main objectives were to:

1. Measure metacognition of the English and science teachers.
2. Examine the gender differences in metacognition of teachers
3. Find difference between metacognitive awareness of English and science teachers.

RESEARCH HYPOTHESES

There is a significant difference between Metacognitive awareness of English and science teachers.

H_0: There is no difference between metacognitive awareness of English and science teachers.

H_1: The average score of the science teachers on metacognitive inventory is higher than English teachers.

H_2: The average score of the English teachers on metacognitive inventory is higher than science teachers.

RESEARCH METHODOLOGY

This was a survey research. Metacognition of teachers was assessed using Dennison & Schraw (1994) metacognitive inventory. After getting a formal approval from the Directorate of Schools and Literacy department for the collection of data, consents were obtained from school principles explaining the purpose and requirements of the research through a letter. Then in a meeting with school teachers, the objectives of and application procedure was discussed. The instrument was administered by the researcher personally in all the schools. The respondents were asked to read the statements carefully and indicate their response by tick marking the appropriate box. Average completion time for the inventory was ten minutes.

Instrument of the Study

The researcher used Schraw and Dennison, 1994 Inventory because it is a reliable and valid instrument available. The inventory represents two component categories of metacognition, knowledge of cognition and regulation of cognition. The inventory was a five point likert scale ranging from "Always" to "Not at all" in which the participants were asked to tick appropriate box.

Participants

Multistage sampling technique was used. A total of 100 science teachers and 100 English teachers selected randomly. The teachers were selected from both boys and girls secondary schools equally.

Pilot Test of Instrument

A pilot test was conducted to find reliability and validity of metacognitive inventory. Ten teachers (5 science teachers and 5 English teachers) were selected as a sample for pilot test. For internal consistency Cronbach alpha and correlation coefficient were computed. Cronbach's Alpha value of the inventory was "0.875" (standardized reliability is 0.70) which indicated reasonable initial internal consistency for the whole scale as shown in the below table:

Table 1. Reliability Analysis of Teachers inventory

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*
.875	.902

ANALYSIS OF DATA

The data was analyzed using parametric and non parametric statistics. Table 2 represented mean score of science teachers and English teachers on different components of the metacognitive inventory. The table shows that science teachers have a higher mean score of 16.93, 42.80 and 28.41 on sub scales of conditional knowledge, management strategies and evaluation. While teachers of English have a higher mean score of 17.62, 26.28 and 21.94 on sub scales of procedural knowledge, declarative knowledge and evaluation.

Table 2. MAI score of teachers

Teacher		*Procedural Knowledge*	*Declarative Knowledge*	*Conditional Knowledge*	*Planning*	*Management Strategies*	*Evaluation*
Science Teacher	*Mean*	17.19	25.72	16.93	21.45	42.80	28.41
	N	100	100	100	100	100	100
	Std. Deviation	1.69	3.02	2.03	2.59	4.94	4.49
	Minimum	13.0	18.0	10.0	12.0	32.0	10.0
	Maximum	20.0	30.0	20.0	25.0	54.0	35.0
	Variance	2.88	9.15	4.15	6.69	24.44	20.14
English Teacher	*Mean*	17.62	26.28	15.86	21.94	42.360	28.07
	N	100	100	100	100	100	100
	Std. Deviation	1.66	2.45	2.42	2.53	4.72	3.81
	Minimum	14.0	19.0	11.0	11.0	31.0	16.0
	Maximum	20.0	30.0	20.0	25.0	54.0	35.0
	Variance	2.74	6.0	5.88	6.40	22.25	14.53

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Table 3. Comparison of mean score of science and English teachers

Teacher	*Statistics*	*Knowledge of Cognition*	*Regulation of Cognition*	*Teacher's MAI*
Science Teacher	Mean	59.84	92.66	152.50
	N	100	100	100
	Std. Deviation	5.96	9.0	13.31
	Minimum	42.0	63.0	116.0
	Maximum	70.0	114.0	181.0
	Variance	35.47	81.0	177.10
English Teacher	Mean	59.76	92.37	152.13
	N	100	100	100
	Std. Deviation	5.1	9.15	12.72
	Minimum	49.0	68.0	124.0
	Maximum	70.0	113.0	182.0
	Variance	25.9	83.81	161.79

The table 3 reveals that science teachers have a higher mean score of 59.8 and 92.7 on knowledge of cognition and regulation of cognition. Further the overall mean score of science teachers was higher than English teachers.

Table 4. Testing of Research Hypothesis

Independent Samples Test										
		Levene's Test for Equality of Variances		*t-test for Equality of Means*						
		F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std. Error Difference*	*95% Confidence Interval of the Difference*	
									Lower	*Upper*
Teacher's MAI	*Equal Variances Assumed*	.16	.69	.20	198	.84	.37	1.8	-3.26	4.0
	Equal Variances Not Assumed			.20	197.6	.84	.37	1.8	-3.3	4.0

Independent sample test was conducted to test hypothesis. The results of Levene's test narrates that F value was not significant (F = 0.16 at p = .692) as F value was lesser than significance value which shows that variances were homogeneous. Further the significance value .84 was greater than alpha (0.05) which revealed that there was no significant difference between metacognitive awareness of science and English teachers, t (198) = 0.20, p = .84. In this case the null hypothesis was accepted.

FINDINGS

1. Science teachers possessed a higher mean score on metacognitive inventory than English teachers though the difference was not significant.
2. The overall mean score of all male science teachers on metacognitive awareness inventory was also higher than overall mean score of all the female science teachers.
3. The mean score of science teachers on both the components (Knowledge of cognition and Regulation of cognition) of the inventory was higher than the teachers of English.
4. The science teachers have a higher mean score on the sub scales of conditional knowledge, management strategies and evaluation while teachers of English had a higher score on procedural knowledge, declarative knowledge and planning sub scale of the inventory.
5. The overall mean score of male teachers on metacognitive awareness inventory was higher than female teachers.

DISCUSSION

The results indicated that science teachers have a higher mean score on the metacognitive inventory than teachers of English, however this difference was not significant. It was revealed that male teachers possessed high mean score on the inventory but the study did not found any significant difference between metacognition of male and female teachers, thus the present study did not found any significant gender differences in metacognitive awareness. Similarly no significant difference was found in metacognitive awareness of urban and rural teachers. However, it is worthy to mention that urban teachers have a higher mean score than rural teachers on the overall inventory.

This research also has some limitations, which may require attention in future research. Firstly, the sample of the present study consisted of secondary schools teachers, so the inventory may be applied to all teachers at different level.

RECOMMENDATIONS

Following were the main recommendations:

1. Higher academic qualification of science teachers has a positive impact on the metacognition of teachers. Therefore the teachers may be encouraged to pursue higher qualification.
2. This was a correlation study based on quantitative data. The study was delimited to secondary school English and science teachers, therefore a study may be conducted on other subjects and level.
3. Qualitative Research is also needed to examine psychological factors affecting metacognition of teachers.

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