Research Article

METACOGNITION AND ACHIEVEMENT IN COMPUTER SCIENCE OF DEGREE STUDENTS

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Abstract

This paper reports on the metacognition and academic achievement of computer science students. The sample consisted of 59 B.Sc comptuter science students. A scale on Metacognition was used to get the data from the students. Percentage analysis, Pearson-Product moment correlation co-efficient. t-test, F-test and chi-square tests were used for analysing the data. The result shows that among the sample. there is a low negative correlation between the metacognition and achievement in computer science of degree students. Further, Female students have better metacognition than the male students, Government aided college students have better metacognition than the government college students, and students studying in women's college have better metacognition them the co-education college students.

Keywords: *Metacognition, Academic Achievement, Computer Science Students, Correlation Analysis, Gender Differences, Institutional Differences, and Higher Education.*

Introduction

Nowadays, metacognition is recognized as an important mediating variable for learning. Metacognitive knowledge was defined as the knowledge one has about the interplay between personal characteristics. task characteristics and the available strategies in a learning situation (I3rown. 1978, 1987; Flavell, 1987). Declarative metacognitive knowledge was found to be 'what' is known about the world and the influencing factors of human thinking (Jacobs & Paris. 1987, as cited in Marzano et al., 1988). Procedural metacognitive knowledge deals with the knowledge of 'how· skills work and how they are to be applied (Jacobs & Paris, 1987. as cited in Marzano et al., 1988).

For successful learning. learners cultivate a repertoire of metacognitive strategies that they apply when and as required by Different learning circumstances. Success hinges on the appropriate transfer of relevant strategies. Metacognitive strategy must take into account this transfer. Knowledge and control are the two consistent themes in metacognition. It involves knowledge and control of self and control of process respectively (Pa1is and Winograd as cited in Marzano et al., 1988).

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In Knowledge and Control of Self, successful students are aware of, monitor, and control their learning. Central to this knowledge of self and self- regulation are commitment, attitudes, and attention. Metacognition is at work in students who choose to commit themselves to tasks. Paris and Cross (1983) align "skill with will" which alone shows the level of commitment towards the successful completion of any task. According to Edward de Bono(as cited in Maclure and Davies, 1991) "Unless you know everything, what you need is thinking", which alone paves way to successful learning'. For successful learning and academic excellence knowledge of metacognitive strategies alone is not enough, it also depends on students being able to effectively control and monitors their learning. This in turn is influenced by the elements of metacognition, some of which are Metamemory, Meta comprehension, Self-regulation and Schema Training. Following are the some of the research studies done in metacognition: Annemie Desoete(2007), studied on evaluating and improving the mathematics teaching-learning process through metacognition and his study reveals that metacognitive skills were found to be trainable and students could learn to adopt a more orienting and self-judging learning approach. Sarah Schwarm et al.(2007)., studied on 'Using Classroom Assessment to Detect Students' Misunderstanding and Promote Metacognitive Thinking and the study reveals that instructor's perceptions of students' understanding changed through the use of Classroom Assessment Techniques(CATs), while CATs encouraged students to become more aware of their own learning. Christian et al. (2004) studied Metacognitive knowledge of writing: Students and individual differences. This study highlights the complex issue of

metacognitive knowledge of writing and of using such information to develop responsive instruction in writing for students with developmental disabilities and learning difficulties in inclusive classrooms. Giuseppe et al. (2006) studied on Surfing Hypertexts with a Metacognition Tool and the result reveals that the students in the experimental group improved their comprehension of the intrinsic structure of the hypermedia and created more accurate conceptual maps. Further, the students considered the system to be a useful self-monitoring tool. The trend analysis in this area shows that only a few studies have been done. Therefore, 'Metacognition and Achievement in Computer science of degree students' is been taken up for study.

Objectives of the study

1. To find out the level of meta-cognition among· computer science degree students.
2. To find out the level of academic achievement in computer science of degree .students
3. To find out the relationship between metacognition and academic achievement of computer science degree students

The above said objectives are achieved in terms of demographic variables: gender, type of the college, nature of the college, educational qualification of the parents and occupation of the parents

Null Hypotheses

1.1. There is no significant difference in meta-cognition of computer science degree students with respect to their

i. Gender

ii. Type of the college

iii. Nature of the college

1.2. There is no significant association in meta-cognition of computer science degree students with respect to their

i. Educational Qualification of Parents

ii. Occupation of Parents

2.1. There is no significant difference in the academic achievement of computer science degree students with respect to their

i. Gender

ii. Type of the college

iii. Nature of the college

2.2. There is no significant association in the academic achievement of computer science degree students with respect to their

i. Educational Qualification of Parents

ii. Occupation of Parents

3.1. There is no significant influence of meta-cognition on academic achievement of computer science degree students.

Method: Survey method of research was adopted for the study.

Sample: Randomly selected 59 first year computer science students from Rani Anna College of Arts and Science, Tirunelveli and St. John's College of Arts and Science, Palayamkottai were selected for the study.

Tool: Metacognition scale. developed by Annaraja(2007) was used for data collection.

Data Analysis: Percentage .. t- test, F- test, Chi square test and Karl Pearson product moment co-efficient of correlation •were used for analysing the data.

Table 1: Metacognition and Achievement in Computer Science Degree Students

S.No	Meta Cognition Level	No. of Students	%	Academic Achievement	No. of Students	%
1.	High	18	***30.5***	High	8	***13.55***
2	Moderate	27	***45.76***	Moderate	38	***64.40***
3.	Low	14	***23.72***	Low	13	***22.00***
4	Total	59	***100***	Total	59	***100***

It is inferred from the above table that 30.5% of computer science students have high meta-cognition, 45.76% of them have moderate meta-cognition and 23. 72% of them have low level of meta-cognition.

Further, it is inferred that 13;55% students have high Academic Achievement, 64.40% students of them have moderate and 22% of them have low level of academic achievement in computer science.

Table 2: Difference in Metacognition of Computer Science Degree Students

Factor		*N*	*Mean*	*S.D*	*t-Value*	*df*	*Remark**
Gender	Male	17	27.88	4.314	3.407	58	s
	Female	**42**	32.02	4.009			
Type of College	Co-education	**32**	33.59	2.394	6.652	58	s
	Women	27	27.56	4.173			
Nature of College	Govt.	32	33.59	2.394	6.652	58	s
	Govt. Aided	27	27.56	4.173			

* Significant at 0.05 level of t' value is 2.02

It is inferred from the above table that the calculated "t" values (3.407, 6.652) are greater than the table values of "t" (2.02). for 58 degrees of freedom. Hence the null hypotheses are rejected. Thus, there is a significant difference between male and female. government aided and government college students, women's and co-edification college students in their meta-cognition..

Table 3: Association between Metacognition of Degree Students and Educational Qualification and Occupation of their Parents

Factors		**Meta Cognition**				**df**	**Calculated chi-square Value**	**Re marks**
		Low	*Moderate*	*High*	*Total*			
Educational Qualification of Parents	Illiterate	4	10	7	21	4	4.942	NS
	School Education	6	15	10	31			
	College Education	4	2	1	7			
Total		**14**	**27**	**18**	**59**			
Occupation of parents	Coolie	15	16	7	38	4	4.545	NS
	Government Employee	2	7	5	14			
	Business	1	4	2	7			
Total		**18**	**27**	**14**	**59**			

*Significant at 0.05 level of c2 value is 9.488

It is inferred from the above table that the calculated 'x2' values (4.942 and 4.545) are less than the table value of 'x2' (9.488). Hence the null hypotheses are accepted. Thus there is no significant association between the Educational Qualification of the parents. Occupation of the parents and metacognition of computer science students.

Table 4: Difference !n Achievement of Computer Science Students

Factor		*N*	Mean	*S.D*	*t' value*	*Remark**
Gender	Male	17	5.88	2.088	**0.593**	Not Significant
	Female	42	5.52	2.144		
Type of College	Co-education	32	67.06	8.791	0.147	Not Significant
	Women	27	66.73	8.427		
Nature of College	Govt.	32	67.06	8.791	**0.147**	Not Significant
	Govt. Aided	27	66.73	8.427		

*Significant at 0.05 level of' value is 2.02

It is inferred from the above table that the calculated "t" values (0.593, 0.147, and 0.147) are less than the table values of "t" (2.02). Hence the null hypotheses are accepted. Thus, there is 1io significant difference between male and female students, government aided and government college students, women's and co-education college students' achievement in computer science.

Table 5: Association between Academic Achievement and Educational Qualification and Occupation of their parents

Factors		Academic Achievement				df	Calculated chi-square Value	Re marks*
		Low	*Moderate*	*High*	*Total*			
Educational Qualification of Parents	Illiterate	4	13	4	21	4	1.364	NS
	School Education	8	20	3	31			
	College Education	1	5	1	7			
Total		13	38.	8	59			
Occupation of parents	Coolie	8	'.26	4	38	4	4.775	NS
	Government Employee	5	7	2	14			
	Business	0	5	2	7			
Total		13	38	8	59			

*Significant at 0.05 level of c2 value is 9.488

It is inferred from the above table that the calculated 'x,2' values (1.364 and 4.775) are less than the table value of·'x,2' (9.488). Hence the null hypotheses are accepted. Thus there is

no significant association between the educational qualification of their parents, occupation of their parents and achievement in computer science of the degree students.

Table 6: Correlation between Meta Cognition and Academic Achievement Computer Science Degree Students

			*Remarks**
Meta cognition and Academic Achievement	df=57	r= -0.187	**NS**

* Significant at 0.05 levels is 0.250

It is inferred from the above table that the calculated 'r' value 0.168 is less than the table value of "r" (0.250). Hence the null hypothesis is accepted. Thus, there is no significant correlation between the brain dominance and academic achievement of computer science students.

Findings and Interpretations

1.1. The percentage of computer science students having high level o.f meta-cognition is 30.5;; 45.76% students have moderate level of meta -cognition

1.2. There is a significant difference between male and female computer science degree students in their meta-cognition. However, while comparing the mean values, female students (27.88) have better metacognition than the male students (32.02).

1.3. There is a significant difference between government aided and government college computer science degree students in their metacognition. However, while comparing the mean values, the government college students (33.59) have better greater level of meta-cognition than the government aided college students (27.56).

1.4. There is a significant difference between women's and co-education college computer science degree students in their meta-cognition. However, while comparing the mean values, the students studying in women's college (33.59) have better meta-cognition than the students studying in co-education colleges (27.56).

1.5. There is no significant association between the educational qualification of their parents, and meta-cognition of computer science degree students.

1.6. There is no significant association between occupation of parents and meta-cognition of computer science degree students.

2.1. 78.95% of students have high level of achievement in computer science.

2.2.There is no significant difference between male and female students in their achievement in computer science.

2.3. There is no significant difference between government and government aided college students' achievement in computer science.

2.4. There is no significant difference between the students from Women's and Co-education colleges in their achievement in computer science.

2.5. There is no significant association between academic achievement in computer science and educational qualification of the parents.

2.6. There is no significant association between academic achievement in computer science and Occupation of the parents.

3.1. There is no significant influence of meta-cognition on academic achievement in computer science of degree students.

Suggestions

We suggest the following activities to improve the meta-cognition of the computer science students

I. Since every individual has different levels of meta-cognition, the teachers in the colleges can emphasize on varied teaching or learning goals, and thus different activities can be derived for apparently the same educational tasks.

II. Opportunities should be given to the students, to plan appropriate activities and observing activities engaged by others with different values or socio-cultural backgrounds which will enable the students to reflect on their own goals.

III. Teachers can use c01nputers to improve their meta-cognition by giving them. A set of expe1iences with specific and rect1rrent events where personal decision making is required. Opportunities to appreciate what other sources of information are important to consider and to reflect on. This kind of meta-cognition is useful because, in many situations, especially in complex teaching situations, teachers often lack background information to know what solution can be sought and which strategies will work.

IV. Teachers must explain to learners about why, when, and how to use metacognitive strategies for successful academic achievement.

V. Intelligent Tutorial System and Blended Instruction can be adopted to foster the metacognitive strategies for learning among students.

References

1. Annemei Desoete, 2007, 'Evaluating. and improving the mathematics teaching-learning process through metac6gnition', Electronic Journal.' of Research in Educational Psychology, Nl3 Vol 5(3), pp:705-730

2. Brown, A.L. (1987).Metacognition, executive control, self-regulation, and other more mysterious mechanisms. In F.Reiner & R.Kluwe(Eds), Metacognition, motivation, and understanding(pp.65-116).Hillsdale, NJ:Lawrence Erlbaum.

3. Flavell,J.H.,(1987).Speculations about the nature and development of metacognition. In F.E.Weinert & R.H.Kluwe(Eds.). Metacognition, Motivation, and understanding (pp. 20-29). Hillsdale, NJ:Lawrence Erlbaum.

4. Maclure, S., & Davies, P. (Eds.). (1991). Learning to Think: Thinking To Learn. Oxford: Pergamon Press.
5. Marzano. R.J., Brandt, R.S., Hughes, C.S., Jones, B.F., Presseisen, B.Z.,Rankin, S.C., & Suhor, C. (1988). Dimensions of Thinking. Alexandria, VA:Association for Supervision and Curriculum Development. pp. 9-16.

Websites

1. Personal Efficacy: http://www.ncrel.orq/sdrslareas/issues /students! learning/ lr200.html
2. Strategies for developing metacognitive behaviors: http://www.valdosta. peachnet.edu/ ~whuitt/ psy702/digests/ metacogn.dig
3. Teaching Thinking: An Introduction to the Research Literature: http:// www. ed.ac. uk/~webscre/Spotlight26.html
4. Teaching Thinking Skills: http://www.nwrel.org/scpd/sirs/6/cul l.html