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INTERACTIVE EFFECT OF META-COGNITIVE STRATEGIES-BASED INSTRUCTION IN MATHEMATICS AND SOCIO-ECONOMIC STATUS OF STUDENTS ON THEIR ACADEMIC ACHIEVEMENT

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Short Profile

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ABSTRACT:

This paper attempts to ascertain the interactive effect of meta-cognitive strategies-based instruction in mathematics and socio-economic status on academic achievement of students. For this purpose, an intervention programme based on meta-cognitive strategies of about 35 hours was developed for students of standard eighth spreading over eight weeks. The aim of the research was to ascertain whether meta-cognitive strategies-based instruction facilitates the academic achievement of students, and if so, for which level of socio-economics status of students. Structured tools were used in study. The participants of the study included 62 and 60 students in the experimental and control groups respectively. Students were found to be significantly influenced by the intervention programme as well as their socio-economic status. The effect size of the intervention programme on academic achievement of students was found to be1.01 which is high in magnitude and that of the socio-economic status was found to be 0.69 which is moderate in magnitude. It also needs to be mentioned that a students' socio-economics status had an effect on their academic achievement.

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KEYWORDS

Meta-cognitive strategies, Academic achievement, Socio-economic status.

INTRODUCTION

According to the PISA (2012), the economic status of a student's family has an impact on academic success. The results of this study showed that this relationship is positive, although complicated. It can be said that those students with families who are financially in a good condition are more successful compared to those who are not. The students with more affluent families obtain better grades compared to those with poorer families. As a result of the social policies embraced by some OECD countries, financial state does not pose a barrier against success. Students with families in the worst financial conditions display the highest success in Finland and Japan. Children with higher SES backgrounds were more likely to be proficient on tasks of addition, subtraction, ordinal sequencing and mathematics word problems than children with lower SES backgrounds (Coley, 2002). Children from low-SES environments acquire language skills more slowly, exhibit delayed letter recognition and phonological awareness and are at risk for reading difficulties (Aikens & Barbarin, 2008). Students from low-SES schools entered high school 3.3 grade levels behind students from higher SES schools.

Rationale of the Study :Meta-cognitive strategies-based instructional programme could be used for enhancing academic achievement of the students. Meta-cognitive strategies-based instructional programme could include different activities, based on think aloud or self- reflection wherein students can share their difficulties with teacher or with peers and resolve their problems. It is expected that socio-economic status of a student will interact with the intervention programme and influence academic achievement of students.

REVIEW OF RELATED LITERATURE

Academic Achievement and Socio-Economic Status: Dowson (1998) studied age, gender, cultural and socio-economic differences in relation to middle school students' motivational goal orientations, their cognitive and meta-cognitive strategies and their academic achievement in a variety of curriculum domains. Results suggest that differences in each of the variables of age, gender, cultural background and socio-economic status are strongly related to differences in students' academic motivation, cognition and achievement. Duke (2000) found that achievement of students is negatively correlated with low SES level of parents because it hinders the individual in gaining access to sources and resources of learning. Sander (2001) found that low SES level strongly affects the achievement of students, dragging them down to a lower level. Constantino (2005) examined six communities in greater Los Angeles and California area and found that children in high-income communities had access to significantly more books than children in low-income communities did. In fact, she found that in some affluent communities, children had more books in their homes than low-SES children had in all school sources combined. Milne and Plourde (2006) identified six 2nd graders who came from low-income households but demonstrated high achievement and found that these children's parents provided educational materials, implemented and engaged in structured reading and study time, limited television viewing, and emphasized the importance of education. The researchers concluded that many of the factors of low socio-economic status that negatively affect students' academic success

which could be overcome by better educating parents about these essential needs.Garzon & Kahlenberg(2006) studied students with high level of SES perform better than the middle class students and the middle class students perform better than the students with low level of SES. Aikens & Barbarin (2008) found that initial academic skills are related to home environment, where low literacy environments and chronic stress negatively affect a child's pre-academic skills. The school systems in low-SES communities are often under-resourced negatively affecting students' academic progress. Inadequate education and higher dropout rates affect children's academic achievement, perpetuating the low-SES status of the community. Improving school systems and early intervention programmes may help to reduce these risk factors and thus further research on the correlation between SES and education is essential.Sami (2009) studied elementary students' meta-cognition and epistemological beliefs with reference to science achievement, gender and socio-economic status.Morgan, Farkas, Hillemeier and Maczuga (2009) examined children from low-SES households and communities in relation to development of academic skills and found that these develop more slowly among students from low SES households compared to children from higher SES groups. Rekha (2013) studied the relationship of meta-cognition of undergraduate students in relation to demographic variables like gender, place of living, academic achievement and parents' education. This study suggested that learners understand and regulate their own thinking process to resolve the real life complexities.Abolmaali's (2014) study explained academic achievement of students based on the personality characteristics, the psycho-social climate of the classroom in terms of academic engagement in mathematics.

ACADEMIC ACHIEVEMENT AND META-COGNITION

Coutinho (2007) studied the relationship between goals, meta-cognition and academic success .This study examined the relationship between mastery goals, performance goals, meta-cognition and academic success. Regression analyses revealed a partial mediation effect in the relationship between mastery goals and academic performance. Performance goals were unrelated to academic performance. This study supports research findings suggesting that students with mastery goals reap the rewards of academic success. Kummin & Rehman (2010) studied the relationship between the use of meta-cognitive strategies and achievement in English. Theuse of meta-cognitive strategies affects achievement in English language. The majority of weak students lack the basic meta-cognitive strategies. Gul (2012) studied the relationship between meta-cognition, goal orientation and academic achievement. The results showed that there was a moderate relationship between meta-cognition and goal orientation and academic achievement but weak relationship was found between meta-cognition and achievement.

OPERATIONAL DEFINITIONS OF THE TERMS

Meta-Cognition: Meta-cognition refers to a learner's awareness of his/her own knowledge and cognitive processes and ability to understand, control and manipulate his/her own cognitive processes. Meta-Cognitive Strategies :Meta-cognitive strategies refers to methods used to help students understand the way they learn and refers to the processes designed for students to manage, monitor and evaluate their learning and 'think' about their 'thinking'.

Socio-Economic Status: It refers to the extent of wealth, power and prestige enjoyed by a student's family.

Academic Achievement: Academic achievement refers to the marks obtained by a student in mathematics on a researcher-made test based on the specific content selected for the study.

Statement of the Problem: Interactive Effect of Meta-cognitive Strategies-based Instruction in Mathematics and Socio-Economic Status of Students on their Academic Achievement.

SCOPE AND DELIMITATIONS OF THE STUDY

In the present study, English medium schools from Greater Mumbai affiliated to the SSC board have been included. It excludes schools with other media of instruction such as Marathi, Hindi, Urdu, Gujarati etc. The present study includes eighth standard students from English medium schools situated in Greater Mumbai. Students from other primary and secondary classes have been excluded. It also excludes schools affiliated to ICSE or CBSE boards. The present research studied the interactive effect of meta-cognitive strategies-based instructional mathematics and socio-economic status on academic achievement of students. It has excluded other student-background variables from its purview. The study has adopted the quantitative approach to the study rather than the qualitative approach. It has excluded the qualitative approach.

Aim of the Study: To ascertain the interactive effect of the intervention programme and socio-economics status of students on their academic achievement.

OBJECTIVES OF THE STUDY

1.To ascertain the interactive effect of the intervention programme and socio-economic status on academic achievement of students.
2.To compute the effect size of the intervention programme and socio-economic status on academic achievement of students.

NULL HYPOTHESES OF THE STUDY

Following are the null hypotheses of the study:

1.There is no significant the interactive effect of the intervention programme and socio-economic status on academic achievement of students.

METHODOLOGY OF THE PRESENT STUDY

The study has adopted the quasi- experimental method. In the present research, the quasi-experimental design of the pre- test post-test, non-equivalent group type was used. It can be described as follows:

The pre-test-post-test non-equivalent groups design:

O1X O2 O3 C O4

Where,
O1 and O3: Pre-test Scores & O2 and O4: Post- test Scores
X : Experimental Group & C : Control Group

The duration of the intervention programme was 35 hours in the experimental group. The control group was taught using the traditional method.

Sample of the Study: In the present study, the sample has been selected consisting of one intact class each of standard eighth from two different schools situated in the Greater Mumbai. The experimental and the control groups included 62 and 60 students respectively.

Tool of the Study: In the present study following tools was used by the researcher to collect data:

1.Academic achievement test prepared by researcher Ingole(2013)
2.Socio-economic status prepared by Patel (1997)

Intervention Programme : The duration of the intervention programme is 35 hours. The control group was taught using the traditional method. And experimental group was taught by using intervention programme, which was divided in two levels. The first level included kknowledge about cognition, which was checked through KWL Chart and the second level included regulation about cognition which consisted of three steps, namely, planning (understanding the problem, devising a plan, carrying out the plan and looking back), monitoring (self-awareness of one's thought processes), control (self-monitoring of one's thought processes, beliefs and intuitions about one's cognition) and evaluation (problems on the topic and self -reflection sheet).

Techniques of Data Analysis: The present research used statistical techniques of ANOVA and Wolf's formula.

DATA ANALYSES

Null Hypothesis 1: There is no significant the interactive effect of the intervention programme and socio-economic status on academic achievement of students.

This hypothesis was tested using two-way ANOVA in which the pre-test scores of students is controlled. The following table shows the relevant statistics of academic achievement of students by treatment and socio-economic status.

Table 1 : Relevant statistics for ANOVA

	SOCIO-ECONOMIC STATUS			
	LAW SES (LSES)	**MODERATE SES (MSES)**	**HIGH SES (HSES)**	**Total**
	N	**N**	**N**	**N**
CG	15	29	16	60
EG	14	32	16	62
	29	61	32	122
	Mean	**Mean**	**Mean**	**Mean**
CG	9.26	9.27	10.56	9.61
EG	14.71	14.28	15.18	14.61
Total	11.89	11.90	12.87	12.15

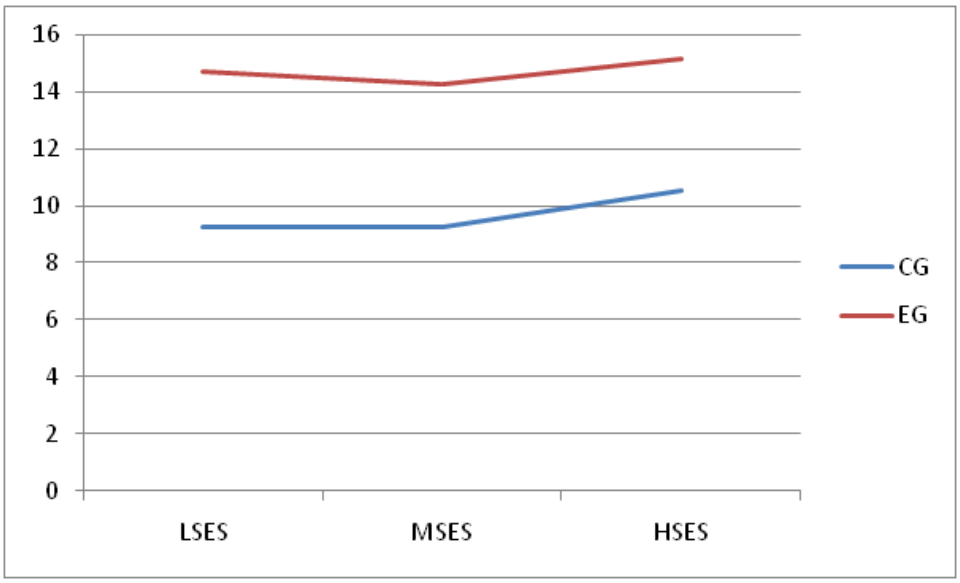
The following table shows the ANOVA for academic achievement of students by intervention programme and SES after partial ling out the effect of the pre-test AAS of students.

Table 2: ANOVA for AAS of students by treatment (T) and socio-economic status(SES)

Source	SS	Df	MS	F	P
Rows (T)	761.15	1	761.15	82.64	<.0001
Column (LA)	22.44	2	11.22	1.22	0.299
Interaction (TxLA)	6.02	2	3.01	0.33	0.7196
Error	1068.43	116	9.21		
Total	1858.04	121			

The preceding table shows that (a) the F-ratio for rows i.e. intervention programme is significant at <0.0001. Hence it may be concluded that the Mean AAS of the experimental group is significantly greater than that of the control group. (b) The F-ratio for columns i.e. socio-economic status is not significant at 0.05 level. Hence it may be concluded that the Mean AAS does not differ significantly on the basis of socio-economic status of students. (c) The F-ratio for interaction effect of intervention programme and socio-economic status is not significant at 0.05 level. Hence it may be concluded that the Mean AAS of students do not differ on the basis of the interaction between intervention programme and socio-economic status of students.

The following figure shows the differences in the Mean AAS of students on the basis of treatment and SES of students.



The effect size of the independent variables was computed using Wolf's formula and was found to be 1.01 (high) for the intervention programme.

CONCLUSION:

It may be concluded that the Mean AAS of students of the experimental group is significantly greater than that of the control group. Thus, the meta-cognitive strategies-based instructional programme was found to be effective in enhancing academic achievement of students with high, moderate and low socio-economic status. The SES of the students was not found to influence the academic achievement of students.

DISCUSSION :

The treatment i.e. the intervention programme developed by the researcher is found to be effective for enhancing academic achievement of students. The literature review indicated that the roles that teachers play in the academic achievement are paramount in student success. This study could serve as a contribution to educational research that will help to enrich the teaching and learning practices with the help of meta-cognitive strategies based instruction that may increase the academic performance of students for students with different levels of socio-economic backgrounds.

Moreover, with concerns among educational practitioners in general about the gaps in achievement among control groups, this study has shed light on different meta-cognitive strategies for participating students that can be utilized readily in an effort to increase the academic achievement of students for different socio-economic groups and ultimately contribute to teaching practices that could facilitate academic achievement of students. In sum, the results of this study could provide a framework for educators to implement best practices that will lead to increasing academic achievement of students and help to close the education gap that persists.

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