

ACHIEVEMENT IN MATHEMATICS OF NINTH CLASS PRIVATE SCHOOL STUDENTS IN RELATION TO THEIR CLASSROOM ENVIRONMENT

Dr. Kiranjit Kaur*

ABSTRACT

The present study examines the achievement in mathematics of ninth class private school students in relation to their classroom environment. The findings were based on the responses of 472 private school adolescents (231 males and 241 females) selected from ten private schools of Chandigarh. Classroom environment Scale developed by Moos and Trickett (1987) and Mathematics Achievement test developed and standardized by the investigator were used for data collection. Results show that achievement in mathematics of adolescents studying in private schools has a significant and positive relationship with various dimensions of classroom environment i.e. involvement, affiliation, teacher support, competition, order and organization, rule clarity, innovation, and class room environment (total) except task orientation and teacher control dimensions of classroom environment. The study concluded that there is significant difference in achievement in mathematics of ninth class private school students in relation to their perception of classroom environment except teacher control dimension of classroom environment.

Keywords : Achievement, Mathematics, Classroom Environment

Introduction

As mathematics is the gatekeeper of many careers, good performance in mathematics is needed at all levels of school education. In spite of all this importance given to mathematics in the society, there exist low levels of mathematics attainment of students at every level of the education. This has given many educators/stakeholders a high level of concern (Ajayi, Lawani, & Adeyanju, 2011). Its knowledge is essential for the understanding of various other subjects and living life better. Mathematics being an important and compulsory subject in the school curriculum remains a potential area of research work.

Classroom Environment

A positive classroom environment is an essential component of teaching and learning. Classroom is a place for teaching and learning activities in the formal education system. The ambience of the classroom influences the learning process. A classroom is a warm, pleasant and cordial interactive place not only with the teachers but also with peers. It is a place where the learners can feel welcomed, valued, useful, challenged, respected and physically and psychologically safe. It is a structured, organized and efficient place for creating learning environment (Ramalingam, 2013).

*Assistant Professor, DevSamaj College of Education, Chandigarh

The basic purpose of any educational institution should be to provide an environment favorable to learning as reflected in its milieu or ethos or tone or culture. The environment is both physical and mental. The Secondary Education Commission (1952-53) states that the first concern of the school should be to provide for its pupils a rich, pleasant and stimulating environment which will evoke their manifold interests and make life a joyful experience. A positive learning environment can shape students' outcomes in cognitive, motivational, affective, and behavioral domains (Fraser & Fisher, 1982).

Dimensions of classroom environment

Fraser, Fisher and McRobbie (1996) have given the following psychosomatic aspects of classroom environment :

- 1) Student cohesiveness: It is the amount to which students recognize, help and provide support to one another.
- 2) Involvement: It is the extent of student's interest in classroom activities, including participation in discussion, doing extra work and enjoying the group.
- 3) Teacher support: It is the teacher's support level that helps students, relates to how much the teacher interacts with students, trusts them and is interested in them.
- 4) Task orientation: It is the amount to which it is important to complete planned activities and to stay on the subject.
- 5) Investigation: It is the extent to which there is prominence on the skills and their use in problem solving.
- 6) Cooperation: It is the extent to which students cooperate rather than compete with one another on all the learning tasks.
- 7) Equity: It is the extent to which the teachers take care of students equally.

The classroom environment is considered by Haladnya, Shaughnessy and Shaughnessy (1983) to be among the most powerful indicators of student outcomes. If this

is so then what happens within the classroom environment is crucial to pupil accomplishment. The classroom environment comprises a number of elements and dimensions (Mackay, 2006). Fraser (1994) describes these as a subtle concept, not only including participants' perceptions and experiences within that environment but also their relationships with each other. In fact, the classroom environment effects were considered by O'Reilly (1975) to be a stronger influence on attainment than on pupils' personal and social characteristics. Effective mathematics education requires strategies that engage and motivate learners, that help students develop positive attitude about themselves and about mathematics and that encourage learners to make positive contributions to the

learning environment (Ontario Principals' Council, 2009).

According to Standards for Teaching Mathematics (NCTM, 1991), "Creating an environment that sustains and promotes mathematical reasoning and cultivates all students' competence with, and outlook towards mathematics should be one of the teacher's main concerns. The nature of this type of environment is formed by the kinds of mathematical tasks and discussion in which students participate."

NCTM (1991) further suggests that the teacher of mathematics should create a learning environment that encourages the development of each student's mathematical reasoning power by :

- Providing and constituting the time necessary to explore mathematics and tackle with significant ideas and problems.
- Using the space and resources in ways that facilitate students' mathematics learning.
- Providing a framework that encourages the development of mathematical skill and ability.
- Respecting and giving worth to pupils' ideas, ways of thinking, and mathematical outlook,
- By constantly encouraging pupils to work independently or in collaboration to make sense of mathematics.
- Take intellectual risks by raising questions and formulating inferences, and
- Exhibit a sense of mathematical ability by authenticating and supporting ideas with mathematical argument.

Review of related studies

Chionh, Fraser and Berry (2009) investigated the relationship between classroom environment and students outcome and reported that better examination scores were found in classrooms with more student cohesiveness whereas self-esteem and attitudes were more favorable in classrooms with more teacher support, task orientation and equity. Differences between the classroom environment of Geography and Mathematics classes were small relative to the large differences between student's actual and preferred classroom environment.

Michelle (2009) studied the influence of classroom climate on student's mathematics self-efficacy and achievement and found significant correlations among classroom climate, mathematics self-efficacy, and mathematics achievement. Unlike the single-level analysis, the HLM results did not conclude that classroom climate had a direct effect on mathematics achievement. In addition, results indicated that classroom climate, accounting for mathematics self-efficacy, explained 11.3% of the between-classroom level variance in mathematics achievement.

McKay (2012) examined the relationship between classroom climate and student mathematics achievement and concluded that school type was significantly correlated to student mathematics achievement scores but gender was not found to be significantly correlated to student mathematics performance and the other climate variables contributed very little to influence students' math scores.

Murugan and Rajoo (2013) studied perceptions of students' studying in Sipitang, Sabah, Malaysia with regard to mathematics classroom environment and mathematics achievement. Findings showed the students had a moderate perception of their mathematics classroom environment. Mathematics achievement was low, with female students achieving better than males in their mathematics assessment. There was no significant difference in perception of mathematics learning environment based on gender. No significant correlations were found between mathematics classroom learning environment and mathematics achievement.

Objectives

1. To find out the relationship of achievement in mathematics of ninth class private school adolescents with classroom environment.
2. To study achievement in mathematics of ninth class private school adolescents in relation to classroom environment.

Hypotheses

1. There exists significant positive relationship of achievement in mathematics with classroom environment of ninth class adolescents studying in private schools.
2. There exists significant difference in achievement in mathematics of ninth class private school adolescents in relation to classroom environment.

Design of Study

A systematic procedure to collect data, which helps to test hypotheses of the study under investigation, was adopted. The method was essentially descriptive survey method.

Sample

In the present study, 472 private school adolescents (241 males and 231 females) were selected from ten private schools of Chandigarh. The ninth class students were taken. Two-stage random sampling technique was employed.

Tools Used

The following tools were used to collect data :

1. Classroom environment Scale by Moos and Trickett (1987).
2. Mathematics Achievement test developed by the investigator.

Statistical techniques

To analyze the data statistically Mean, Standard Deviation, t-ratio and coefficient of correlation were computed and the results were interpreted accordingly.

Table 1: Correlation of Achievement in Mathematics with Different Dimensions of Classroom Environment of Ninth Class Adolescents Studying in Private Schools (N=472)

Variables	Achievement in Mathematics
Classroom Environment	
Involvement	0.179**
Affiliation	0.185**
Teacher support	0.198**
Task orientation	0.085
Competition	0.176**
Order and organization	0.160**
Rule clarity	0.118*
Teacher control	0.044
Innovation	0.117*
Classroom environment(total)	0.269**

**** Significant at 0.01 level * Significant at 0.05 level**

Table 1 shows that achievement in mathematics of adolescents studying in private schools has a significant and positive relationship with various dimensions of classroom environment i.e. involvement, affiliation, teacher support, competition, order and organization, rule clarity, innovation, and class room environment (total). Whereas there is no significant relationship of achievement in mathematics with task orientation and teacher control dimensions of classroom environment.

As there is a positive and significant correlation between achievement in mathematics and involvement dimension of classroom environment, this suggests that adolescents scoring high in involvement dimension of classroom environment also score high in mathematics achievement. This implies that the more the adolescents are interested and attentive in classroom activities and participate in class discussions, the higher is their

achievement in mathematics. Also, significant and positive relationship of affiliation dimension of classroom environment with mathematics achievement suggests that the more the students feel friendly for each other, and help each other in home work, the higher is their achievement in mathematics.

A positive and significant correlation between teacher support dimension of classroom environment and mathematics achievement of adolescents studying in private schools indicates that those adolescents, who are supported and trusted by teacher, score higher in mathematics. Also, there is a positive and significant relationship of competition dimension of class room environment with mathematics achievement of adolescents. This suggests that the more the students compete with each other for grades and recognition and work hard to achieve good grades, the higher mathematics achievement they have. In other words, the higher the competitive spirit among adolescents, the higher is their achievement in mathematics. A positive and significant correlation of achievement in mathematics and order and organization dimension of classroom environment of adolescents studying in private schools indicates that those adolescents who behave in an orderly and polite manner and organize assignments in an effective way, achieve high in mathematics.

A positive correlation between rule clarity dimension of classroom environment and mathematics achievement of adolescents studying in private schools suggests that those adolescents who follow a clear set of rules in the classroom, have high achievement in mathematics. Similarly, a positive and significant correlation between innovation dimension of classroom environment and mathematics achievement of adolescents indicates that adolescents of those classes where more innovative techniques are used by teachers to encourage creative thinking, among adolescents, score higher in mathematics.

The results entered in Table 1 further show a positive and significant relationship between total classroom environment and mathematics achievement. This suggests that favorable classroom environment facilitates the pupil's progress in mathematics. As there is no significant relationship of achievement in mathematics with task orientation and teacher control dimensions of classroom environment, it suggests that emphasis laid on completing planned activities and strict teacher control in the classroom do not effect mathematics achievement of private school students. On the basis of above discussion of results, it can be concluded that mathematics achievement of adolescents studying in private schools is significantly related with various dimensions of classroom environment i.e. involvement, affiliation, teacher support, competition, order and organization, rule clarity, innovation and total classroom environment except task orientation and teacher control dimensions of classroom environment. Hence, the Hypothesis 1 namely, "There

exists significant positive relationship of achievement in mathematics with perception of classroom environment of ninth class adolescents studying in private schools," has been accepted to a great extent.

Table 2 : Mean Differentials in Achievement in Mathematics of Ninth Class Private School Adolescents with Low and High Scores in Different Dimensions of Classroom Environment

Dimensions of Classroom Environment	M ₁ (N=127)	M ₂ (N=127)	SD ₁	SD ₂	t- value	Level of significance
Involvement	35.69	43.66	12.68	12.07	5.12	0.01
Affiliation	35.09	43.22	13.23	11.60	5.20	0.01
Teacher support	35.33	43.02	12.81	11.21	5.08	0.01
Task orientation	35.39	41.06	13.37	12.58	3.47	0.01
Competition	35.68	41.86	13.66	12.58	3.75	0.01
Order and organization	34.98	42.58	12.88	11.71	4.91	0.01
Rule clarity	36.36	41.00	13.31	12.07	2.90	0.01
Teacher control	38.00	39.57	13.07	13.19	.955	NS
Innovation	36.20	39.84	13.71	13.07	2.16	0.05
Classroom environment (total)	33.31	42.98	12.98	12.07	6.14	0.01

M₁ = Mean mathematics achievement scores of private school adolescents with low scores in different dimensions of classroom environment.

M₂ = Mean mathematics achievement scores of private school adolescents with high scores in different dimensions of classroom environment.

SD₁ = Standard deviation of mathematics achievement scores of private school adolescents with low scores in different dimensions of classroom environment.

SD₂ = Standard deviation of mathematics achievement scores of private school adolescents with high scores in different dimensions of classroom environment.

Results entered in Table 2 show that the mean differentials calculated between the mean scores of achievement in mathematics of private school adolescents with low and high scores in different dimensions of classroom environment, i.e. involvement, affiliation, teacher support, task orientation, competition, order and organization, rule clarity, and class room environment (total) were significant at .01 level of significance and mean differential with respect to innovation dimension of classroom environment was significant at .05 level of significance. However, the calculated t -value between the two groups with regard to teacher control dimension was not significant.

The mean score of mathematics achievement of adolescents with high scores in involvement dimension of class room environment is higher than those with low scores in this dimension. This suggests that the adolescents who are more interested and attentive in classroom activities score higher in mathematics than their counterparts with low scores in this dimension.

Further, the mean score of achievement in mathematics of adolescents with high scores in affiliation dimension of class room environment is higher than those with low scores in this dimension. This suggests that achievement in mathematics of the adolescents, who are more friendly with each other, help each other in home work, and enjoy working together, is higher than their counterparts who are less friendly and do not enjoy working together.

Results reported in Table 2 further show that the mean mathematics achievement score of adolescents with high scores in teacher support dimension of class room environment is higher than those with low scores in this dimension. This suggests that those adolescents, who are supported and trusted by the teacher more, score higher in mathematics than their counterparts with low scores in this dimension.

The mean score of mathematics achievement of adolescents with high scores in task orientation dimension of class room environment is higher than adolescents with low scores in this dimension. This suggests that mathematics achievement of the adolescents of private schools where more emphasis is laid on completing planned activities in the classroom, is better than those of with low scores in this dimension. The higher mean score of achievement in mathematics of private school adolescents with high scores in competition dimension of class room environment than those with low scores in this dimension suggests that achievement in mathematics of the adolescents who compete more with each other for grades and recognition, and work harder to achieve good grades, is better than their counterparts i.e. those who lack competitive spirit.

Table 2 further shows that the mean score of achievement in mathematics of adolescents with high scores in order and organization dimension of class room environment is higher than those with low scores in this dimension. This suggests that achievement in mathematics of those adolescents who are more orderly and organized and organize the classroom assignments more effectively, is higher than their counterparts. Further, the mean score of achievement in mathematics of private school adolescents with high scores in rule clarity dimension of class room environment is higher than adolescents with low scores in this dimension. This suggests that

achievement in mathematics of the adolescents who follow a clear set of rules in the classroom is higher than those who lack it.

The mean score of achievement in mathematics of adolescents with high scores in innovation dimension of class room environment is higher than those with low scores in this dimension. This suggests that achievement in mathematics of adolescents, where more innovative techniques are used by teachers to encourage creative thinking among adolescents and plan classroom activities, is higher than their counterparts.

In addition, the mean scores of achievement in mathematics of private school adolescents with high scores in total classroom environment is higher than the mean scores of adolescents with low scores in total classroom environment. This suggests that achievement in mathematics of the adolescents who perceive classroom environment more positively is better than their counterparts. However, the mean differentials with regard to teacher control dimension of classroom environment was not significant at any level of significance. This implies that strict teacher control does not affect mathematics achievement of private school adolescents.

On the basis of above discussion of results, it can be concluded that achievement in mathematics of private school adolescents, who show more interest and attention in classroom activities, enjoy working together, are supported and trusted by teacher, complete planned activities, compete with each other for grades and recognition, work hard to achieve good grades, organize assignments and classroom activities, follow a clear set of rules, and contribute in planning classroom activities, is better as compared to their counterparts. Hence, Hypothesis 2, namely, "There exists significant difference in achievement in mathematics of ninth class private school adolescents in relation to their perception of classroom environment." has been accepted to a great extent.

Conclusion

To conclude it must be said that mathematics achievement of adolescents has a significant and positive relationship with classroom environment, therefore for effective learning of mathematics there must be proper physical as well as psychological arrangements. To facilitate students' achievement, teacher should create productive learning environment by focusing on things that can be altered such as increasing students' motivation and encouraging group development and participation.

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