Student Achievement and Associated Factors

A study of Class X CISCE students, based on the secondary analysis of data of the National Achievement Survey (NAS Cycle – 1), conducted by NCERT

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Research Development and Consultancy Division

Council for the Indian School Certificate Examinations
New Delhi

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FOREWORD

Improvement of student performance and achievement of learning outcomes is one of the primary goals of any educational system. Collection, analysis and utilisation of data is central to any such endeavour.

The National Achievement Survey (NAS) - Class X, which was conducted by the National Council of Educational Research and Training (NCERT) in the year 2015, to test achievement levels of Class X students in the subjects English, Mathematics, Social Science, Science and Modern Indian Languages, had placed ICSE students above students of all other school boards in the country. The present study, which is based on the data of the Council affiliated schools that had participated in the NAS - 2015, goes a step further to analyse various background factors related to the participating schools, students and teachers, along with subject wise performance of students in different areas.

I take this opportunity to thank Prof. H.K. Senapati, Director, NCERT for making the data of the National Achievement Survey (NAS) Cycle – 1, available to us. I would like to thank Prof. Y. Sreekanth and Dr Sayta Bhushan from Educational Survey Division (ESD) of NCERT for their support. I would also like to congratulate Mrs Shilpi Gupta, Deputy Head – RDCD for bringing out this study.

Mr. Gerry Arathoon

April 2018   Chief Executive & Secretary

PREFACE

The Council has a large repository of data related to the ICSE and the ISC Examinations. This data provides valuable information on the subjects taken up by schools for the Examinations, trends over the years, region and gender wise performance of candidates, performance in various subjects and across mark ranges, etc. It also serves as a critical decision-making tool on various aspects related to the organisation and conduct of the ICSE and ISC Examinations.

This study, which is based on the data of the Council affiliated schools that had participated in the National Achievement Survey (NAS -Class X), 2015, conducted by the NCERT, aims to supplement the data of schools already available with the Council, by providing in-depth information on intervening variables related to the sample schools, students, and teachers, that are believed to have an impact on student achievement.

A total of 3568 Class X students and 438 teachers from 85 Council affiliated schools all over the country had participated in the NAS, 2015. This study aims to provide a broad overview of the students studying in Council affiliated schools by highlighting variables such as parental education and occupation, resources available at home, help received in studies, subjects liked and problems faced. The study will also provide information on schools affiliated to the Council by looking at the type of schools and their location, facilities available in the schools and activities commonly carried out by schools. Teacher related factors such as educational qualifications, teaching practices and assessment methods used, confidence in using different teaching methods along with their suggestions for improving teaching-learning in schools, will also be discussed in the study.

In addition to the factors related to schools, students and teachers, the study will also discuss performance of students in English, Mathematics, Science, Social Science and Modern Indian Languages, besides highlighting what students know and can do in various content areas, in different subjects. The study will also discuss effect of certain intervening variables on achievement of students in these subjects.

In preparing this report, all efforts have been made to ensure that the matter is presented in a simple, user-friendly manner. I would like to express my appreciation of the work put in by Dr Manika Sharma, Education Officer, RDCD, in coordinating analysis of data and preparation of this report.

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Shilpi Gupta

Deputy Head – RDCD

</div>

April 2018

CONTENT S

Part 1:

INTRODUCTION

This Study is a secondary analysis of the data of the ICSE schools that had participated in the National Achievement Survey (Cycle – 1), conducted in the year 2015 by the National Council for Educational Research and Training (NCERT).

A brief background of the National Achievement Survey (NAS) – Cycle 1
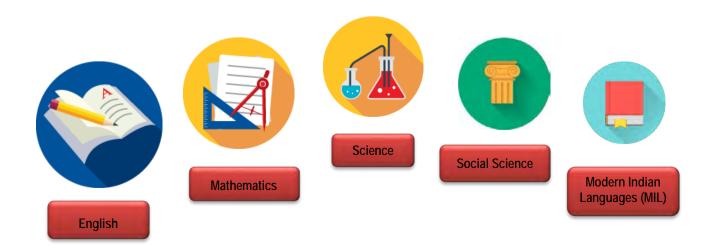
The main objective of NAS – Cycle 1 was to study the achievement levels of students of Class X.

Participating States/Union Territories and Boards

1.	Andhra Pradesh	12.	Madhya Pradesh	23.	Tripura
2.	Arunachal Pradesh	13.	Maharashtra	24.	Uttarakhand
3.	Assam	14.	Meghalaya	25.	West Bengal
4.	Delhi	15.	Mizoram	26.	A & N Islands
5.	Goa	16.	Nagaland	27.	Chandigarh
6.	Gujarat	17.	Odisha	28.	D &N Haveli
7.	Haryana	18.	Punjab	29.	Daman & Diu
8.	Himachal Pradesh	19.	Rajasthan	30.	Lakshadweep
9.	Jammu & Kashmir	20.	Sikkim	31.	Puducherry
10.	Karnataka	21.	Tamil Nadu	32.	CBSE
11.	Kerala	22.	Telangana	33.	ICSE

A sample of 358 schools in each State/Board were selected in the first stage.

The Survey was administered across the country in 15 languages of instruction.

To assess learning achievement of Class X students, multiple test booklets were developed in the following subjects:

English

Mathematics

Science

Social Science

Modern Indian Languages (MIL)

- For each subject, three test booklets were developed.
- Each of these test booklets contained items covering content/ competencies expected at the secondary level (Classes IX-X).
- Use of multiple test booklets, helped in increasing the measurement points.
- Standardised tests were used for comparing students' abilities in different content areas.

Information was also gathered on background factors including the background of students, the school environment and teacher characteristics, through the following questionnaires:

Pupil Questionnaire

School Questionnaire

Teacher Questionnaire

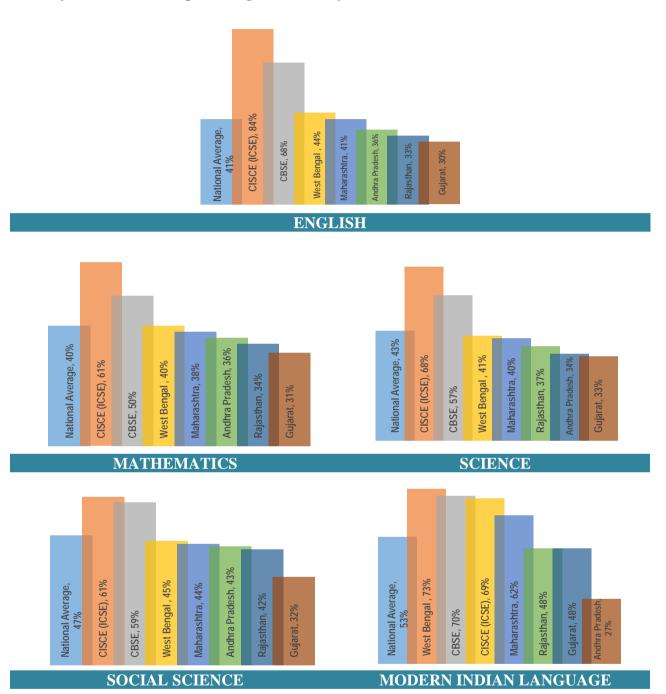The survey tools (tests and questionnaires) were administered by the State Education Boards and the National Boards.

For capturing the responses of students, Optical Mark Recognition (OMR) sheets were used and for the background factors, information was filled in the questionnaires by the respondents.

Classical Test Theory (CTT) and 1 PL model of Item Response Theory (IRT) were used for analysing the data.

National Achievement Survey (NAS- Cycle 1): A snapshot

Subject wise scores in percentage obtained by students from National and State boards

ENGLISH

National Average, 41% | CISCE (ICSE), 84% | CBSE, 68% | West Bengal, 44% | Maharashtra, 41% | Andhra Pradesh, 36% | Rajasthan, 33% | Gujarat, 30%

MATHEMATICS

National Average, 40% | CISCE (ICSE), 61% | CBSE, 50% | West Bengal, 40% | Maharashtra, 38% | Andhra Pradesh, 36% | Rajasthan, 34% | Gujarat, 31%

SCIENCE

National Average, 43% | CISCE (ICSE), 68% | CBSE, 57% | West Bengal, 41% | Maharashtra, 40% | Rajasthan, 37% | Andhra Pradesh, 34% | Gujarat, 33%

SOCIAL SCIENCE

National Average, 47% | CISCE (ICSE), 61% | CBSE, 59% | West Bengal, 45% | Maharashtra, 44% | Andhra Pradesh, 43% | Rajasthan, 42% | Gujarat, 32%

MODERN INDIAN LANGUAGE

National Average, 53% | West Bengal, 73% | CBSE, 70% | CISCE (ICSE), 69% | Maharashtra, 62% | Rajasthan, 48% | Gujarat, 48% | Andhra Pradesh, 27%

(Source: What students know and can do: A summary of National Achievement Survey Class X, 2015, NCERT)

As indicated in the survey results, the ICSE students outperformed their counterparts from all other boards (National and State), in all subjects except Modern Indian Language (MIL).

About the present Study

The present Study is based on the data of the ICSE Class X students, CISCE schools and teachers, that had participated in NAS – Cycle 1. Data for the Study was obtained from the Educational Survey Division (ESD) of NCERT. The purpose of this study was to analyse the performance levels of ICSE Class X students. Data was investigated on the following parameters:

Description of background factors (Pupil, School and Teacher)

Performance of students (in English, Mathematics, Science, Social Science and Modern Indian Languages) and in different competencies/content areas tested

Effect of intervening variables on achievement

Description of background factors includes:

- **Pupil Profile:** Covers student related factors such as gender, location, parental education and occupation, resources available at home, liking towards a subject, opinion on certain statements, etc.
- **School Profile:** Covers school related factors such as location, school type, facilities available in school, activities organised by schools, etc.
- **Teacher Profile:** Covers teacher characteristics such as gender, age, educational qualification, teaching practices, etc.

Sample Size

Number of students: 3,568

Number of school: 85

Number of teachers: 438

Performance of students includes:

- Overall, gender wise, area wise and category wise performance of students in different subjects
- Comparison of performance with respect to gender and area
- What students know and can do (Performance in various competencies/content areas in different subjects)
- Comparison of performance in various competencies/content areas with respect to gender and area

Effect of intervening variables includes:

Influence of certain background factors (student, school and teachers) on achievement in different subjects tested

Reporting of results

Throughout this study, results have been presented in terms of percent correct (by applying Classical Test Theory) on unweighted data. Statistical techniques such as Percentages and t-test have been used for analysing the data. Data has been analysed using Statistical Package for Social Sciences (SPSS) for running descriptives and calculating t-values for comparative analysis.

Understanding the comparison tables

Comparison tables given in this report shows N (Number of students), Mean (in terms of percent correct), Standard Errors and t-values with the level of significance. For t-test, mean values compared with their standard errors indicate whether an observed difference is likely to be a true difference or whether it has occurred by chance. The t-test has been applied using a confidence level of 95%, which means that if a difference is marked as 'statistically significant' (with * mark, refer to t-value column of the table), the probability of the difference occurring by chance is less than 5%. In other words, we are 95% confident that the difference between the two values is true.

t-test has been used to observe significant differences in the performance of boys and girls, in rural and urban areas in different subjects and at various competency levels.

Given below is an example showing the comparison tables used and the manner in which they have been interpreted in this report:

Comparison on the basis of Gender

Gender	N	Mean	SE	t-value
Girls	457	85.3	0.6	2.1*
Boys	305	83.4	0.7	

*Significant at 0.05 level

Girls performed better than boys.

The table shows comparison between the performances of boys and girls in a particular subject. The t-value of 2.1 is significant at 0.05 level with a mean of girls as 85.3 and that of boys as 83.1. It means that there is significant difference between the performance of girls and boys in the subject. The probability of this difference occurring by chance is less than 5%. The mean value of girls is higher than that of boys. It can be interpreted that girls performed significantly better than boys.

Organisation of the Report

This report has been organised in two parts - Introduction and Findings. The second part, i.e. Findings includes five sub-sections which are as follows:

Section 1 gives a description of the Sample covered in the Study

Section 2 comprises of profile description of Student, School and Teacher characteristics

Section 3 provides a comparative analysis of performance levels of students in different subjects and in various competencies/content areas covered in different subjects

Section 4 explores effect of intervening variables on achievement of students in different subjects

Section 5 sums up the study by providing the Major Highlights

Part 2: FINDINGS

SECTION 1: SAMPLE DESCRIPTION

Sample size

Students	Schools	Teachers
3568	85	438

SUBJECT WISE STUDENT DESCRIPTION
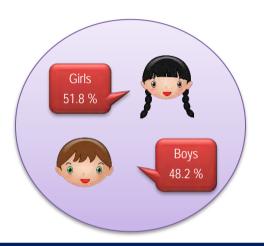
		English	Mathematics	Science	Social Science	MIL
	Girls	60%	43%	48.1%	52.7%	54.9%
	Boys	40%	57%	51.9%	47.3%	45.1%
	Rural	16.3%	17.1%	15.7%	17.3%	19%
	Urban	83.7%	82.9%	84.3%	82.7%	81%
	SC	4.1%	3.3%	3.7%	4.5%	3.6%
	ST	3.4%	2.1%	2.9%	4.4%	3.1%
	OBC	14.3%	16.4%	18.1%	13.6%	16.8%
	General	78.2%	78.2%	75.3%	77.5%	76.5%
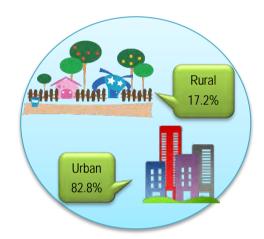
SECTION 2:
SAMPLE PROFILE

- Students
- Schools
- Teachers

STUDENT PROFILE
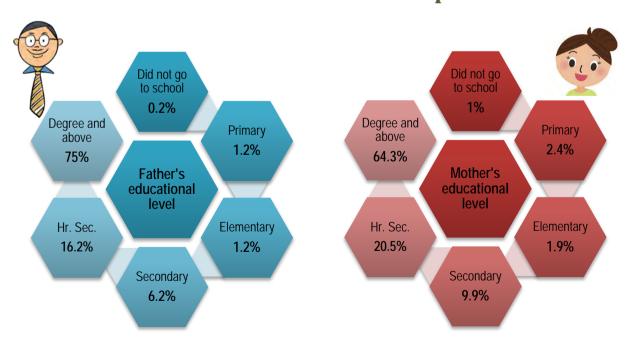
Gender and Location of Students

Girls
51.8 %

Boys
48.2 %

Rural
17.2%

Urban
82.8%

The sample comprised of 52% girls and 48% boys. Majority of the sampled students resided in urban areas.

Parental Education and Occupation

Did not go to school
0.2%

Degree and above
75%

Primary
1.2%

Father's educational level

Hr. Sec.
16.2%

Elementary
1.2%

Secondary
6.2%

Did not go to school
1%

Degree and above
64.3%

Primary
2.4%

Mother's educational level

Hr. Sec.
20.5%

Elementary
1.9%

Secondary
9.9%

Fathers of 75% of the students were educated up to degree level and above. The corresponding figure for mothers was 64.3%. One percent of the mothers and 0.2% of the fathers had not gone to school.

Fathers' Occupation

- Unemployed **0.3%**
- Household **0.2%**
- Agricultural Labour/Domestic Servant/Daily Wager/Street Vendor **0.5%**
- Farmer (Cultivator) **2.4%**
- Skilled Worker/Office Worker **20.9%**
- Shopkeeper/Businessman **37.2%**
- Teacher/Lecturer/Professor **6.9%**
- Manager/Senior Officer/Professional **31.6%**

Mothers' Occupation

- Unemployed **0.3%**
- Housewife **72.6%**
- Agricultural Labour/Domestic Servant/Daily Wager/Street Vendor **0.01%**
- Farmer (Cultivator) **0.01%**
- Skilled Worker/Office Worker **3.5%**
- Shopkeeper/Businessman **2.2%**
- Teacher/Lecturer/Professor **15.2%**
- Manager/Senior Officer/Professional **6.1%**

A large majority of the fathers of sampled students were either shopkeepers/ businessmen (37%) or mangers/senior officers/professionals (31.6%). About 0.5% fathers were agricultural labourers/domestic servants/daily wagers/street vendors and almost the same percentage belonged to the category of unemployed/household.
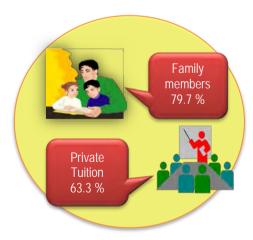A large majority of the mothers were housewives (72.6%). About 15% of the mothers were teachers/lecturers/professors and 6.1% of the mothers were managers/senior officers/professionals.
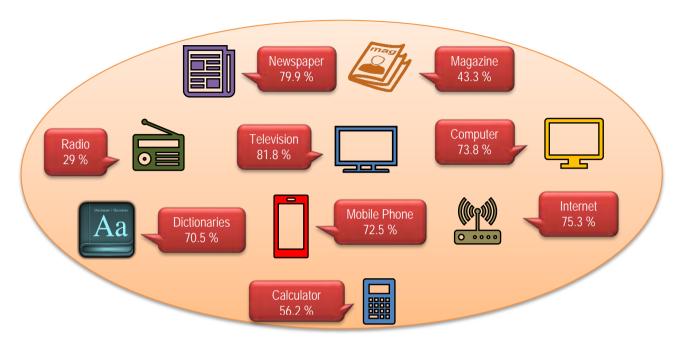
Help in Studies

Nearly eighty percent of the students received help in studies at home from family members and 63.3 % of the students reported to receiving private tuitions in different subjects.

Family members 79.7 %

Private Tuition 63.3 %
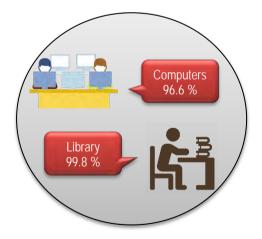
Resources available at Home

Resource	Percentage
Newspaper	79.9 %
Magazine	43.3 %
Radio	29 %
Television	81.8 %
Computer	73.8 %
Dictionaries	70.5 %
Mobile Phone	72.5 %
Internet	75.3 %
Calculator	56.2 %

Resources such as televisions, newspapers, computers, internet, mobile phones and dictionaries were available to more than seventy percent of the students at home. Calculators were used by 56.2% of the students. Magazines and radio were available to 43.3% and 29% of the students, respectively.

Facility of Computers and Library in School

More than 95% of the students reported that they had the facility of working on computers in their school and 99.8% stated that they had a library in their school.
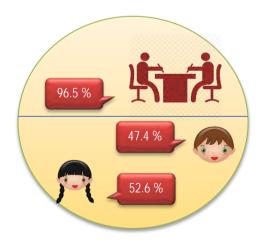
Facility	Percentage
Computers	96.6 %
Library	99.8 %

Most Liked Subject

English
20.4 %

71.4 % 28.6%

Mathematics
36.4 %

42.7 % 57.3%

Science
34.2 %

51.3 % 48.7%

Social Science
6.7 %

46.6 % 53.4%

Language other
than English 2.3%

50% 50%

Mathematics (36.4%) and Science (34.2%) were the subjects liked most by the sampled students, followed by English (20.4%), Social Science (6.7%) and Language other than English (2.3%). Mathematics and Social Science were liked by a larger percentage of boys, whereas English and Science were liked by a larger percentage of girls.

Sharing subject related problems with friends

More than ninety-five percent of the students reported that they shared subject related problems with their friends/classmates. A larger percentage of girls (52.6%) shared subject related problems with friends as compared to the boys (47.4%).

96.5 %

47.4 %

52.6 %

Sharing with parents, teachers and friends

	Never	Sometimes	Often
I share with my parents what is happening at school	2.1%	43.9%	54%
I discuss the difficult concepts with teachers	2.7%	46.3%	51%
I discuss the problems with my friends	2 %	33.4%	64.6%
I ask for help from my parents/teachers if I am stuck with a problem	2.8%	35.9%	61.3%
My parents check if I do my homework	21.3%	47%	31.8%

More than half of the students often shared what is happening at school with parents, discussed difficult concepts with teachers, discussed problems with friends and asked for help from parents or teachers if stuck with a problem.
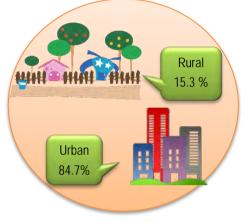
Students' views on School Environment
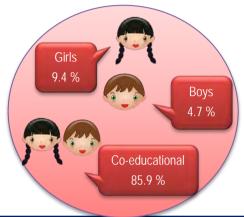
	Disagree	Agree
I look forward to going to school	3.7%	96.3%
It is easy to understand what the teachers teach in class	4.7%	95.3%
My teachers give me interesting activities to do in class	19.1%	80.9%
I don't like going to school	94.9%	5.1%
I need more help/extra time from the teacher to understand a topic	59.7%	40.3%
In class, my teachers encourage me to ask questions related to the topic	6.3%	93.7%
It is important to do well at school	2.5%	97.5%
The school gives me enough chances to participate in sports and cultural activities	9.1%	90.9%
I feel proud of my school	2.6%	97.4%

More than 90% of the students looked forward to going to school, felt proud of their school and felt that the school gave them enough chance to participate in sports and cultural activities. Majority of the students understood what was taught in the class and were also encouraged to ask questions related to the topic, by the teachers.

SCHOOL PROFILE
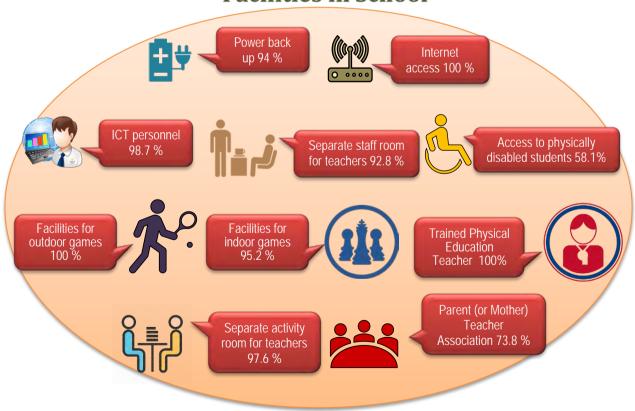
Location and Type of Schools

Rural
15.3 %

Urban
84.7%

Girls
9.4 %

Boys
4.7 %

Co-educational
85.9 %

Nearly 85% of the sampled schools were located in urban areas. Majority of the schools (i.e., 86%) were co-educational schools while 9.4% and 4.7% schools were girls and boys schools, respectively.
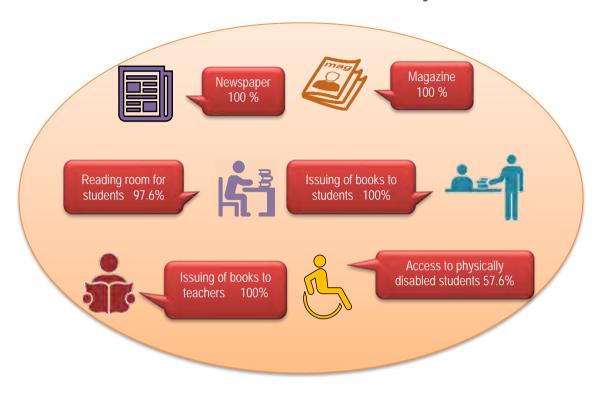
Facilities in School

Power back up 94 %

Internet access 100 %

ICT personnel 98.7 %

Separate staff room for teachers 92.8 %

Access to physically disabled students 58.1%

Facilities for outdoor games 100 %

Facilities for indoor games 95.2 %

Trained Physical Education Teacher 100%

Separate activity room for teachers 97.6 %

Parent (or Mother) Teacher Association 73.8 %

Most of the schools had facilities such as internet access, power back up, parent teacher association, separate staffroom for teachers, facilities for indoor and outdoor games, etc. Only 58% schools provided access to physically disabled students.

13

Facilities in the Library

Newspaper 100 %

Magazine 100 %

Reading room for students 97.6%

Issuing of books to students 100%

Issuing of books to teachers 100%

Access to physically disabled students 57.6%

Facilities such as newspapers, magazines and issuing of books to teachers and students were available in all the sampled schools. In 57.6% of the schools, physically disabled students had access to the library.
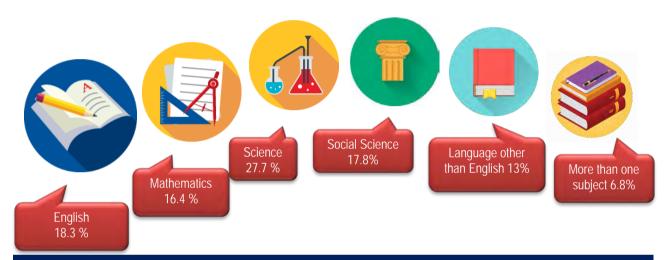
Activities organised by School

Science Exhibition 43.3 %

School Fair 90.1%

Sports/Cultural events 100%

Functions involving persons from the community 92.6 %

All schools organised sports/cultural events and majority of the schools organised, functions involving persons from the community and science fairs. Science exhibitions were organised in only 43.3% of the schools.
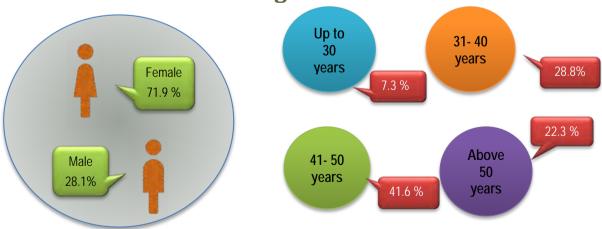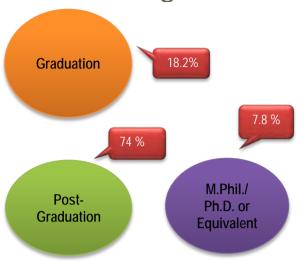
TEACHER PROFILE

Subjects Taught

English 18.3 %

Mathematics 16.4 %

Science 27.7 %

Social Science 17.8%

Language other than English 13%

More than one subject 6.8%

The sample of teachers comprised of Class X subject teachers teaching English, Mathematics, Science, Social Science and Languages other than English. 6.8% of the teachers taught more than one subject.

Gender and Age of Teachers

Female 71.9 %

Male 28.1%

Up to 30 years 7.3 %

31- 40 years 28.8%

41- 50 years 41.6 %

Above 50 years 22.3 %

Majority of the sample teachers (71.9%) were female. Most of the Class X teachers (41.6%) were in the age group of 41-50 years. Only 7.3% teachers were in the age group of 'up to 30 years'.

Highest Educational Qualification

Graduation — 18.2%

Post-Graduation — 74 %

M.Phil./Ph.D. or Equivalent — 7.8 %

A large majority of the sample teachers were post-graduates (74%) or had a higher degree (M.Phil./Ph.D or equivalent). 18.2% of the teachers were graduates

Teacher related factors

	Low	Medium	High
Teachers' job satisfaction	1.2%	26.5%	72.3%
Teachers' understanding of the school's curricular goals	0.2%	13.9%	85.9%
Teachers' degree of success in implementing the school curriculum	0.9%	22.7%	76.4%
Teachers' expectations for student achievement	0.7%	15.2%	84.1%
Parental support for student for achievement	6%	57.1%	36.9%
Parental involvement in school activities	10.6%	58.9%	30.5%
Students' regard for school property	5.3%	52.4%	42.2%
Students' desire to do well in studies	2.8%	38.4%	58.8%

More than seventy percent teachers viewed job satisfaction, understanding of the school's curricular goals, teacher's degree of success in implementing the school curriculum and teacher's expectations for student achivement in the school to be high.

Frequency of using different teaching practices

	Never	Some lessons lesson	Almost every
Summarize what students should have learnt from the lesson	-	5.3%	94.7%
Relate the lesson to students' daily life experiences	0.2%	27.6%	72.2%
Use questioning to elicit reasons and explanations	0.5%	9.4%	90.1%
Encourage all students to improve their performance	-	2.8%	97.2%
Praise students for good efforts	0.5%	7.9%	91.7%
Prepare Teaching-Learning Material	1.4%	39.5%	59.1%
Bring interesting teaching materials to class	2.3%	60%	37.6%
Give homework to students	1.6%	26.5%	71.9%

Teaching practices such as summarising what students have learnt from the lesson, questioning to elicit reasons and explanations, encouraging students to improve their performance and praising students for good efforts were used by more than ninety percent teachers in almost every lesson.
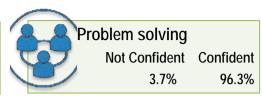
Teaching learning material for every lesson was prepared by 59.1% teachers. Most of the teachers brought interesting teaching materails to class for some/ almost every lesson.

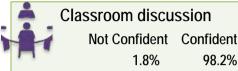# Level of Confidence in using teaching methods

Pair and group Work		Problem solving	
Not Confident	Confident	Not Confident	Confident
6.5%	93.5%	3.7%	96.3%

Role playing/simulation		Classroom discussion	
Not Confident	Confident	Not Confident	Confident
10.8%	89.2%	1.8%	98.2%

Project Work		Lecturing	
Not Confident	Confident	Not Confident	Confident
4.8%	95.2%	3.2%	96.8%

Laboratory activities		ICT supported activities	
Not Confident	Confident	Not Confident	Confident
17.6%	82.4%	18.6%	81.4%

While majority of the sample teachers were confident in using teaching methods such as Classroom discussion , Lecturing , Problem solving , Project work, Pair and Group work , almost 18% and 19% of the teachers, respectively, were not confident in using Laboratory activities and ICT supported activities.

Frequency of using different Assessment Methods

Written tests/examinations (e.g.,open-ended, essay)			Achievement tests (e.g. multiple choice, true/false, matching)			Oral tests		
Never	Sometimes	Often	Never	Sometimes	Often	Never	Sometimes	Often
0.5%	18.3%	81.2%	8.1%	51.4%	40.6%	3.5%	40.8%	55.8%

Observation of students			Written homework assignments			Student self-assessment		
Never	Sometimes	Often	Never	Sometimes	Often	Never	Sometimes	Often
-	15.5%	84.5%	1.8%	25.7%	72.5%	5.8%	55%	39.3%

Peer assessment			Projects		
Never	Sometimes	Often	Never	Sometimes	Often
10.6%	64.2%	25.2%	1.1%	36.9%	61.9%

Observation of students was the most popular assessment method used often/ sometimes by all the sample teachers. Written tests/examinations, written home assignments and Projects were other methods used often or sometimes by the sampled teachers. Assessment methods such as peer assessment and student self-assessment were never used by 10.6% and 5.8% of the sample teachers, respectively.

Teachers opinion on improvement in teaching learning in schools

- 12.3% More textbooks and materials of teaching learning
- 45.2% Better textbooks and materials of teaching learning
- 46.3% More training in teaching methods
- 45.9% More training in content/subject/matter knowledge
- 43.6% More cooperation between teachers in different subject areas
- 36.3% More instructional time allocated to the subject
- 59.8% Better assessment procedure

Nearly sixty percent teachers opined that better assessment procedure was required for improving teaching-learning in schools. Other aspects which need improvement (in the opinion of teachers) are better textbooks and materials of teaching learning (45.2%), training in teaching methods (46.3%), training in content/subject matter knowledge (45.9%) and more cooperation between teachers in different subject areas (43.6%).

SECTION 3: PERFORMANCE OF STUDENTS
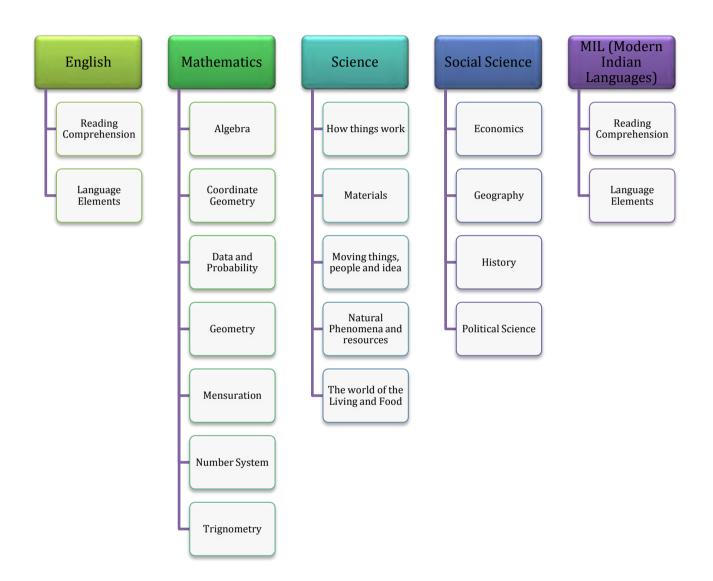
Performance of Students in different subjects

Mean performance of students in English, Mathematics, Science, Social Science and Modern Indian Languages (MIL) is given below:

	English	Mathematics	Science	Social Science	MIL
Girls	85.3%	66.2%	73.3%	58%	77.6%
Boys	83.4%	64.6%	74.4%	58.8%	72.8%
Rural	80.5%	62.7%	73%	56.9%	76.5%
Urban	85.3%	65.8%	74%	58.7%	75.2%
SC	77.8%	58.7%	67.2%	51%	77.2%
ST	77.7%	49%	59.2%	47.5%	61.6%
OBC	79.1%	62.2%	71.3%	52.9%	76.5%
General	86.2%	66.6%	75.4%	60.4%	75.7%
Overall	84.5%	65.3%	73.9%	58.4%	75.5%
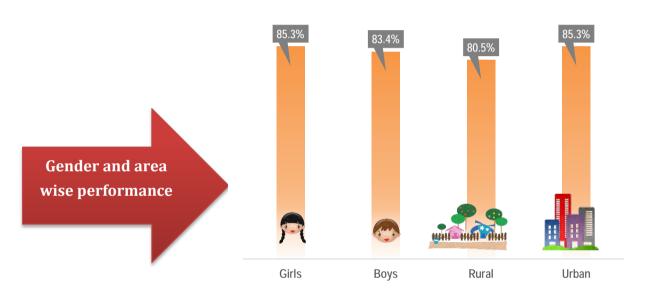
Competencies/content areas covered in different subjects

Competencies /content areas covered in each subject for development of test items are as follows:

English	Mathematics	Science	Social Science	MIL (Modern Indian Languages)
Reading Comprehension	Algebra	How things work	Economics	Reading Comprehension
Language Elements	Coordinate Geometry	Materials	Geography	Language Elements
	Data and Probability	Moving things, people and idea	History	
	Geometry	Natural Phenomena and resources	Political Science	
	Mensuration	The world of the Living and Food		
	Number System			
	Trignometry			

English

Overall

84.5%

Gender and area wise performance

85.3%	Girls
83.4%	Boys
80.5%	Rural
85.3%	Urban

Comparison on the basis of gender and area (overall)

Gender	N	Mean	SE	t-value
Girls	457	85.3	0.6	2.1*
Boys	305	83.4	0.7	

Significant at 0.05 level

Performance of the girls was better than the boys

Students of schools in urban areas performed better than those of rural areas.
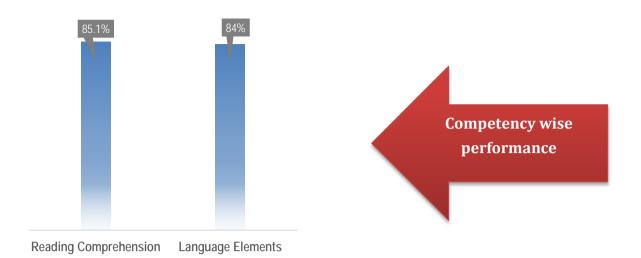
Area	N	Mean	SE	t-value
Rural	124	80.5	1.4	-3.3*
Urban	638	85.3	0.5	

Significant at 0.05 level

85.1% **84%**

Reading Comprehension   Language Elements

Competency wise performance

Competency wise comparison on the basis of gender

Competency/ Content Area	Gender	N	Mean	SE	t-value
Reading Comprehension	Girls	457	86.2	0.6	2.7*
	Boys	305	83.6	0.8	
Language Elements	Girls	457	84.5	0.6	1.3
	Boys	305	83.2	0.8	

*Significant at 0.05 level

Performance of girls in 'Reading Comprehension' was better than the boys. In 'Language Elements', no significant differences were observed.

Competency wise comparison on the basis of area

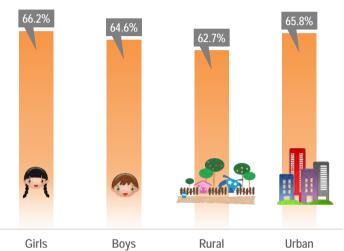| Competency/ Content Area	Area	N	Mean	SE	t-value
Reading Comprehension	Rural	124	81.8	1.4	-2.7*
	Urban	638	85.8	0.5	
Language Elements	Rural	124	79.4	1.5	-3.4*
	Urban	638	84.9	0.5	

*Significant at 0.05 level

Significant differences were observed in the performances of students from schools in urban and rural areas. Students from schools in urban areas performed better than the students from schools in rural areas in 'Reading Comprehension' as well as 'Language Elements'.

$\mathbf{M}$athematics

Overall

65.3 %

66.2% 64.6% 62.7% 65.8%

| Girls | Boys | Rural | Urban |

Comparison on the basis of gender and area (overall)
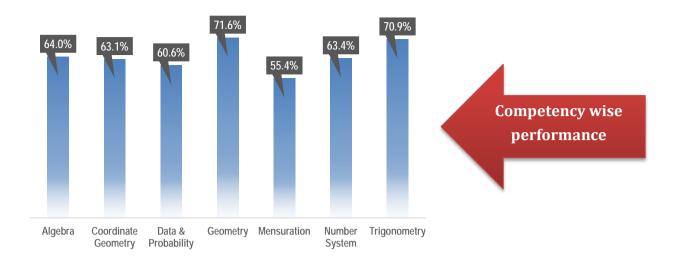
Gender	N	Mean	SE	t-value
Girls	335	66.2	0.9	
Boys	444	64.6	0.8	1.3

Gender and area wise performance

No significant difference was observed between the performance of girls and boys.

Area	N	Mean	SE	t-value
Rural	133	62.7	1.4	
Urban	646	65.8	0.7	-2.0*

Significant at 0.05 level

Students from schools in urban areas performed significantly better than those from rural areas.

Competency wise comparison on the basis of gender

Competency/ Content Area	Gender	N	Mean	SE	t-value
Algebra	Girls	335	63.9	1.2	-0.1
	Boys	444	64.0	1.1	
Coordinate Geometry	Girls	334	65.1	1.3	1.9
	Boys	443	61.6	1.2	
Data & Probability	Girls	335	62.1	1.4	1.4
	Boys	444	59.4	1.2	
Geometry	Girls	335	73.4	1.0	2.3*
	Boys	444	70.3	0.9	
Mensuration	Girls	335	55.7	1.4	0.3
	Boys	444	55.2	1.2	
Number System	Girls	335	61.8	1.4	-1.5
	Boys	444	64.6	1.2	
Trigonometry	Girls	335	72.1	1.3	1.1
	Boys	444	70.1	1.2	

*Significant at 0.05 level

In 'Geometry', girls performed significantly better than the boys. However, no significant variations were observed in other competencies/ content areas covered in Mathematics.
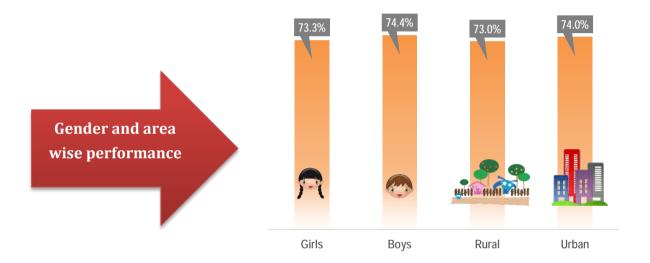
Competency wise comparison on the basis of area

Competency/ Content Area	Area	N	Mean	SE	t-value
Algebra	Rural	133	61.8	1.9	-1.3
	Urban	646	64.4	0.9	
Coordinate Geometry	Rural	133	63.1	2.3	0.0
	Urban	644	63.1	1.0	
Data & Probability	Rural	133	53.1	2.1	-3.9*
	Urban	646	62.1	1.0	
Geometry	Rural	133	69.4	1.5	-1.6
	Urban	646	72.1	0.8	
Mensuration	Rural	133	51.9	2.1	-1.8
	Urban	646	56.1	1.0	
Number System	Rural	133	63.5	2.2	0.1
	Urban	646	63.4	1.0	
Trigonometry	Rural	133	69.0	2.4	-0.9
	Urban	646	71.3	1.0	

*Significant at 0.05 level

Students from schools in urban areas performed significantly better than the students from schools in rural areas, in the competency/content area 'Data & Probability'. However, in other competencies or content areas, no significant differences were observed.

Science

Overall

73.9%

Gender and area wise performance

73.3% 74.4% 73.0% 74.0%

Girls   Boys   Rural   Urban

Comparison on the basis of gender and area (overall)
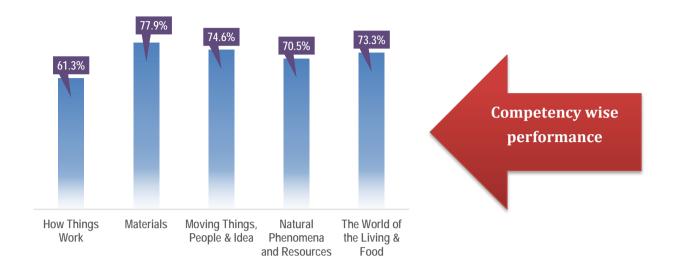
Gender	N	Mean	SE	t-value
Girls	353	73.3	0.9	0.9
Boys	381	74.4	0.8	

No significant differences were observed on the basis of gender.

No significant differences were observed on the basis of area.

Area	N	Mean	SE	t-value
Rural	115	73	1.3	-0.7
Urban	619	74	0.7	

27

Competency wise performance

Competency wise comparison on the basis of gender

Competency/ Content area	Gender	N	Mean	SE	t-value
How Things Work	Girls	352	60.2	1.4	-1.0
	Boys	381	62.3	1.5	
Materials	Girls	353	77.2	1.0	-1.0
	Boys	381	78.6	0.9	
Moving Things, People & Idea	Girls	353	73.0	1.1	-2.1*
	Boys	381	76.0	1.0	
Natural Phenomena and Resources	Girls	353	69.4	1.1	-1.3
	Boys	381	71.5	1.0	
The World of the Living & Food	Girls	353	73.7	1.0	0.6
	Boys	381	72.9	1.0	

*Significant at 0.05 level

In the competency/content area 'Moving Things, People & Idea', boys performed significantly better than the girls. In other competencies /content areas no such differences were observed.

Competency wise comparison on the basis of area

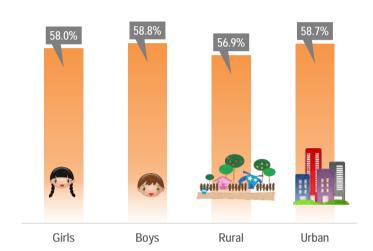| Competency/ Content area	Area	N	Mean	SE	t-value
How Things Work	Rural	115	61.9	2.7	0.2
	Urban	618	61.2	1.1	
Materials	Rural	115	77.1	1.6	-0.6
	Urban	619	78.1	0.8	
Moving Things, People & Idea	Rural	115	75.4	1.6	0.6
	Urban	619	74.4	0.8	
Natural Phenomena and Resources	Rural	115	67.3	1.7	-2.1*
	Urban	619	71.1	0.8	
The World of the Living & Food	Rural	115	71.6	1.5	-1.2
	Urban	619	73.6	0.8	

*Significant at 0.05 level

In the competency /content area 'Natural Phenomena and Resources', students of schools in urban areas performed significantly better those from rural areas.

Social Science

Overall

58.4%

Gender and area wise performance

Girls	Boys	Rural	Urban
58.0%	58.8%	56.9%	58.7%

Comparison on the basis of gender and area (overall)
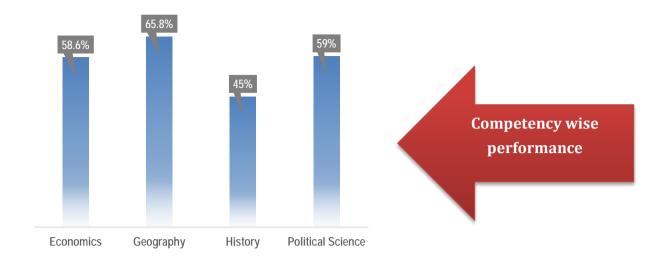
Gender	N	Mean	SE	t-value
Girls	375	58	0.7	
Boys	336	58.8	0.8	0.7

No significant difference was observed on the basis of gender.

No significant difference was observed on the basis of area.

Area	N	Mean	SE	t-value
Rural	123	56.9	1.1	
Urban	588	58.7	0.6	-1.4

Competency wise comparison on the basis of gender

Competency/ Content Area	Gender	N	Mean	SE	t-value
Economics	Girls	375	58.1	0.7	-1.0
	Boys	336	59.2	0.8	
Geography	Girls	375	65.4	0.9	-0.7
	Boys	336	66.3	1.0	
History	Girls	375	44.6	1.0	-0.5
	Boys	336	45.4	1.1	
Political Science	Girls	375	58.8	0.8	-0.3
	Boys	336	59.3	0.9	

No significant difference was observed between the performance of girls and boys in all the competencies/content areas covered under Social Science.

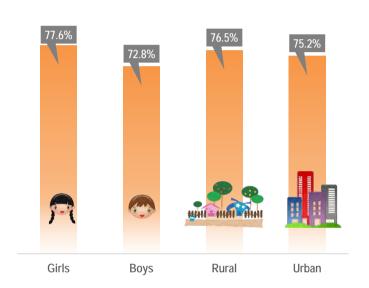## Competency wise comparison on the basis of area

Competency/ Content Area	Area	N	Mean	SE	t-value
Economics	Rural	123	56.9	1.2	-1.5
	Urban	588	58.9	0.6	
Geography	Rural	123	64.3	1.5	-1.2
	Urban	588	66.2	0.7	
History	Rural	123	43.0	1.9	-1.2
	Urban	588	45.4	0.8	
Political Science	Rural	123	58.0	1.4	-0.8
	Urban	588	59.3	0.7	

No significant difference was observed in the performance of students from schools in rural and urban areas.

M IL

(Modern Indian Languages)

Overall

75.5%

Gender and area wise performance

77.6%	Girls
72.8%	Boys
76.5%	Rural
75.2%	Urban

Comparison on the basis of gender and area (overall)

Gender	N	Mean	SE	t-value
Girls	353	77.6	0.8	3.4*
Boys	290	72.8	1.2	

Significant at 0.05 level

Performance of girls was significantly better than the boys.

No significant difference was observed between the performance of students from schools in rural and urban areas.

Area	N	Mean	SE	t-value
Rural	122	76.5	1.4	0.8
Urban	521	75.2	0.8	

SECTION 4:

EFFECT OF INTERVENING VARIABLES

This section delves into some of the factors which are associated with student achievement.

Taking Tuitions

Subjects	Statement	N	Mean	SE	t-value
English	Yes	472	83.3	0.6	-3.30*
	No	275	86.3	0.7	
Mathematics	Yes	474	64.7	0.8	-1.14
	No	282	66.2	1.0	
Science	Yes	451	72.6	0.8	-2.94*
	No	261	76.2	0.9	
Social Science	Yes	433	56.7	0.6	-3.93*
	No	259	60.7	0.8	
MIL	Yes	406	75.4	0.9	-0.08
	No	221	75.5	1.2	

Significant at 0.05 level

Students who were not taking private tuitions performed significantly better than those who were taking tuitions, in English, Science and Social Science.

Subject Preference

Subjects	Statement	N	Mean	SE	t-value
English	Yes	281	85.7	0.7	2.09*
	No	470	83.8	0.6	
Mathematics	Yes	455	67.5	0.8	4.33*
	No	311	61.9	1.0	
Science	Yes	373	74.9	0.8	1.86
	No	347	72.6	0.9	
Social Science	Yes	99	57.3	1.2	-0.86
	No	600	58.4	0.5	
MIL	Yes	44	75.5	2.6	0.00
	No	588	75.5	0.7	

Significant at 0.05 level

Students who preferred English and Mathematics performed significantly better in these subjects as compared to those who did not like these subjects.

Availability of Newspapers at home

Subjects	Statement	N	Mean	SE	t-value
English	Yes	615	85.5	0.5	4.24*
	No	136	79.7	1.3	
Mathematics	Yes	602	65.8	0.7	1.88
	No	164	62.9	1.4	
Science	Yes	575	75.0	0.7	3.62*
	No	145	69.2	1.5	
Social Science	Yes	546	59.5	0.5	4.32*
	No	153	54.0	1.1	
MIL	Yes	512	75.7	0.8	0.74
	No	120	74.3	1.7	

*Significant at 0.05 level

Performance levels of students who had newspapers at home were significantly higher than their counterparts, in the subjects English, Science and Social Science.

Availability of Magazines at home

Subjects	Statement	N	Mean	SE	t-value
English	Yes	356	86.3	0.6	3.74*
	No	395	82.9	0.6	
Mathematics	Yes	317	66.5	1.0	1.71
	No	449	64.3	0.8	
Science	Yes	327	76.1	0.9	3.50*
	No	393	71.9	0.9	
Social Science	Yes	287	60.5	0.8	3.84*
	No	412	56.7	0.7	
MIL	Yes	259	76.1	1.1	0.76
	No	373	75.0	0.9	

*Significant at 0.05 level

Availability of magazines at home had a significant positive impact on English, Science and Social Science achievement.

Television Viewing

Subjects	Statement	N	Mean	SE	t-value
English	Yes	630	85.3	0.5	3.41*
	No	121	80.3	1.4	
Mathematics	Yes	613	65.9	0.7	2.03*
	No	153	62.5	1.5	
Science	Yes	605	75.0	0.6	4.10*
	No	115	67.4	1.8	
Social Science	Yes	548	58.9	0.6	2.47*
	No	151	55.8	1.1	
MIL	Yes	521	75.4	0.8	-0.20
	No	111	75.8	1.6	

*Significant at 0.05 level

Television viewing at home had a significant contribution towards performance of students in English, Mathematics, Science and Social Science.

Computer Usage

Subjects	Statement	N	Mean	SE	t-value
English	Yes	560	86.2	0.5	5.96*
	No	191	79.5	1.0	
Mathematics	Yes	571	66.6	0.7	3.76*
	No	195	61.1	1.3	
Science	Yes	552	75.6	0.7	5.19*
	No	168	67.9	1.3	
Social Science	Yes	484	59.8	0.6	4.44*
	No	215	54.8	0.9	
MIL	Yes	467	75.6	0.8	0.26
	No	165	75.2	1.4	

Significant at 0.05 level

Positive influence of computer usage at home could be seen in performance of students in all the subjects except Modern Indian Languages (MIL).

Dictionary Usage

Subjects	Statement	N	Mean	SE	t-value
English	Yes	548	85.2	0.5	2.59*
	No	203	82.5	0.9	
Mathematics	Yes	524	66.2	0.7	2.40*
	No	242	63.0	1.1	
Science	Yes	520	75.1	0.7	3.21*
	No	200	70.5	1.3	
Social Science	Yes	475	59.5	0.6	3.39*
	No	224	55.7	0.9	
MIL	Yes	447	76.6	0.8	2.31*
	No	185	72.8	1.4	

Significant at 0.05 level

Use of dictionaries had a positive impact on students' achievement in all the subjects tested in the survey.

Internet Usage

Subjects	Statement	N	Mean	SE	t-value
English	Yes	584	85.9	0.5	5.31*
	No	167	79.7	1.1	
Mathematics	Yes	573	66.0	0.7	2.27*
	No	193	62.7	1.3	
Science	Yes	545	75.6	0.7	4.94*
	No	175	68.3	1.3	
Social Science	Yes	501	59.7	0.6	4.43*
	No	198	54.6	1.0	
MIL	Yes	483	75.9	0.8	1.07
	No	149	74.2	1.3	

Significant at 0.05 level

In all subjects, except MIL, performance of students who were using internet at home was significantly better than those who were not.

Usage of Calculators

Subjects	Statement	N	Mean	SE	t-value
Mathematics	Yes	422	66.8	0.8	2.79*
	No	344	63.3	1.0	
Science	Yes	425	76.6	0.7	5.43*
	No	295	69.8	1.0	

Significant at 0.05 level

Students who used calculators had higher levels of achievement in Mathematics and Science as compared to those who were not.

Frequency of sharing happenings at school with parents

Subjects	Statement	N	Mean	SE	t-value
English	Sometime	319	82.9	0.7	-3.19*
	Often	416	85.9	0.6	
Mathematics	Sometime	341	62.8	0.9	-3.63*
	Often	402	67.4	0.8	
Science	Sometime	288	71.3	1.1	-3.27*
	Often	410	75.5	0.7	
Social Science	Sometime	313	55.4	0.8	-5.30*
	Often	369	60.7	0.7	
MIL	Sometime	299	74.7	1.0	-1.39
	Often	321	76.7	1.0	

Significant at 0.05 level

Students who often shared happenings at school with their parents performed significantly better in English, Mathematics, Science and Social Science than those who did so sometimes.

Frequency of discussing difficult concepts with teachers

Subjects	Statement	N	Mean	SE	t-value
English	Sometime	357	84.3	0.6	-0.57
	Often	376	84.8	0.7	
Mathematics	Sometime	350	63.5	0.9	-2.86*
	Often	390	67.1	0.8	
Science	Sometime	323	72.8	0.9	-1.99*
	Often	372	75.3	0.8	
Social Science	Sometime	332	56.4	0.7	-4.06*
	Often	339	60.5	0.7	
MIL	Sometime	278	73.0	1.1	-3.04*
	Often	331	77.5	0.9	

Significant at 0.05 level

Students who discussed difficult concepts with teachers frequently, performed better in Mathematics, Science, Social Science and MIL than those who did so sometimes.

Opportunities to perform experiments in school laboratory

Subjects	Statement	N	Mean	SE	t-value
Mathematics	Sometime	338	63.3	1.0	-3.42*
	Often	325	67.9	0.9	
Science	Sometime	326	72.0	0.9	-2.86*
	Often	311	75.7	0.9	

Significant at 0.05 level

More frequent opportunities to perform experiments in the school laboratory had a significant positive influence on Mathematics and Science achievement.

Being able to ask more questions about a topic which is not clear

Subjects	Statement	N	Mean	SE	t-value
English	Yes	179	88.4	0.9	5.13*
	No	572	83.3	0.5	
Mathematics	Yes	156	69.4	1.4	3.34*
	No	610	64.1	0.7	
Science	Yes	141	76.7	1.3	2.37*
	No	579	73.1	0.7	
Social Science	Yes	131	63.7	1.1	5.52*
	No	568	57.0	0.6	
MIL	Yes	124	76.1	1.8	0.39
	No	508	75.3	0.8	

Significant at 0.05 level

Being able to ask more questions about a topic which is not clear had a significant positive impact on English, Mathematics, Science and Social Science achievement.

Interesting activities given by teacher in class

Subjects	Statement	N	Mean	SE	t-value
English	Yes	124	85.2	1.0	0.72
	No	627	84.4	0.5	
Mathematics	Yes	158	66.2	1.4	0.80
	No	608	64.9	0.7	
Science	Yes	148	77.6	1.3	3.13*
	No	572	72.9	0.7	
Social Science	Yes	126	58.8	1.2	0.54
	No	573	58.1	0.6	
MIL	Yes	119	75.2	1.7	-0.16
	No	513	75.5	0.8	

Significant at 0.05 level

Students who got interesting activities to do in class performed significantly better in Science.

SECTION 5: MAJOR HIGHLIGHTS

Major Highlights of the Study are as follows:

- Sample for this study comprised of 3568 Class X students from 85 Council affiliated schools and 438 ICSE Class X teachers.

- Achievement levels of students were studied in the subjects English, Mathematics, Science, Social Science and MIL (Modern Indian Languages) in specified competencies/ content areas.

- The student sample comprised of 51.8% girls and 48.2% boys. Majority of the sample students resided in urban areas.

- Fathers and mothers of majority of the students were educated upto degree level and above.

- A large majority of the fathers of the sampled students were either shopkeepers/ businessmen (37%) or mangers/senior officers/professionals (31.6%). Majority of the mothers were housewives (72.6%).

- 63.3 % of the students reported to receiving private tuitions in different subjects.

- Resources such as televisions, newspapers, computers, internet, mobile phones and dictionaries were available to more than seventy percent of the students at home.

- Mathematics (36.4%) and Science (34.2%) were the subjects liked most by the sampled students. Mathematics and Social Science were liked by a larger percentage of boys, whereas English and Science were liked by a larger percentage of girls.

- More than 50% of the sample students often shared what is happening at school with parents, discussed difficult concepts with teachers, discussed problems with friends and asked for help from parents or teachers if stuck with a problem.

- More than 90% of the students looked forward to going to school, felt proud of their school and felt that the school gave them enough chance to participate in sports and cultural activities. Majority of the students understood what was taught in class and were also encouraged by the teacher to ask questions related to the topic.

- Nearly 85% of the sampled schools were located in urban areas. Majority of the schools (i.e., 86%) were co-educational schools.

- Most of the schools had facilities such as internet access, power back up, parent teacher association, separate staffroom, facilities for indoor and outdoor games, etc. Only 58% schools provided access to physically disabled students.

- All schools organised sports/cultural events and majority of the schools organised, functions involving persons from the community and science fairs.

- The sample of teachers comprised of Class X subject teachers teaching English, Mathematics, Science, Social Science and Languages other than English. Majority of the sample teachers (71.9%) were female.

- A large majority of the sample teachers were post-graduates (74%) or had a higher degree (M.Phil./Ph.D or equivalent).

- More than seventy percent teachers viewed job satisfaction, understanding of the school's curricular goals, teacher's degree of success in implementing the school curriculum and teacher's expectations for student achievement in the school to be high.

- Teaching practices such as summarising what students have learnt from the lesson, questioning to elicit reasons and explanations, encouraging students to improve their performance and praising students for good efforts were used by more than ninety percent teachers in almost every lesson.

- While majority of the sample teachers were confident in using teaching methods such as Classroom discussions, Lecturing, Problem solving , Project work, Pair and Group work, almost 18% and 19% of the teachers, respectively, were not confident in using Laboratory activities and ICT supported activities.

- Observation of students was the most popular assessment method used often/ sometimes by all the sample teachers. Written tests/examinations, written home assignments and Projects were other methods used often or sometimes by the sample teachers. Assessment methods such as peer assessment and student self-assessment were never used by 10.6% and 5.8% of the sample teachers, respectively.

- Nearly sixty percent teachers opined that better assessment procedure was required for improving teaching-learning in schools. Other aspects which need improvement (in the opinion of teachers) are better textbooks and materials of teaching learning (45.2%), training in teaching methods (46.3%), training in content/subject matter knowledge (45.9%) and more cooperation between teachers in different subject areas (43.6%).

- Performance of girls was significantly better than the boys in English and MIL (Modern Indian Languages). Students from urban areas performed better than the students from rural areas in English and Mathematics.

- In English, Reading Comprehension of girls was found to be significantly better than that of boys.

- In 'Geometry', girls performed significantly better than the boys. However, no significant variations were observed in other competencies/ content areas covered in Mathematics.

- In Mathematics, students from schools in urban areas performed significantly better than those from rural areas, in the competency/content area 'Data & Probability'. However, in other competencies or content areas no significant differences were observed.

- In Science, in the content area 'Moving Things, People & Idea', boys performed significantly better than the girls. In the content area 'Natural Phenomena and Resources', students of schools from urban areas performed significantly better than students from schools located in rural areas.

- No significant differences were observed between the performance of girls and boys and students from schools in rural and urban areas in all the competencies/content areas covered under Social Science.

- Students who were not taking private tuitions performed significantly better in English, Science and Social Science than those taking tuitions.

- Students who liked Mathematics and English also performed better in these subjects. This was however not true for other subjects.

- Availability of newspapers and magazines at home had a positive influence on the achievement in English, Science and Social Science.

- Television viewing, Computer usage and availability of Internet at home contributed significantly to better performance in English, Mathematics, Science and Social Science.

- Use of dictionaries had a positive impact on students' achievement in all the subjects tested in the survey.

- Students who used calculators had higher levels of achievement in Mathematics and Science as compared to those who were not.

- Students who often shared happenings at school with their parents, performed significantly better in English, Mathematics, Science and Social Science than those who did so sometimes.

- Students who discussed difficult concepts with teachers frequently, performed better in Mathematics, Science, Social Science and MIL than those who did so sometimes.

- More frequent opportunities to perform experiments in the school laboratory had significant positive influence on Mathematics and Science achievement.

- Being able to ask more questions about a topic which is not clear had a significant positive impact on English, Mathematics, Science and Social Science achievement.

- Students who got interesting activities to do in class performed significantly better in Science.