Secondary School Education in Assam (India) with Special Reference to Mathematics

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Abstract

This paper describes the prevailing academic scenarios of a representative group of secondary schools in Assam (India) with special references to students performance in general and mathematics performance in particular. The state of Assam is one of the economically backward regions of India and is witnessing socio-political disturbances mainly centered with younger population. Object oriented education leading ensured employment is expected to reduce the present social crisis in this region. Appropriate secondary school knowledge backed by perfect learning in mathematics can make students competent for future career.

Investigation of prevailing education scenario vis-à-vis mathematics performance of students of 21 representative schools of Assam revealed wide variations of academic environment amongst the school so also the variations of performances. The financial and managerial statuses of the schools seem to be major factors influencing academic performance. In general, academic performances as well as mathematics performances of the government and private schools are better than the schools not getting government aids. The study also revealed that mathematics performances of schools are positively correlated with (a) the academic performance of school indicated by school leaving pass percentage and also (b) with the performances in subjects other than mathematics. On the other hand, students and teacher ratio seems not to affect the mathematics performance of the schools. Improvement of the performance of secondary school in Assam is required considering the societal needs.
Introduction

Education is considered as an important index to measure societal development. This is the reason that education is taken as priority sector for development by all nations. Every nation develops the system of education to express and promote its unique socio-cultural identity and also to meet the challenges of the times. The role of educational development in mitigating several problems of the human society has been realized at all levels. School education is an important segment of the whole educational structure and it is considered as a powerful instrument to develop students’ behavior and hence the society.

There have been many studies related to education issues in India. While discussing the education and cast in India, Chauhan (2008) pointed that low school enrolment and completion rates, high dropout and failure rates are reported are the characteristics amongst the weaker section of the society. Shortcoming related to teaching staff has also been identified as the major problems in effective teaching learning (Desai, 1999). Despite of government’s effort to provide uniform level of education for its citizen, non-uniform academic experiences of students belonging to different schools are evident in India. Such differences are not only between urban and rural schools, but also amongst the schools having similar location. The existences of varying academic experiences viz., rich and poor, rural and urban in India are also reported (Banaji S. 2005). The micro level investigations are also conducted to assist effective teaching-learning in India. The importance of curriculum reform through changes in evaluation process in effective teaching-learning process is evidenced by such study (Agrawal, 2004).

The importance of quality education in nation building has also been realized by several nations including developed countries. Several developed nations including USA realized that their role as leaders in the world’s economy and their capacity to produce wealth and quality jobs depend directly on the ability of education system to produce students who
can compete in mathematics and science dominated industries of the future. Thus, improving mathematics and science education has been the priority of the policymaking agenda (Anon, 2005).

Students’ performance in mathematics subject has been investigated through bilateral surveys in two European countries (Robertson, 2000). Requirements of changes in national policies suiting their respective culture are emphasized in order to minimize the differences in performances amongst the countries.

The interactions of a large number of socio-economic as well as academic environmental factors influence the student’s performance in school. Poor school performance not only results in the child having a low self-esteem, but also causes significant stress to the parents (Karande and Kulkarni, 2005). Identification of causes of poor performance and execution of corrective action plan so that the students can perform up to their full potential is required.

A psychological aspect of female students with special reference to mathematics subject has been matter of investigation in past reporting that high mathematics anxiety is associated with low mathematics achievement (Yee, 1987). Another interesting finding of such study was that for the most capable students, test anxiety seems to act as a facilitator in their mathematics performance. The role of teachers has also been pointed out by the study stating that students' scores on the perception of their mathematics teachers have the strongest correlation with their mathematics anxiety scores. Teacher’s quality supported by training and experiences has influencing role in effective teaching-learning. Teaching experience plays important role in success of education (Tui, 1987).

From the above discussion it is evident that education has not only the priority area of policy makers, but adequate attention has also drawn to many researchers. The present investigation is concerning the secondary school education prevailing in a region of India.
India is a developing country with vast chunk of human resources. The Indian Government has realized the importance of educational development and therefore, provides required importance in education. A multi-level structured education system prevails in India. The levels and major governing bodies of education prevailing in India are presented in Table 1 and Table 2, respectively. The present investigation is pertaining to secondary school education and schools considered in the present study are under the state government board.

Table 1. Levels of education system in India

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pre- Primary</td>
<td>It consists of children of 3-5 years of age studying in nursery, lower kindergarten and upper kindergarten.</td>
</tr>
<tr>
<td>2</td>
<td>Primary</td>
<td>It includes the age group of children of 6-11 years studying in classes from 1st first to 5th</td>
</tr>
<tr>
<td>3</td>
<td>Middle</td>
<td>It consists of children studying in classes from 6th to 8th</td>
</tr>
<tr>
<td>4</td>
<td>Secondary</td>
<td>It includes students studying in classes 9th and 10th</td>
</tr>
<tr>
<td>5</td>
<td>Higher Secondary</td>
<td>Includes students studying in 11th and 12th classes</td>
</tr>
<tr>
<td>6</td>
<td>Undergraduate</td>
<td>Here, a student goes through higher education, which is completed in college. The duration of undergraduate course may vary according to the subject pursued by the student.</td>
</tr>
<tr>
<td>7</td>
<td>Postgraduate</td>
<td>After completing graduation a student may opt for post graduation</td>
</tr>
</tbody>
</table>

The Indian Government has initiated several plans such as ‘Sarva Siksha Abhiyan’ (SSA), District Primary Education Program (DPEP), Operation Blackboard, Mid Day Meal etc, mainly to improve the level of primary education and to reduce illiteracy. Government also makes plan and policy to address issues related to upper levels of education including secondary education. The national policy of education (1986) and program of action (1992) states that the curriculum of secondary education should expose the students to differentiated roles of science, the humanities, and social science. The roles of teacher and infrastructure facility for effective education are also realized and mentioned in the policy documents.

Progress in education scenario is remarkable in India probably due to Government policy and programmes. However, some areas still require attention. The quality of secondary
education is such an area which needs special intervention and attention. There are several subjects taught at school e.g. language, literature, social studies, science and mathematics. Subject wise performance variations are generally reported. Amongst the subjects taught in schools, mathematics is considered as one of the toughest subjects with poor performances of students. The lower level of pass percentage has been a matter of serious concern. Thus, science subject in general and mathematics in particular has been a problem area for majority of secondary schools in India.

Table 2. Education Governing bodies in India

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Central Board of Secondary Education</td>
<td>This is the official governing body of education system in India. It conducts examination and looks after the functioning of schools accredited to central education system from primary to higher secondary level</td>
</tr>
<tr>
<td>2</td>
<td>The State Government Boards</td>
<td>Apart from CBSE and CISCE each state in India has its own State Board of education, which looks after the educational issues up to higher secondary level. Some states have separate board for secondary and higher secondary levels</td>
</tr>
<tr>
<td>3</td>
<td>The Council of Indian School Certificate Examination</td>
<td>It is a board for Anglo Indian Studies in India. It conducts two examinations 'Indian Certificate of Secondary Education' and 'Indian School Certificate'. Indian Certificate of secondary education is a k-10 examination for those Indian students who have just completed class 10th and Indian school certificate is a k-12 public examination conducted for those studying in class 12th</td>
</tr>
<tr>
<td>4</td>
<td>The National Open School</td>
<td>It is also known as National Institute of Open Schooling. It was established by the Government of India in 1989. It is for those students who cannot attend formal schools.</td>
</tr>
<tr>
<td>5</td>
<td>The International School</td>
<td>It controls the schools, which are accredited to curriculum of international standard</td>
</tr>
</tbody>
</table>

The state of Assam is one of the economically backward regions of India located in north-eastern region. The state has witnessed several socio-political turmoil in recent past centering on the younger population. Provision for appropriate employment could distract the younger generation from such disturbing activities. The entire north-eastern region has agricultural dominancy with lower economical and industrial activities. The oil and tea are
two major industries absorbing manpower based on certain level of academic skill. Similarly, appointments in other local and national sectors also demand competitive academic skill. It is true that secondary school curriculum is prepared to impart necessary academic training for higher education as well as for such academic skill. The course curriculum is only one factor responsible for imparting quality education. There are other academic environment factors governing the success of secondary education to achieve its goal. If socio-political disturbances involving youth of this region are considered as a yardstick of educational performance, then analysis of the existing education system prevailing in this region is imperative.

It is being often told that there exists phobia towards mathematics learning amongst the student communities of secondary schools. Mathematical skill is essential not only for the higher education aspiring section, but also success in several competitive examination for jobs depends upon the basic understanding in mathematics. Thus, perfect teaching-learning in secondary schools in all subjects in general and mathematics subject in particular has been a serious issue needing investigation.

Keeping in view of the above discussion, the present investigation is undertaken to analyse the educational scenario of some selected secondary schools located in Assam. The students’ performance reflected by examination results will be analyzed in light of several socio-academic factors. The specific objectives of the present investigation are mentioned below:

1. To investigate the academic scenario of secondary schools in Assam with special reference to (i) age, (ii) management, (iii) teacher : student ratio and (iv) result of 10th standard school leaving examination.
2. To compare the academic performance in mathematics subject with performances in other subject of secondary schools of Assam as reflected by scores of students’ class examination.

3. To investigate the dependency of students’ mathematical performance on some relevant academic environmental factors prevailing in secondary schools of Assam.

Methods and materials

Study domain

The study covers some selected schools of Nalbari, Assam (India). The selected schools follow the course curriculum of a state government managed academic organization called Board of Secondary Education, Assam (SEBA).

The Nalbari is one of the 23 districts of Assam located between 26°N and 27° N latitude and 91° E and 97° E longitude. The northern side of the district is bounded by the Indo-Bhutan International boundary and the southern side by the mighty Brahmaputra. The district with 2.88% area of the state shelters about 4.27 % of the state’s total population. The population density of the district is 504 persons/square km as against 340 persons/per square km for the state as a whole. Nearly, 97.59% of the total populations (0.67 million) of the district live in villages.

The literacy rate of Nalbari is 68.08% which is marginally higher than that of the State (64.28%). It covers large number of schools with variations of managerial status and socio-economic conditions (urban and rural). Schools of Nalbari district is considered to be representative of schools of Assam and therefore, selected for the present study.

Selection of schools and pupil

List of secondary schools (having curriculum for IX and X standard) is collected from the local education department. Schools are classified based on the nature of financial and managerial assistance as (i) Government (GO: fully managed by Government), (ii) Provincialized (PZ: Partially managed by Government), (iii) Recognized (RG: Government
has recognized for provincialization, but has not come under government management/assistance), (iv) Non–recognized (NR: established by private effort and only with permission of Government) (v) Private (PR: established and run by private party).

Again, location of the schools is also considered as one of the criteria for grouping. Accordingly schools are classified into urban (U) and rural (R).

A sample of 21 schools out of total 223 schools of Nalbari District is selected to have representation in each category mentioned above based on a standard randomized procedure. After finalizing the study schools, 25% of total pupil of class X of each school is randomly selected for evaluation and analysis. Altogether 244 students are selected from these 21 schools.

**School data**

Following information is collected from each of the study school.

(i) **Basic information of school:** Year of establishment, total number of teachers, number of mathematics teachers and total number of students of each school are collected.

(ii) **HSLCE results:** High School Leaving Certificate Examination (HSLCE) is a common test for 10th standard students conducted by Board of Secondary Education of Assam (India) under the state Government of Assam. This is a standard test and majority of the schools of Assam follow HSLCE for evaluation of the 10th standard students. Uniform pattern for testing and evaluation are followed for all the schools and therefore, the results can be considered as a uniform treatment for all schools. There are altogether six different subjects in the HSLCE including mathematics. In general, a minimum of 30% of the total marks is set for declaring pass *i.e.* success in HSLCE. In the present study, HSLCE passing percentages of each school during three consecutive years viz., 2004, 2005 and 2006 are collected as a measure of academic performance of the schools.
(iii) Results of annual examination: The school conducts annual test of all the six subjects including mathematics. Though each school conducts test individually, the syllabus is common and therefore, the test is considered uniform treatment for all the study school.

For the present study, following information relating to results of annual tests for all the students are collected: (a) percentage scores of all the subjects excluding mathematics and (b) percentage scores in mathematics subject only.

Data analysis
Collected information is analysed as given below:

Coding of school

Each school is considered as an individual study sample and schools are coded such that status with respect to (a) management, (b) location, (c) age of establishment can be read from the codes. For example, $S_{PZ\_R\_059}$ is a provincialized (PZ), rural (R) school with an age of establishment of 59 years. If schools have identical years of establishments then they subscript a, b etc are used for distinction, e.g., $S_{RG\_R\_017a}$ and $S_{RG\_R\_017b}$ both are RG category of school with 17 years of age.

Academic performance indicators

Three indicators are defined as a measure academic performance of the schools under study as discussed below.

(i) Pass percentage in HSLCE ($PSLCE$): The percentages of successful students in HSLCE during 2004, 2005 and 2006 of a school are averaged to estimate $PSLCE$ of the school. It is assumed that higher the $PSLCE$ better the academic performance of the school.

(ii) Class average performance excluding mathematics ($CAO$): This is the average of the individual students’ percentage score in all the subjects excluding mathematics in two consecutive year’s annual examinations viz., Class VIII and Class IX. Higher CAO
would indicate presence of more number of better performing students in the school. This is a performance indicator for all subjects except mathematics.

(iii) Class average mathematics performance (CAM): This is the averages of the individual students’ percentage score of two consecutive year’s annual examinations (Class VIII and Class IX) in mathematics subject only. Better performance in mathematics would be reflected by higher CAM of a school.

For estimation of CAO and CAM, average percentage score of annual examination results for classes VIII and IX have been used. It is to be noted that CAO reflects the students’ ability and school’s performance in subjects other than mathematics, whereas, CAM would reflect the students’ ability and school’s performance in mathematics.

**Academic environment indicators**

The student: teacher ratio of a school influences academic environment. The ratio of student and teacher (S:T) of all the schools under consideration have been estimated form the collected data of (a) total number of enrolled students and (b) total number of teachers. As the focus of present investigation is on performance in mathematics subject, the ratio of students and mathematics teachers (S:M) has also been estimated and used as an indicator of the academic environment of the school.

**Ranking of schools**

The schools are ranked based on (a) PSLCE, (b) CAO, (c) CAM, (d) (S:T) and (e) (S:M) values. The school with the highest PSLCE is ranked 1, while the school with the lowest PSLCE is given the lowest rank. All other schools with intermediate PSLCE values are also ranked accordingly. Similar pattern of ranking is used for CAO and CAM, while reverse order is followed for ranking the school for (S:T) and (S:M). This is due to the fact that lower the S:T or S:M, better the academic environment of the school.
Investigation of mathematics performance in the light of measured parameters

The CAM ranks are considered as the performance indicator in mathematics subject of the schools. Ranks for other parameters are compared with the CAM ranks through x-y plot to investigate their relationship (CAM ranks are plotted in y-axis, while ranks for other parameters are plotted in x-axis). For a given pair of ranks, greater deviation of the plots from the $x = y$ line would reflect lack of mutual dependence of the parameters.

Results and discussion

The results of this study are presented and discussed below.

Characteristics of the schools under study

Age of school, type of management, location and teacher-student ratio are some of the influencing parameters of academic environment of a school. Information collected from the schools relating to these parameters is presented in Table 3. The overall academic environment with reference to these selected parameters of the schools under study are considered relevant for the present study and discussed below. The study schools are coded with descriptions of managerial status, location and age.

Amongst the schools, there is one Government school and eleven schools are provincialized. Six schools obtained the Government recognition to operate, whereas, two other have not yet recognized. There is only one private school in the selected sample. As mentioned earlier, the numbers of schools in each category are selected based on standard sampling procedure.

Rural dominance is noticed as there are only three schools ($S_{GO \_U \_119}$, $S_{PR \_U \_021}$ and $S_{PZ \_U \_078}$) located in urban area.

There is school as old as 119 years ($S_{GO \_U \_119}$) amongst the selected schools. Altogether, there are nine schools ($S_{GO \_U \_119}$, $S_{PZ \_U \_078}$, $S_{PZ \_R \_059}$, $S_{PZ \_R \_053}$, $S_{PZ \_R \_050}$, $S_{PZ \_R \_048}$, $S_{PZ \_R \_045}$, $S_{PZ \_R \_044}$ and $S_{PZ \_R \_044}$) more than 40 years old. Six schools ($S_{RG \_R \_019}$, $S_{GO \_U \_119}$, $S_{PZ \_U \_078}$, $S_{PZ \_R \_044}$ and $S_{PZ \_R \_044}$) more than 40 years old. Six schools ($S_{RG \_R \_019}$, $S_{GO \_U \_119}$, $S_{PZ \_U \_078}$, $S_{PZ \_R \_044}$ and $S_{PZ \_R \_044}$) more than 40 years old. Six schools ($S_{RG \_R \_019}$, $S_{GO \_U \_119}$, $S_{PZ \_U \_078}$, $S_{PZ \_R \_044}$ and $S_{PZ \_R \_044}$) more than 40 years old. Six schools ($S_{RG \_R \_019}$, $S_{GO \_U \_119}$, $S_{PZ \_U \_078}$, $S_{PZ \_R \_044}$ and $S_{PZ \_R \_044}$) more than 40 years old.
SRG_R_019, SRG_R_017_1, SRG_R_017_2, SNR_R_015 and SNR_R_009) are less than 20 years old. Overall, the selected schools may be considered as fully established.

The largest school (970 enrolled students) is a private school located in urban area and relatively a new school established in 1985. On an average, for every 27 students there is one teacher in this private school and almost about one third of total teachers are mathematics teacher. Amongst the provincialized schools, student-teacher ratio (S:T) varies between 10 and 48. Comparatively, recognized category of schools have better S:T ratio with a variation between 7 and 19 mainly due to lower student population.

Table 3 Parameters of the Schools considered under study

<table>
<thead>
<tr>
<th>School Code</th>
<th>Description</th>
<th>S:T</th>
<th>S:M</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGU_119</td>
<td>Government, urban and 119 years old</td>
<td>18</td>
<td>63</td>
</tr>
<tr>
<td>SPR_U_021</td>
<td>Private, urban and 21 years old</td>
<td>27</td>
<td>97</td>
</tr>
<tr>
<td>SPZ_U_078</td>
<td>Provincialized, urban and 78 years old</td>
<td>16</td>
<td>58</td>
</tr>
<tr>
<td>SPZ_R_059</td>
<td>Provincialized, rural and 59 years old</td>
<td>27</td>
<td>807</td>
</tr>
<tr>
<td>SPZ_R_053</td>
<td>Provincialized, rural and 53 years old</td>
<td>28</td>
<td>112</td>
</tr>
<tr>
<td>SPZ_R_050</td>
<td>Provincialized, rural and 50 years old</td>
<td>29</td>
<td>132</td>
</tr>
<tr>
<td>SPZ_R_048</td>
<td>Provincialized, rural and 48 years old</td>
<td>20</td>
<td>116</td>
</tr>
<tr>
<td>SPZ_R_045</td>
<td>Provincialized, rural and 45 years old</td>
<td>48</td>
<td>483</td>
</tr>
<tr>
<td>SPZ_R_044a</td>
<td>Provincialized, rural and 44 years old</td>
<td>41</td>
<td>110</td>
</tr>
<tr>
<td>SPZ_R_044b</td>
<td>Provincialized, rural and 44 years old</td>
<td>22</td>
<td>84</td>
</tr>
<tr>
<td>SPZ_R_039</td>
<td>Provincialized, rural and 39 years old</td>
<td>10</td>
<td>36</td>
</tr>
<tr>
<td>SPZ_R_028</td>
<td>Provincialized, rural and 28 years old</td>
<td>15</td>
<td>160</td>
</tr>
<tr>
<td>SPZ_R_024</td>
<td>Provincialized, rural and 24 years old</td>
<td>22</td>
<td>79</td>
</tr>
<tr>
<td>SRG_R_029</td>
<td>Recognized, rural and 29 years old</td>
<td>10</td>
<td>60</td>
</tr>
<tr>
<td>SRG_R_022</td>
<td>Recognized, rural and 22 years old</td>
<td>11</td>
<td>63</td>
</tr>
<tr>
<td>SRG_R_019a</td>
<td>Recognized, rural and 19 years old</td>
<td>19</td>
<td>104</td>
</tr>
<tr>
<td>SRG_R_019b</td>
<td>Recognized, rural and 19 years old</td>
<td>7</td>
<td>33</td>
</tr>
<tr>
<td>SRG_R_017a</td>
<td>Recognized, rural and 17 years old</td>
<td>9</td>
<td>34</td>
</tr>
<tr>
<td>SRG_R_017b</td>
<td>Recognized, rural and 17 years old</td>
<td>13</td>
<td>46</td>
</tr>
<tr>
<td>SNR_R_015</td>
<td>Non-recognized, rural and 15 years old</td>
<td>11</td>
<td>55</td>
</tr>
<tr>
<td>SNR_R_009</td>
<td>Non-recognized, rural and 9 years old</td>
<td>13</td>
<td>60</td>
</tr>
</tbody>
</table>

The ratios of student to mathematics teacher (S:M) have also been estimated and presented in Table 3. There are altogether 8 schools with more than 100 students for each mathematics teacher. The condition seems to be critical for two schools (SPZ_R_059 and
where there is only one mathematics teacher for each 807 and 483 enrolled students of these schools, respectively.

**Academic performance**

As discussed earlier, three indices viz., PSLCE, CAO and CAM are defined for evaluating the academic performances of the selected schools. Varied performances are noticed with reference to these parameters amongst the 21 schools under study which is presented in Fig. 1 (see appendix). All the three parameters for the 21 schools are presented in Fig. 1 and discussed below.

**Pass percentage of school leaving certificate examination (PSLCE)**

There is a remarkable variation of the pass percentages amongst the 21 schools under study. The highest and the lowest PSLCE have been 98% (S_{PZ,R_048}) and 16% (S_{RG,R_019b}), respectively. There are 15 schools with more than 50% PSLCE, out of which 9 schools having more than 80% PSLCE. Six schools recorded between 50% and 80% PSLCE, whereas PSLCE of remaining six schools are below 50%.

If PSLCE is considered as the yardstick for overall academic performance, the majority of provincialized (7 out of 11) schools along with the lone government (GO) and private (PR) are better performer having more than 80% PSLCE. Another fact worth mentioning that performances of all the three schools located at urban area are better having more than 80% PSLE.

The six intermediate performer categories of schools (50-80% PSLCE) belong to PR (3), RG (1) and NR (1). The bottom categories of PSLCE performer belong to four RG schools along with one each PZ and NR. The performances of non-recognized schools are better than recognized schools as evident from the facts that all the four schools having less than 30% PSLCE are recognized category of school.

Government (GO) schools are few in number and it is fully aided and managed by government. Thus, infrastructural facility and prospect of availability of quality teacher are
better in GO schools compared to other category of schools. The provincialized (PZ) schools
are aided by government and managed by local management bodies. Limited financial aids
including salary of teachers are provided by government. Infrastructural facilities and
financial condition of this category of school is better than recognized (RG) and non-
recognized (NR) schools. As mentioned earlier, RG and NR schools are not aided by
government and only established with anticipation of getting provincialization status in near
future. Mostly these schools are running with varying degree of financial constraints.
Introduction of private (PR) schools are relatively new in educational scenario of Assam.
There are several objectives of initiating private school discussion of which is considered out
of scope of the present study. As students fees constitutes major component of revenue of PR
category of school these schools are remain alert to perform better so as to attract more
students. PR schools also create infrastructural facility and attempted to appoint qualified
teacher with an aim to improve performance.

This part of the results of the present investigation concerning PSLCE performance
can be viewed as the reflection of status of the schools with regards to financial and
managerial aids as discussed above. The students of GO and PR schools are exposed to
favourable academic environment in terms of infrastructure and teacher resulting higher
PSLCE. On the other hand, students of RG and NR school might have not received similar
treatment as that of GO and PR. Similarly, the performance of seven PZ schools can also be
explained on the basis of students’ exposure to better academic environment. However, the
relatively worse PSLCE performance of four PZ schools viz., S_{PZ_R_044b} (71%), S_{PZ_R_045}
(68%), S_{PZ_R_053} (66%) and S_{PZ_R_039} (29%) would require further investigation. All these
schools are old and receiving financial aids from government. The student teacher ratio of
these schools are also comparable with other schools except S_{PZ_R_045} which has S:T=48.
Students’ performance in annual examination

The performances of the schools in terms of CAO are also in similar pattern as that of PSLCE barring a few exceptions. In general, urban located private, government and provincialized schools’ class average scores are better than recognized and non-recognized schools. The highest CAO (75.19) of S\textsubscript{PR, U, 021} is substantially higher than the lowest CAO (26.76) of S\textsubscript{RG, R, 017a}. There are only five schools with more than 50% CAO belonging to two PZ, and one each of PR, GO and NR amongst the 21 schools. It is also noticed that performances of majority of students fall within 30% to 50% as CAO of 13 schools falls in this range. Again majority of these 13 schools belong to PZ (8), followed by RG (4) and NR (1). The worse performer schools with CAO less than 30% belong to RG (2) and PZ (1).

Mathematical performance in annual examination

There are three schools with more than 60% CAM viz., S\textsubscript{PR, U, 021} (82.92%), S\textsubscript{PZ, U, 078} (64.21%), S\textsubscript{GO, U, 119} (61.56%) amongst the schools under study. CAM values of the remaining 18 schools are below 50%. Again out of these 18 schools, CAM values of seven schools belonging to PZ (3), RG (3) and NR (1) are even less than 30%.

The mathematical performance of S\textsubscript{PZ, R, 024} is not in line with its PSLCE performance. This 24 years old, provincialized and rural school performed better in HSLCE making more students successful, but its CAM is only 22.94% - the worst amongst the schools under study. The S:M of this school is 79 which is more than S\textsubscript{PR, U, 021}, the highest CAM scorer with S:M of 97. Thus, inadequacy of mathematics teacher can not be termed as a reason of poor performance in mathematics of S\textsubscript{PZ, R, 024}. CAO of this school is 43.60% and this indicates the requirement of special care for mathematics subject.

Overall, the CAM values are less than their respective CAO values except for four schools viz., S\textsubscript{PR, U, 021}, S\textsubscript{GO, U, 119}, S\textsubscript{PZ, R, 028}, S\textsubscript{RG, R, 029}. It implies that mathematics as subject is not helping majority of the students and due attention is needed to address this aspect.
Mathematics performance ranking vs. ranking of other academic parameters

This part of the analysis is made to investigate the dependency vis-à-vis relationship between relative mathematics performances of the selected schools (given by CAM ranks) and relative statuses of the schools given by (i) S:T, (ii) S:M, (iii) PSLCE and (iv) CAO ranks.

The x-y plots between CAM ranks and ranks of other parameters viz., S:T, S:M, PSLCE and CAO are shown in Figs. 2 through 5 (see appendix). The values of coefficient of correlation are also estimated and presented in the respective Figs.

Both the x-y plots relating relative mathematics performance with relative adequacy of total teachers (Fig. 2) and mathematics teachers (Fig. 3) of the schools (represented by the ratios of students and teachers of individual school) failed to indicate distinct trend. It is noticed that there exists great variations of S:T (7 to 48) as well as S:M (33 to 807) amongst the schools under study. Similarly, variations are also noticed in the CAM (22% to 83%) performance amongst the schools. As mentioned earlier, the values of performance parameter as well as values of academic environment parameters are ranked to investigate dependency of relative statuses. The high degree of scatter of (i) CAM vs. S:T (Fig. 2) and (ii) CAM vs. S:M (Fig. 3) indicates lack of dependency between mathematics performance and student–teacher ratio. Further, it is observed that S:T and S:M ranking of the schools are negatively correlated with CAM ranking.

As mentioned earlier, results of HSLCE can be used as measure of academic performance of school. The scores by individual students and passing percentage of school are the measure of performances. However, in the present study only, passing percentages (PSLCE) in HSLCE have been used as an index of academic performance. The dependency of relative mathematics performance (given by CAM rank) with HSLCE performance (PSLCE ranks) of the schools is investigated through x-y plot (Fig. 4). Overall, relative mathematics performance is positively correlated with HSLCE performance (degree of
correlation as 0.509). However, there are several schools exceptional to this relation. The most prominent exceptional schools are $S_{PZ,R,048}$ (1st PSLCE and 15th CAM), $S_{PZ,R,024}$ (4th PSLCE and 20th CAM), $S_{NR,R,009}$ (13th PSLCE and 4th CAM rank) and $S_{RG,R,019}$ (21st PSLCE and 12th CAM). $S_{PZ,R,048}$ being a provincialized school is expected not to be constrained by managerial and financial factors and is showing the best HSLCE performance. However, the poor performance in mathematics as well as in other subject is a matter of concern. Mere maintaining higher level of pass percentage can not be considered as the objective of secondary education. If CAM and CAO are considered as the reflection of students understanding on the respective subjects, then the reason(s) of poor CAM (also CAO) of $S_{PZ,R,048}$ School should be investigated for initiating appropriate corrective measures. Otherwise, the group of learners studying in this school would be deprived of some required academic treatments so as to improve their performance. Similar, is the case of $S_{PZ,R,024}$. However, the cases of $S_{NR,R,009}$ and $S_{RG,R,019}$ are different as reflected by better relative performances in mathematics associated with poor HSLCE performance.

The average mark obtained by a group of student in a given subject is considered as an index of performance of the group on that subject. Accordingly, CAO and CAM have been defined and evaluated in the present study to reflect the relevant performances of the 21 schools under study. The dependency of relative performances in mathematics on the relative performances in other subjects is examined by the plot given in Fig. 5. In general, the plot reflects dependency between CAM and CAO with value of positive coefficient of correlation as 0.788. Thus, schools with better performance in subjects other than mathematics are also better performer in mathematics barring few exceptions. The clear example being $S_{PZ,R,024}$ with relatively better CAO performer with 8th rank while poor performance in CAM with 20th rank.
Conclusions

A wide range of variations are observed amongst the secondary schools of Nalbari district of Assam with reference to managerial status and academic performance. Investigation of the prevailing education scenario vis-à-vis mathematics performance of students of 21 representative schools of Assam revealed wide variations of academic environment amongst the school so also the performances. The financial and managerial status of the schools seems to be the major factors of academic performance. In general, academic performances as well as mathematics performances of the government and private schools are better than the schools not getting government aids. The study also revealed that mathematics performances of schools are positively correlated with (a) the academic performance of school indicated by school leaving pass percentage and also (b) with the performances in subjects other than mathematics. On the other hand, students and teacher ratio seems not to affect the mathematics performance of the schools under study. The requirement of urgent attention to improve the performance of secondary school is indicated considering the societal needs. The state of Assam is one of the economically backward regions of India and is witnessing socio-political disturbances manly centered with younger population. Object oriented education leading to increase in employment opportunities is expected to reduce the present social crisis. Appropriate secondary school knowledge backed by perfect learning in mathematics can make the students competent for future career.
References


APPENDIX
Fig. 1 Academic performance pattern of schools under study
Fig. 2. CAM rank vs. PSLE rank
Fig. 3. CAM rank vs. CAO rank

$r(CAO, CAM) = 0.788$
Fig. 4. \( CAM \) rank vs. \( S:T \) rank

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r(S:T, CAM) = -0.402
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Fig. 5. $CAM$ rank vs. $S:M$ rank

$r (S:M, CAM) = -0.366$