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The present study has adopted the analytical survey research method, where information is collected on a range of explanatory variables that are hypothesised to influence the criterion variables of interest. Here the main criterion is the achievement of students in computer science subject. Achievements were further analyzed to investigate how differences in computer achievement of students could be explained by factors such as their attitude towards the subject, sex of the students and the qualification of the teachers.

3.1 Research questions

The following research questions were considered in the study.

(a) What is the attitude of students toward computer education?
(b) What is the attitude of teachers towards computer education?
(c) Does the students achievement test score have any relationship with their attitude towards computer science?
(d) Does the students attitude towards computer science differ from that of teachers?
(e) Does the attitude of girls towards computer science differ from that of the boys?
(f) Is there any difference in achievement test results of girls and boys?
(g) Is there any difference between students of Assamese medium and English medium students regarding their attitude towards computer science as well as their achievement in the computer science subject?
3.2 Objective of the study

3.2.1 General objective

The general objective of the study is to obtain a detailed description of the status of computer education in the secondary schools of Assam.

3.2.2 Specific objective

(a) To understand the attitude of students and the teachers towards computer education.
(b) To assess the educational background of the teachers and their experience with computers.
(c) To assess the infrastructural facilities in the schools.
(d) To assess the gender disparities in computer education if any.
(e) To assess the knowledge (in terms of achievement score) of the students in computer science.
(f) To find out differences if any in computer education between Assamese medium and English medium students.
3.3 Sampling Design

The present study may be termed as analytic survey research method. It is aimed at investigating the existing status of computer education in the secondary schools of Assam.

3.3.1 Target population

All government and government-aided and private schools following the curriculum for computer education course laid down by the Board of Secondary Education Assam within the territory of Assam in the year 1998 and 1999 are taken as the target population.

3.3.2 Teachers

All the teachers teaching computer science to the students in the selected schools have been included in the sample.

3.3.3 Students

All students studying in class VIII and IX with computer education as a subject of study in the selected schools have been included in the present study.

3.4 The sampling frame

The multistage sampling technique has been adopted, as outlined below:
3.4.1 Selection of schools

All government and government aided and private secondary schools following the curriculum of computer education course laid down by the Board of Secondary Education, Assam in the year 1998 and 1999 are included in the sample schools, barring the one that did not offer computer education in VIIIth and IXth classes.

So far the following schools have been accorded permission to introduce computer education with effect from the academic session of 1996:

4. Don Bosco High School, Guwahati.
5. Ankur Seminary, Guwahati.
6. St Mary's High School, Guwahati.
7. Somar Vidyapeeth High School, Digboi.
8. Miles Bronsons' Residential School, Guwahati.
10. Sibsagar Govt. HS & MP School, Sibsagar.
11. Sishu Niketan Digboi High School, Digboi.
12. South Point High School, Guwahati.
15. Town High School, Silchar.
For the present investigation the following schools were selected. The schools which were not included are the ones which did not offer computer education in the VIIIth and IXth classes at that point of time.

(3) Barpeta Higher Secondary School, Barpeta.
(4) Don Bosco High School, Guwahati.
(5) Blue Bird English Medium High School, Guwahati.
(6) Holy Child High School, Guwahati.
(7) St Mary's English High School, Guwahati.
(8) South Point English High School, Guwahati.
(9) Miles Bronsons' High School, Guwahati.
(10) Sishu Niketan, Digboi.
(11) Sibsagar Govt. HS & MP School, Sibsagar.
(12) Ankur Seminary, Guwahati.

3.4.2 Selection of the Students

The following selection procedure was followed:

(a) If there was only one section in a class and there were 30 or less number of students, then the entire class was selected.

(b) If there were more than 30 students, then the class register was referred to. Boys and girls were arranged
alternately and 30 students were selected by using the random number table.

(c) If the number of section was found to be more than one and if the sections did not indicate ability grouping, then one section was randomly selected and again the class register was referred to select 30 students by using the table of random numbers.

3.5 The sample for the present study

For the present study the sample comprise altogether 490 students.

Table – 3.1

<table>
<thead>
<tr>
<th>Sex</th>
<th>Class VIII</th>
<th>Class IX</th>
<th>Total</th>
<th>Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>English medium</td>
<td>Assamese medium</td>
<td>English medium</td>
<td>Assamese medium</td>
</tr>
<tr>
<td>Male</td>
<td>94</td>
<td>43</td>
<td>83</td>
<td>55</td>
</tr>
<tr>
<td>Female</td>
<td>99</td>
<td>9</td>
<td>90</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>193</td>
<td>52</td>
<td>173</td>
<td>72</td>
</tr>
</tbody>
</table>

3.6 Tool used

The study involved the collection of data through the following tools.

(a) Computer attitude questionnaire to measure the attitude of students and the teachers towards computer education.

(b) Achievement test to measure the academic achievement of students in computer education.
(c) Questionnaire for students to elicit factual information about students experience with computer.

(d) Questionnaire for teachers for acquiring information with regard to the teachers educational background, their perceptions about how computer instruction could be improved, and also about the facilities provided in the school for computer education.

(e) Besides, informal discussions were also held with the parents, students, heads of the institutions, private agencies etc. implementing computer education in the schools for some further inputs.

3.6.1 The computer attitude questionnaire

Social psychologists of the 1920's focused on attitude as a central concept in seeking their field as a scientific discipline. Indeed, attitude seem so pervasive that their study might be said to cover the full range of human behaviour and experience. People tend to develop attitudes towards whatever they experience towards other people, towards moral and philosophical systems, towards political and religious institutions, apparently towards everything.

In educational application, learning and achievement attitude have been recognized as important predictors of individual differences (Evans, K. M. 1995). As a consequence.
considerable investment has been made in monitoring the attitudinal dimensions of established curriculum areas like mathematics education, science education and in U.K. even religious education.

More recently, there has been growing interest in measurement of attitudes towards computers among school students. As such, a number of scales have been constructed specifically for use among undergraduate students. For example, Griswarld P. A. (1983) examined the relationship between computer attitude and locus of control among education students studying psychology. Koohang (1986) examined the relationship between gender and computer attitude among students enrolled in a general education method course.

For the present study, to measure the attitude of the teachers and students towards computer education, the attitude questionnaire used for the purpose of the study is based on the previously published computer attitude scale used with students abroad (Griswarld P. A., 1983), (Jones T. and Clark V. A., 1994), (Robertson, S. Ian., et. al. 1995), (Gressard C. and Loyd B., 1996).

The following procedure was followed to develop the questionnaire:
3.6.2 Selection of the items of the attitude questionnaire

A pool of items was created from a number of available computer attitude scales to suit the needs of the study. Statements reflecting both favourable as well as unfavourable attitude towards computer education were included. A few items were reconstructed to make them suitable for local use. The questionnaire is composed of fifty nine (59) items to assess teachers' and students' attitude towards computer education. It has seven variables to measure anxiety, confidence, use, enjoyment, behaviour, competence and cognitive component. They were labeled (a) Computer anxiety, (b) Computer confidence, (c) Computer use, (d) Cognitive, (e) Computer enjoyment, (f) Computer competence, (g) Behaviour.

3.6.3 Description of the variables of the attitude questionnaire

(a) **Computer anxiety**: Anxiety is a condition within the individual. It is a generalized fear, born of a future incident or doubts created in the mind. Research evidence shows that learning not only depends on knowledge and acquisition but also on emotions and the mood state of the students. Emotions experienced in class-room context can be categorised as positive (as for
example joy, excitement) or negative (as for example anxiety anger, sadness). Anxiety has detrimental effects on cognitive performance. It was demonstrated in many studies that anxiety blocks task relevant information processing (The International Encyclopedia of Education, Second edition, Vol. I, 1994).

The computer anxiety section of the computer attitude questionnaire contains statements about how one feels about computers. The investigator sought to assess on the part of both the teacher and taught alike whether some form of anxiety exists because of this new innovation in the field of education. Examples include -

(13) Computer bore me.
(19) Working with computers makes me feel cut off from other people.

(The numbering of the above two sentences refer to their position in the questionnaire.) There are twelve (12) items intended for eliciting computer anxiety.

(b) **Computer confidence**: Computer confidence items in the questionnaire seek to reveal one's belief in the ability to work with computer. It is one of the effective variable that influences learning outcome. People who lack confidence in their ability to perform in a learning situation hesitate to attempt any challenging or difficult
task. The items in the questionnaire contain mainly positive statements showing eagerness and enthusiasm to learn and use the computer. Example include –

(7) I am sure I could do good work with computers.
(16) I am no good with computers.

There were four (4) items eliciting computer confidence.

(c) **Computer use**: This part of the computer attitude questionnaire seeks to analyse one’s understanding of the utility of computer in teaching learning process. It also relates to one’s perception about the effectiveness of computers. This section contains seven (7) items mostly in the form of assertions about the role of computers and their effectiveness particularly in education. Examples include –

(54) Computers are everywhere.
(46) Computers make mistake at least 10 per cent of the time.

(d) **Cognitive**: By cognitive we mean that mental process through which help we acquire knowledge of worldly things. Thus it refers to the acquisition of knowledge and beliefs about the environment, persons and society. The items in the cognitive attitude aimed at measuring beliefs about learning and understanding to work effectively with computers examples include –
(5) Working with computers means working on your own without contact with others.

(17) To use computer you have to be highly trained.

There are fifteen (15) items eliciting cognitive attitude.

(e) **Computer enjoyment**: Enjoyment is a feeling of pleasure one experiences. The items in the enjoyment components relate to the degree of enjoyment that respondent feel upon using a computer. This section also has certain items pertaining to students negative attitude towards computer. Examples include –

(8) I would like working with computers.

(28) I don’t know how some people can spend so much time in front of computer and seem to enjoy it.

There are eight (8) items for eliciting computer enjoyment.

(f) **Computer competence**: This part of the attitude questionnaire seeks to analyse a person’s belief about her/his extent of being competent with computers. It also aims at revealing one’s capacity to use computer knowledge in other than class-room situations. It also has negative items revealing lack of computer competency. Examples include –

(11) I am used to using computer.
(20) I know nothing about computer.

There were six (6) items for eliciting computer competence.

(g) **Behaviour**: Behaviour can be defined as – responses to the environmental conditions, which can be regarded as an agglomeration of interacting and interdependent manifestation of an individual (Encyclopedia Britanica. Vol. 2, 1988), i.e. any activity of an intact organism or all human actions admit of analysis into stimulus and response (Oxford Encyclopedia Dictionary. Vol. I. 1991). Thus behaviour of an individual calls for an individual mind. The items in the behaviour reflect mainly the intentions about working with computers. It is referred to as behaviour since the items relate to what the persons intend to do using a computer, i.e. the behavioural aspects of it. Examples include –

(47) I would like to spend a lot of time using a computer.

(29) If I can, I will take subject that will teach me to use a computer.

There were seven (7) items eliciting behaviour attitude.

**3.6.4 Scoring**

The attitude questionnaire is composed of fifty nine (59) items to assess teachers' and students' attitude towards computer
education. The survey used the five point (5 point) Likert format, and the responses to the items were coded as follows:
Strongly agree - 5, agree - 4, neither agree or disagree - 3, disagree - 2 and strongly disagree is 1.

In case of negative statement, the order of scoring is reversed. A high score on any of the components represents "positive" attitude towards computers. Students or teachers with a high score are therefore more likely to have positive views about the effectiveness of computers in learning.

3.6.5 Statistical techniques used

The scores obtained by the subject in different variables were analysed statistically. The mean score and the standard deviation of the students and teachers on the different variables was done. Further ‘t’ test was used for finding out significance of difference, if any, between the scores obtained by both on some selected variables of the study.

The computation of data was done through the most widely used computer package for analyzing quantitative data, known as the “Statistical package for social science” (SPSS).

3.6.6 Administration of attitude questionnaire

The average administration time of this questionnaire is fifteen (15) minutes. Prior to administration the teacher and the
students were told briefly about the nature of the study and the task that they were supposed to do. It was clearly brought out to them that this exercise would have nothing to do with their school examination or any kind of evaluation relating to school. They were further told that this is only an attempt to understand the state of computer education in Assam. There were no right or wrong answers. The only thing required from them was their kind co-operation and honest response. Since the responses will be kept strictly confidential there was no need to worry about the implication of the responses.

A few examples were written on the black board to clarify their doubts.

Teachers and students were administered the questionnaire separately. For the Assamese medium students and Assamese version of the same was used. A copy of each of the questionnaire is attached as Annexure I (English) and Annexure II (Assamese).

3.7 Achievement test

Achievement tests are designed to measure the proficiency gained by students in the activities stated in the school syllabus. Achievement tests, which are direct measures of school subjects, reveal their knowledge and understanding in terms of achievement
3.7.1 Construction of the achievement test

To measure the academic achievement of students in computer science subject two sets of achievement tests for the students of classes VIII and IX have been constructed. The tests have been formulated on the basis of suggestions from experts dealing with the computer syllabus for the Board of Secondary Education, Assam (SEBA), computer course.

The items included in the test may not necessarily follow the standardised pattern of computer tests, but they have been so designed that they are extracted intrinsically from the course content of the computer science syllabus of the Board of Secondary Education, Assam (SEBA).

The achievement test questionnaire for classes VIII and IX have three components (a) Knowledge, (b) Understanding and (c) Application. For class VIII, the number of items to test knowledge is fourteen (14), understanding seven (7), application four (4), with a total of twenty five (25) items.

For class IX, the number of items to test knowledge is ten (10), understanding five (5), application nine (9), total twenty four (24) items.

The test consists of multiple choice type questions with a view to assess the achievement of the students in the field of knowledge, understanding and application.
The assessment in the knowledge area in the present study deals with the knowledge outcomes concerned with facts, principles, methods and procedures of computer education. Understanding and application of knowledge are important. The students' learning must go beyond mere memorization of a fact or a principle. The students should be able to identify and apply their learning correctly as asked for. Hence the present test aims at reflecting the students' understanding of the subject and their ability to transfer learning situations that have not been previously encountered.

The questionnaire was applied on a sample of twenty (20) students (class VIII – 10 nos.), (class IX – 10 nos.) and it was modified on the basis of the responses given by the students initially.

For the present study, students of class VIII have been selected in view of the fact that they have already acquired a basic knowledge of computers in class VII. Likewise, it is expected that the knowledge of computer gets sharpened and strengthened by the time these students reach class IX.

For Assamese medium students the items in the questionnaire are translated into Assamese from English. Utmost care were taken in making the translation, so that the meaning of the statement did not get altered. A copy of each of the questionnaire is attached as Annexure III (English) and Annexure IV (Assamese).
3.7.2 Scoring of the achievement test

The scoring pattern of the achievement test is such that a student can get either ‘1’ or ‘0’, depending upon the student's response. A score of ‘1’ is given for the correct answer to a question and ‘0’ for the wrong answer. This implies that the total score of a student can range from ‘0’ to ‘25’ for class VIII and from ‘0’ to ‘24’ for class IX.

3.8 Students questionnaires

To elicit factual information about students' experience with computers, a questionnaire relevant to the study was prepared by the following procedure.

3.8.1 Construction of the students questionnaire

Before preparing the questionnaire a number of books and journals were consulted to decide the type of questions to be incorporated to elicit responses on the selected variables. In addition favourable and unfavourable opinions relating to computer education in schools were collected through informal discussions with the students taking computer in the schools. The opinions expressed by the different students formed the bases for the development of the items in the students’ questionnaire.
After getting the required opinion from the students, the investigator had discussions with the experts to give their critical comments and suggestions on the items of the questionnaire to improve it. On the basis of the discussion the questionnaire was prepared. Initially the questionnaire was applied on a sample of 25 students and it was modified on the basis of responses of the students. The students’ questionnaire consists of 10 questions. In each question there were minimum two to maximum five options. The students had to respond by writing the appropriate number given against each box. Each of these questions dealt with different aspects of computer education in school as for example:

Question 1: Information from the students as to why they have taken computer as a subject.
   (a) I have chosen this subject because it will help in my future career – 1
   (b) I took this subject because it is a compulsory subject in our school – 2

For the Assamese medium students an Assamese version of the same was used. A copy of each of the questionnaire are attached as Annexure V (English) and Annexure VI (Assamese).

3.8.2 Scoring of the students questionnaire

The scores obtained by the subjects in different items of the questionnaire were analysed statistically. In each question
there were minimum two to maximum five options. The responses of the students were simply tallied against each option and expressed in percentage for further analysis.

3.9 Teachers’ questionnaire

As teachers are considered to be the back-bone of the educational system, it is important to know about their education, their experience with computer, their felt needs in computer education, about their views regarding the importance of computer in school education etc. Hence the teachers imparting computer education were also asked to answer a parallel questionnaire.

3.9.1 Construction of the teachers questionnaire

The procedure for the construction of teachers questionnaire was same as that of the students questionnaire.

The items of the teachers’ questionnaire regarding the computer education are grouped as follows.

(1) Teachers educational background and their experience with computer. For example -

(a) Name of the School, Name of the Teacher, Sex
   Qualification
(b) Years of teaching experience.

It contains six (6) questions.
(2) Teachers perceptions about how computer implantation could be improved. For example -

(a) How important do you feel computers to be in today's class-room?

(b) Give the most important reason for implementing computers.

It contains four (4) questions.

3. Facilities in the school for computer education. For example -

(a) Who is conducting the course of computer education?

(b) Does your school have provision for annual maintenance contact (AMC)?

It contains six (6) items.

3.9.2 Scoring of a teachers questionnaire

Here too, the responses were tallied and expressed in terms of percentages. A copy of the questionnaire is attached as Annexure VII.

3.10 Data collection procedure

After finalization of the research topic the investigator made a pre-study visit to a number of schools and had discussions with different quarters of people related to computer education. An attempt was made to collect following information.
(a) The facilities provided for the computer education course in the secondary schools of Assam.

(b) Curriculum followed in the secondary schools for computer education.

(c) Views of teachers and students about the computer education course that are being followed in their schools.

(d) Attitude of teachers and students towards computer education.

(e) Performance of students in the computer education course.

(f) View points of the management regarding computer education course.

(g) Procurement of computer resources etc.

(h) In order to obtain a proper perspective of the literature related to the present study, many libraries were visited within and outside the state.

In the endeavor to collect relevant data and other inputs to support the subject of study the investigator met the following persons:

(a) Head of the institution and teachers teaching the subject of computer.

(b) Students taking computer as a subject.

(c) Functionaries of Board of Secondary Education, Assam (SEBA) dealing with computer course.

(d) Functionaries of private companies who implement computer education in the schools.

(e) Director of North Eastern Council (Ministry of Home Affairs, Government of India), Shillong.

(f) Prof. S. D. Phukan, Adviser (Technical Education), Assam.
The investigator went personally to the concerned schools and took appointment with the respective heads of the institution and teachers to apprise them about the purpose of the visit, and then to collect opinions and suggestions regarding the problem faced by them in their functioning. Next, the investigator met the students of government and private schools and collected their views on computer education.

After collecting the views of the students, the investigator contacted the private sector companies who are responsible for implementing computer education in the private schools such as - Information Computer System (ICS), Tokyon Computer System specialist in school computing, Computer System and Service (CSS) regarding the role played by them. Similar information were also collected from the Board of Secondary Education, Assam (SEBA), North Eastern Council (NEC), Shillong, Directorate of Secondary Education, Assam, regarding the development of computer education in Assam.

Based on the information gathered from this initial information gathering phase of the study, the investigator developed the following tools to be used in the study.

1. Attitude questionnaire (to measure the attitude of teachers and students on computer education).

2. Two sets of achievement test for the students of class VIII and IX. The achievement tests were subjected to scrutiny by
experts dealing with computer syllabus of the Board of Secondary Education, Assam (SEBA) computer course.

3. A questionnaire to elicit students experience with computer relevant to this study.

4. A questionnaire to elicit background information of teachers regarding their qualification and experience with computers, teachers their perceptions about how computer instruction could be improved, and the facilities in the school for computer education.

After the tools were ready, they were field tested in two schools of greater Guwahati to test their feasibility as well as their quality. A few minor changes were made in the computer attitude questionnaire to make it clearer to the students.

In the second stage of the work the investigator again went personally to the concerned school and took appointment with the head of the institution and computer teachers. After apprising them of the objectives of the research and its relevance to the school community, requests were made to allow some time and space to conduct the study with students of class VIII and IX. The head of the institutions and teachers extended full co-operation.

According to the pre arranged time the investigator came to the class and introduced herself to the students and informed them about the purpose of her visit. Then the selection of students was made. If there was only one section in a class and there were 30 or a less
number of students then the entire class was selected. If there were more than 30 students then the class register was referred to. In co-education schools boys and girls were arranged alternately and 30 students were selected by using random start. If the number of sections was found to be more than one, and if the sections did not indicate ability grouping then one section was randomly selected and again the class register was referred to and 30 students were selected by using random start.

In the next step, instructions were provided on how to respond to the questionnaire and it was emphasised that there were no correct or incorrect answers, rather what was being sought was – how the respondent felt about certain issues regarding computer education. These instructions were provided verbally and were also written on the first two pages of the questionnaire. In the event of any difficulty, the children were instructed to ask the investigator and not to consult their neighbours. Children settled down quickly on every occasion and only a few asked questions about how to complete particular questions. A brief explanation was found to satisfy all the children.

The children were permitted as much time as they wished to complete the questionnaires, though most took around two periods to complete it (80 minutes) while a few completed it in one periods time. In this way the investigator collected data from all the selected high schools.

The data obtained from the questionnaire was coded and then entered into computer for the statistical analysis with the help of the statistical package for social science (SPSS).