CHAPTER 3

REVIEW OF RELATED PREVIOUS RESEARCHES

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3.1 INTRODUCTION

Practically all-human knowledge can be found in books and libraries. Unlike other animals that must start a new with each generation, man builds upon the accumulated and recorded knowledge of the past. His constant adding to the vast store of knowledge makes possible progress in all areas of human endeavour.

An educational researcher who would advance scientific knowledge must first identify and understand the research that has already been done in field of interest. The review of the literature in educational research provides one self with the means of getting to the frontier in the particular field of knowledge.

The search for the reference material is a time-consuming but fruitful phase of the research programme. A familiarity with the literature in any problem area helps to discover what is already known, what others have attempted to find out, what methods of attack have been promising or disappointing, and what problems remain to be solved. Knowing how to use the library effectively should receive primary emphasis in the research programme in education. This attempt prompts a greater understanding of the problem and its crucial aspects and ensures the avoidance of unnecessary duplication.

3.2 STUDIES ON ITEM-BANK AND USE OF COMPUTERS IN EDUCATION IN THE STATE

3.2.1 Rathod(1992) has done his Ph.D. work on the application of item response theory in criterion-referenced measurement.\textsuperscript{1}

Objectives were:

1. To construct items based on cognitive operations using computer
2. To prepare valid item-bank by analyzed all items through item response theory.
3. To construct and establish validity for field referenced test, achievement test and diagnostic test for different requirements of criterion referenced educational measurement from item-bank.

4. To construct various computer software for the application of item-response theory in criterion referenced measurement.

The study was limited to the unit of 4th grade mathematics - sum of fraction. Sample was of 464 of primary students studying in Gujarati medium of Bhavnagar. Computer programme was used in the test construction. CREDIT2 programme was used for item - analysis based on item-response theory. Computer softwares were developed as a part of the study in the basic language.

Name of the Computer Programmes are given below:

1. ADPRLXT computer programme for test construction based on cognitive operations for the unit of 4th grade Mathematics.
2. UD computer programme to find out unidimensionally based on graph principal.
3. EIDI computer programme for verifying the equality of item discrimination characteristics.
4. CA computer programme for content validity.
5. RDD C. Programme for Rasch Person - Characteristics
6. TCCTIF computer Programme for Item Characteristic curve and tables for test information.

3.2.2 Bhogayata(1997) constructed and established validity for Attitude scale for Science, based on item response theory.²

Objectives were as below:

1) To construct attitude scale for Science by using Partial Credit Model.
2) To establish validity of the prepared attitude scale in the structure of Partial Credit model and traditional test.

Attitude scale was prepared by Likert method with 32 sentences. Item analysis was done by CREDIT2 programme. Final attitude scale was prepared with 30 sentences. Using SPSS computer programme for validity did factor analysis. Also for data analysis -PA Programme and for content validity POLYUD programme were used.

3.2.3 Masuma Dhankot\(^3\)(1998) has prepared a computer programme in Gujarati language for 4 units of grade I CP Science for her M.Ed. studies. For that unit based tests were used based on item - response theory using CREDIT2 computer programme.

3.2.4 Item-banks developed in Bhavnagar University\(^4\)

Various item-banks have been developed by the Education Department, Bhavnagar University as a dissertation work of their students of M.Ed. course. The overview on these item-banks is given below.

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Class</th>
<th>Subject</th>
<th>Topic</th>
<th>Investigator (year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>Mathematics</td>
<td>Rational Numbers</td>
<td>Dhandhala (1992)</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>Mathematics</td>
<td>Geometry</td>
<td>Dave (1987)</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>Mathematics</td>
<td>Algebra</td>
<td>Sondagar (1999)</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>Science</td>
<td>Physics</td>
<td>Miran (1993)</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>Science</td>
<td>Chemistry</td>
<td>Patel (1994)</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>Science</td>
<td>Biology</td>
<td>Mehta (1996)</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>Gujarati</td>
<td>Grammer</td>
<td>Dave (1982)</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>Sanskrit</td>
<td>Grammer</td>
<td>Rayattha (1984)</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>Sanskrit</td>
<td>Grammer</td>
<td>Machhi (1998)</td>
</tr>
<tr>
<td>10</td>
<td>9</td>
<td>Mathematics</td>
<td>Geometry</td>
<td>Bhatt (1992)</td>
</tr>
<tr>
<td>11</td>
<td>9</td>
<td>Science</td>
<td>Gravitational Force</td>
<td>Barad (1994)</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>Mathematics</td>
<td>Geometry</td>
<td>Patel (1985)</td>
</tr>
<tr>
<td>13</td>
<td>10</td>
<td>Science</td>
<td>Energy</td>
<td>Botadara (1999)</td>
</tr>
<tr>
<td>14</td>
<td>10</td>
<td>English</td>
<td>Grammer</td>
<td>Bhatt (1993)</td>
</tr>
</tbody>
</table>
From the table it is evident that
(1) Primary schools only one item-bank has been developed, whereas 13 item-banks have been developed for the Secondary schools
(2) Developed item-banks were related to the Mathematics, Science, Sanskrit, Gujarati and English subject
(3) Five item-banks for Mathematics, five for Science, two for Sanskrit, one for Gujarati and one for English were developed
(4) No item-bank is computerised or no any computer programme is developed for the application of the developed item-bank

3.2.5 Constructed Item-banks

As a part of examination reforms Sir P.P. Institute of Science (Bhavnagar University) had undertaken the Item bank project in the year 1981 by taking the financial assistance of Government of Gujarat. Training regarding the construction and implementation of item bank was given to the lecturers.

Various works regarding the development of item banks is done by the post graduate centers and departments (Bhavnagar University) in the last five years. In which, Education Department, Economics Department and Psychology Department has constructed item bank and used in examination.

Few students of M.Ed. of education department (Bhavnagar University) have constructed and standardised the item banks for secondary schools as a part of their dissertation work.

Association of Indian Universities has published 28 item-banks in the form of books, which is for graduate and postgraduate level. South Gujarat University and Pune University has also published the item-banks for the college level studies.
3.2.7 Computerised Item-bank

Computer Assisted Measurement is fast, objective type and comfortable. Test conduction, scoring and acquisition of result can be made easy with this. For this, computerised item bank is essential.

In India, very few efforts have been done for the construction of item-bank. Goel and Mishra (1992), has developed the computer programme on Teacher Aptitude Test for B.Ed. students. Items of this item-bank were in English language. Rathod (1993) has constructed the Computer programme ADDRULXT for the creation of items for addition in Mathematics. Dhankot (1998) has constructed the item bank for few units of science for class ten in Gujarati.5

3.3 STUDIES ON ITEM-BANK IN THE COUNTRY

3.3.1 Singh, S.B. 19886

The effect of the objective based, regional College of Education, Mysore (RCEM) system and the Personalized System of Instruction (PSI) on the cognitive attainment of children on physics. Ph.D., Edu., Uni. of Rajasthan

Problem: The study attempts to compare the effect of objective-based system and Personalized system of Instruction on the cognitive development of children in Physics.

Objectives: (i) To compare the effect of objective-based system, the Personalised System of Instruction and the traditional method on the total cognitive achievement of students. (ii) To study the comparative effectiveness of the above three methods of
teaching in high, low and average achievers, and (iii) To study the opinion of students in respect of the above cited methods.

**Methodology:** The sample comprised students IX who were divided into the control group (4 students), experimental group 1 (34 students) and experimental group H (36 students). The tools used to collect the data consisted of Raven's Progressive Matrices Achievement Test and Students' Reaction scale developed by the researcher. The collected data were treated by inferential statistics.

**Major Findings:** (i) The objective-based system was superior to the traditional method on total achievement of children in physics. (ii) The Personalised System was better than the traditional method on total achievement of children. (iii) The Objective-based system and the PSI were found superior to the traditional method in respect of achievement on knowledge and understanding objectives. (iv) No significant difference was observed between the objective-based system and traditional method in the case of the application objective. (v) No significant difference existed in the performance of the low achievers on the application objective whether these groups were taught through the objective-based to the PSI or the traditional method.

3.3.2 Singh, R.D.; Ahluwalia S.P.; and Verma, S.K. 1991

Teaching of Mathematics: Effectiveness of Computer Assisted Instruction (CAI) and conventional method of Instruction, Indian Educational Review, Vol. 26(4); 15-34

**Problem:** The study centers upon the problem of the effectiveness of computer-assisted instruction and of the conventional method of instruction in teaching
mathematics, in terms of achievement in Mathematics and direction of change in attitude towards mathematics of male and female students.

Objectives: (i) To study the difference in mathematics achievement which occurs as a result of the difference in instructional strategy, among boys and girls separately and as a group, and (ii) To study the direction of change in attitudes of male and female student separately and as a group towards mathematics as a result of two different instructional strategies.

Methodology: The sample of the study consisted of 220 students from four selected higher secondary schools, covering the good, average and poor schools of the Bhilai Steel Plant, Bhilai (M.P.).

Major Findings: (i) the students who used the computer scored significantly higher than those taught mathematics through the conventional method. (ii) The students who used the computer showed significantly highly favourable attitude towards mathematics than those who did not use the computer. (iii) Achievement in mathematics and change in attitude towards mathematics were found to be independent of the sex factor.

3.3.3 Rose, Antony Stella V., 1992


Problem: The study throws light on the application of Computer Assisted Instruction (CAI) and the Teacher Support System (TSS) for the optimum development of underachievers (UA).
Objectives: (i) To develop CAI software (ii) To find out the effectiveness of CAI with TSS and CAI without TSS with reference to the learner variables, viz. sex, locate, IQ and achievement level, and (iii) To find out the interaction of the learner variables and the treatment on the achievement score.

Methodology: The randomised block design was followed in the selection of the sample with IQ as the blocking variable. The sample consisted of three groups of size 32 each composed of students of standard IX selected from three Tamil Nadu State Board schools covering one rural and two urban. The underachievers in the sample were identified by using the regression analysis. The tools used included CAI software on "the language of sets", Achievement Test, Culture Fair Intelligence Test by Cattell and Cattell, study Habits Inventory by Patel, and Mathematics Study Attitude Scale by Sudarajan. Mean, SD, 't' test, chi-square, one-way and two-way ANOVA were used to treat the collected data.

Major Findings: (i) Both the CAI strategies were superior to the traditional method of instruction, and CAI with TSS was more effective than CAI without TSS for underachievers (UA). (ii) Except achievement level, all the other learner variables combined with the treatment had no interaction effect on the achievement score. (iii) There was no relationship between the post treatment scores and the variables 'sex', 'locale' and 'achievement level' of the experimental group. In case of the variables IQ, 'study habits' and 'maths study attitude', the positive relationship between those variables and achievement at the pre-treatment level was found to be cancelled at the post-test. Similar results were obtained for UA.
3.3.4 Jeyamani, P. 1991


**Problem:** To study the effectiveness of the simulation model in teaching physics to standard XI students through Computer Assisted Instruction (CAI).

**Objectives:** (i) To find out the effectiveness of the simulation model of teaching as compared to the traditional method and (ii) To utilize the frowning use of computers in education.

**Methodology:** The sample for this investigation consisted of students of Standard XI of the two schools selected. The pre-test - post-test method was used. Mean, SD and 't' test were used to treat the data.

**Major Findings:** (i) The experimental group obtained a higher mean than the control group. (ii) The sex-wise comparison proved to be insignificant. (iii) There was no significant difference in learning level between Tamil medium and English medium students. (iv) On concluded that the experimental group performed significantly better than the control group.

3.3.5 Bhattacharya, Madhumita, 1989

A critical review of work done on the use of computer as an instructional tool for teaching chemistry. M.Phil, Edu., Univ. of Delhi.

**Problem:** This study tries to evaluate the status of teaching of chemistry with the help of computers.
Objectives: To aim at developing tools for evaluating the effectiveness of available software in chemistry, along with suggestions in regard to the development of software in other areas of chemistry which are likely to be included in the curriculum.

Methodology: An extensive study was conducted by the researcher on the use of computer as an instructional material for teaching chemistry. A questionnaire was also used.

Major Findings: (i) The available software in chemistry were of good quality. However, background knowledge was inferred in most of the chemistry software. (ii) It was not always possible to maintain the sequence of content especially in games. (iii) Most of the available software adopted lecture-cum-demonstration method in a class of 20-40 minutes. (iv) Most of the software contained knowledge & discovery levels of teaching but they lacked in reflective level. (v) Computer Assisted Instruction could be applied most effectively to an individual or to small groups. (vi) The majority of the software could be used for concept development. (vii) The software that has been selected for classroom teaching mainly provided simulation of a real situation thereby assisting students in long-term retention. Most of this software was in the tutorial mode. (ix) Technical quality of the majority of software was satisfactory. The majority of the software can be used for concept development.

3.3.6 Nagar, Nirmal, 1988

Effectiveness of computers in teaching mathematics in Schools. M.Phil., Edu.Univ. of Delhi.

Problem: The study attempts to ascertain how best a teacher can use the computer to improve learning in the classroom.
Objectives: (i) To examine the usefulness of the computer in teaching mathematics (ii) To examine areas/ aspects of mathematics which can be more effectively taught with the help of computers, and (iii) To examine the trends regarding the use of computer-aided teaching of mathematics.

Methodology: This study is based on a survey of studies, which include, mainly, three projects and ten research studies conducted independently.

Major Findings: (i) Computer Assisted Teaching (CAT) of mathematics benefited both the teacher and the learner. (ii) CAT encouraged individualisation and practice without burdening the teacher with repetitive and monotonous activity. (iii) CAT helped the learners to use their creativity by exploring new areas not covered by the syllabus. (iv) Computer awareness was not sufficient in schools for CAT. (v) In India, we have gone in for the theoretical rather than the practical aspects of Computer-based education. Projects CLASS was not able to reach the child especially, (vi) There were not enough computers in schools and not enough awareness regarding the computer. The computers that were available were not bringing put to the best possible use. Teachers had a great mistrust of the computers and perceived it as an inconvenience rather than as an aid. Their negative attitude was a great hindrance in popularising the use of computer literacy in the educational system, especially at the secondary level of education.

3.3.7 Singh, R.D., 1992

Problem: The present study aims the results of Computer Assisted Instruction (CAI) with the results of the conventional method of instruction in teaching mathematics in certain selected units of the mathematics curriculum.

Objectives: (i) To compare the results of the two groups in mathematical achievement. (ii) To compare the results of the two groups in mathematical achievement sex-wise., and (iii) To compare the attitude towards mathematics of the two groups as whole, and also sex-wise.

Methodology: The study was conducted in four higher secondary schools having facilities of three to five BBC microcomputers. The students belonged to different socioeconomic groups. Three units of the mathematics syllabus in algebra, statistical data and their congruence in geometry were chosen for the study. The tools used in the study included Rating Scale by the researcher, General Intelligence Test of Mohsin, the Attitude scale towards Mathematics of suydam, and the educational software prepared by the practicing teachers. The statistical techniques used included, mean, SD and 't'-test.

Major Findings: (i) The groups taught through CAI in all the schools showed a substantial progress. (ii) The gains in achievement of the pupils of good schools are higher than those of pupils of average and poor schools. (iii) The CAI method of teaching of mathematics had proved to be more effective (iv) Both boys and girls gained more from the computer treatment. (v) A significant favourable change in the experimental groups over the control groups was observed. (vi) The change in attitude towards mathematics was independent of gender.
3.3 STUDIES ON ITEM-BANK ON THE WEBSITES

For the purpose of review of developed item-banks in the area of primary education, the investigator has surfed the Internet.

Some of the surfed websites are listed here.

   - Lamaze International – Exam consultant is responsible for managing the item-bank, which includes co-ordination with the Psychometric consultant on the computerized item-bank to facilitate the psychological parameters.

2. http://www.co.san-bernardino.ca.us/hr/wrib/
   - Western Region Item-bank – An item-bank is computerized collection of multiple choice, true-false and alternate choice test questions which have been categorized by bank is developed by the professional touched company.

   - PES News: Spring 1998 – The item-bank and test development process underlying computerized testing – whether fixed forms or computer adaptive – must be evaluated.

   - Student Assessment Test Development Process – All the field test items and data are entered into a computerize item-bank. Tests are built from the item-bank and are designed to assess the students.

   - CODESP Cooperative organization for the development of employee – CODESP computerized item-bank (C-CIB) is a test preparation service available exclusively to CODESP members.

   - Item banking – It is normally computerized for ease of item storage and to facilitate the generation of new tests. Each item in the item-bank is coded according to competency.
- Hongkong Institute of Education – Computerized Adaptive Testing as a means for Mathematics in Hong-kong for the secondary classed as a continuous and dynamic approach to testing.

- Benchmark Professional 3.12 Whitepaper – advanced and innovative test development tool available in the computerized testing industry.

Apart from the above listed, various websites were visited by the investigator and come to the conclusion that various item-banks are developed and computerized, but most of the computerized item-banks are developed by the professional companies and very few are developed by the departments but no work is done for the purpose of study. Apart from this point, investigator also noted that most of all the item-banks are developed for the means of generation of test papers.

Mainly item-banks are developed in the field of Banking, Health, Accounting, Industries and Surveys. A most important use of item-bank is for employee selection in the corporate.

In the field of education, mostly item-banks are developed and used at secondary, higher-secondary, graduates and postgraduate level.

3.4 SIGNIFICANCE OF THE STUDY

Most of the studies reviewed were checking the effectiveness of computers in education. No any programme related to computerised item-bank or other programme for drilling and revision of the syllabus has been yet developed. Various item-banks
have been constructed in the state as well in the country, but only few have been converted into computerised item-bank for wide application.

In the other countries, also computerized item-banks are developed, but all the banks are mainly developed for the purpose of formation of the test papers as it has been clearly shown in the review of these works.

In the present study, the investigator has idea to develop the software, which will facilitate many aspects of computers in education such as Testing technology, Computers aids to test construction, Computer delivery of tests, computer assisted instruction and computer managed instruction etc.

So, the present study is having importance in the terms of its application as the programme developed through the study will be helpful to teachers and students by means of computer assisted instruction and computer managed instruction respectively.
REFERENCES


2. Ibid.

3. Ibid.

4. Ibid.

5. Ibid


8. Ibid., p. 754

9. Ibid., p. 755

10. Ibid., p. 757


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