CHAPTER - II

SURVEY OF RELATED STUDIES

2.1. RELATED STUDIES

It is worthwhile to cast a glance at some related studies in the field of educational investigation on science achievement before switching over to the actual work of the present investigation. The construction and use of "Achievement Tests" are necessary if an evaluation programme is to function with the maximum efficiency. In recent years much attention has been given to the ways and means of measuring the outcomes of instructions in Science. Various works for educational investigation in the field of scholastic achievement in science have been carried out with the help of self-constructed achievement tests on science or various types of tests, available in foreign countries. A brief account of these works is presented here.

A. REGARDING THE ACHIEVEMENT TESTS

Jha\(^1\) examines the nature of relationship between intelligence and science aptitude besides other factors influencing achievement in Science. He obtains a significant positive relationship between achievement in science and general intelligence.
Jain's investigation on scholastic achievement reveals that the influence of Intelligence on school achievement is the greatest, and it has higher positive relationship with achievement of boys as compared to that of the girls.

Bountra constructs and standardizes a battery of objective type tests in Physical Sciences at the high school level. His findings are that the performance of rural students is found to be significantly better than that of urban students and the boys show significantly better result than the girls.

Gupta constructs and standardizes an attainment test in General Science. Statistical measures, such as measures of central tendency, dispersion etc. are found out; percentile norms is also established.

Faizul Islam constructs and standardizes an achievement test in General Science for students of Class - VII in the state of Bihar. Standard score norms for the male and the female are computed separately.

"Sequential Tests of Educational Progress in Science (1957)". The test is intended for grades 4-6, 7-9, 10-12, 13-14. It is divided into two forms "A" and "B". Manual battery direction, battery technical report and separate answer sheets are available but data on reliability of Form "B" is not given.
"Co-operative Physics Test (1958)". The test is meant for high schools. It does not provide any specific manual but it provides general co-operative manual and norms. It requires 85 minutes for administration. No data on reliability is available.

"Every Pupil Test in Physics, 1958". This test is intended for high schools. New forms are usually issued in December and April. It does not provide data on reliability but it provides norms.

"Every Pupil Scholarship Test in Physics (1958)". The test is meant for high schools. New forms are usually issued each year in January and April. No data on reliability is given, but it provides norms.

In the different school subject, quite a large number of Tests have been developed in foreign countries and hence an exhaustive list of all the tests is very difficult to prepare. The above brief discription (4 Tests) includes only such tests in science as are widely used and have been recorded in the "Mental Measurement Year Book".

The brief description of Tests in science, developed in India is given below:
(a) Scholastic Attainment Test in Chemistry (Mohsin).\textsuperscript{10}  
It is a group verbal test for pupils of Class - VIII. The test contains 31 items and takes 22 minutes for administration. Reliability coefficient of the test is 0.78 and validity coefficient with examination marks in chemistry is 0.58. This project was undertaken at the Educational and Vocational Guidance Bureau, Bihar.

(b) \textit{"Chemistry Achievement Project (Prakash Gupta)\textsuperscript{11}} is a verbal group test for the pupils of classes IX and X. The test was standardised on a sample of 200 students. The reliability coefficient of the test is 0.57 and validity coefficient with school marks in chemistry is 0.54. The time schedule of the Test is 40 minutes. It was approved as an M.Ed. project in 1957 at the Teachers' Training College, Banaras Hindu University, Banaras, U.P., India.

(c) \textit{"An Attainment Test in Physics for Grade-I\textsuperscript{12}} (Patel) is intended for Class - X. There is no time limit for administration of this Test. The whole test is composed of three subsets. The test was administered on a sample of 998 students. Its reliability coefficient is 0.74 and internal validity is 0.85.

Percentile and self-assessment key, contained in the dissertation was approved as the project for the degree of M.Ed. at A.G. Teachers' College, Ahmedabad, India.
(d) "Physics Achievement Test (1956) (Agnihotri)", is a verbal group test for Class - IX and X. The total number of items in six sub-sets of the test is 68. The test is of duration 40 minutes. It was standardised on a sample of 305 pupils. The reliability coefficient is 0.91 and the validity coefficient with high school marks is 0.76. This project was approved as an M.Ed. project at the Teachers' Training College, Banaras, U.P., India.

(e) "Scholastic Attainment Test in Physics" (Mohsin) is a verbal group test for Class - VIII. This test contains 55 items, taking 32 minutes for its administration and was standardised on a sample of 500 students. Its reliability coefficient is 0.87 and the validity coefficient against school marks in Physics is 0.64. This project was undertaken at the Educational and Vocational Guidance Bureau, Bihar.

(f) "Attainment Test in General Science (Gupta)\textsuperscript{14}, is a verbal group test for Class - IX and X containing 150 items. It requires 1 hr. and 30 minutes for its administration. The reliability coefficient is 0.92. This project was undertaken at the Department of Education, Muslim University, Aligarh, India.
(g) Measurement of Achievement in General Science, Geography and Biology (1969). This is one in the series on the statistical studies on the effectiveness of external examinations. This is an attempt to study the weakness of public examinations as they are conducted to-day. It has six areas - (i) question paper; (ii) the appropriateness of question items; (iii) difficulty value; (iv) reliability; (v) validity, and finally (vi) their relationship with the syllabus and question paper. In this study the authors have tried to investigate some aspects of students' achievements in General Science of the School Final Examination. They have attempted to study the quality and quantity of students' responses to the different items of the question paper. It is investigated how many or what percentage of candidates answered the questions and what grades of success they achieved. The appropriateness of the question items has been investigated by their difficulty values, discriminating powers, reliability and validity.

This project was undertaken at the Indian Institute of Technology, Kharagpur, West Bengal and was sponsored by the National Council of Educational Research and Training, New Delhi. This is report No. VI of the "Research Project on Examinations".

(h) Jha, V. carried out an investigation into some factors related to Achievement in Science by the students in Secondary schools. His findings reveal that there is significant positive relationship between achievement in Science and Intelligence.
His investigation also reveals that there exists a positive relationship between Achievement in Science and study habits of the students.

(i) Pathak, A.B.\textsuperscript{17} constructs and standardises an achievement test on science to find out the factors differentiating high and low achievers in science. His findings are (a) the high achievers have a significantly higher mean I.Q. than the low achievers. (b) Study habits and skills of high achievers are better than the low achievers.

**B. REGARDING ACADEMIC MOTIVATION INVENTORY**

According to Morgan\textsuperscript{18}, the "Achievement Motivation, is the motive for success in performing tasks".

According to Munu\textsuperscript{19}, Achievement Motivation is defined as "a desire for attaining some specific standard of excellence".

The theory of achievement motivation is concerned with the interaction of personality and the immediate environment as contemporary determinants of aspiration, effort and persistence when an individual expects that performance will be evaluated as success or failure in relation to some standard of excellence (i.e. one's past performance in comparison with others or an ideal).
Since World War II, the development and refinement of theory is mainly the consequence of an important methodological innovation, viz, the experimental validation of content analysis of thematic apperception for measurement of human motives, (McClelland & Atkinson, Clark and Lowell, 1958). This back through encourages a convergence of clinical insight concerning the unconscious process of motivation (Freud), and disciplines experimental, conceptual analysis of human motivation initiated by Kurl Lewin and his colleagues in early studies of the effects on behaviour of success, failure and level of aspiration.

Lewin's programmatic equation, $B = f (P, E)$, identifies the problems of motivation and distinguishes it from the problems of development [Where the key terms are behaviour (B); Personality (P), Present environment (E)].

The current theory of achievement motivation regarding the conceptual developments evolves in the context of experimental research concerned with behavioural effects of individual differences in achievement-related motivation. These developments have been collected periodically by Atkinson (1958), Atkinson and Feature (1966), Atkinson and Raynor (1974) and (1953) and running parallel to McClelland (1961), and McClelland and Winters (1969) continuing analysis of the expression of achievement motivation in society.
"The individuals differ in basic personality structure (Abraham Kardiner)" is the fundamental idea. The reason is that in childhood there are a limited number of transcultural problems from which will develop a limited set of relatively general and stable common motives (McClelland, 1961). Among these are the following motives (a) to achieve or succeed (Ms), (b) to avoid failure (Mf), (c) to have affiliation or social approval (Maff), (d) to achieve power (MPow) and (e) other motives responsive to extrinsic incentives, which would constitute achievement oriented activities.

Motivation for achieving a particular goal in education is called "Academic Motivation". In all educational activities, the students get motivated. Now the question arises how to measure the academic motivation of the students. Like all other psychological and sociological traits, academic motivation can also be measured through different behavioural outcomes of the students.

These outcomes have recently been identified and analysed by Bhattacharyya. The following categories have been included in the term "Academic Motivation" to delimit his area of appraisal:

<table>
<thead>
<tr>
<th>(1)</th>
<th>Studies at home;</th>
<th>(4)</th>
<th>Educational aspiration;</th>
<th>(5)</th>
<th>Professional aspiration;</th>
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<tbody>
<tr>
<td>(2)</td>
<td>Leisure-time activities</td>
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<td>(6)</td>
<td>Liking for the teachers.</td>
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<td></td>
<td>at home;</td>
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<td>(3)</td>
<td>Attachment to School;</td>
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2.2. TERMS DEFINED

1) OBJECTIVES OF THE ACHIEVEMENT TEST

(A) **Knowledge** :- The investigator defined 'Knowledge' as given by Bloom. According to Bloom, "By knowledge, we mean that the student can give evidence that he remembers, either by recalling or by recognizing some ideas or phenomena with which he had experience in the educational process'.

Knowledge as defined here included those behaviours and test situations which emphasize the remembering, either by recognition or recalls of ideas or material phenomena.

(B) **Understanding** :- An 'Understanding' is defined as the mental power, faculty or function whereby the meaning of phenomena or propositions is apprehended.

(C) **Application** :- 'Application' can be defined as the use of abstractions in particular concrete situations.

(D) **Skill** :- 'Skill' is defined as the translation of knowledge and or understanding through various psycho-motor activities which explain the command over the areas of study concerned.

In this study the present investigator delineated the cognitive objectives (Knowledge, Understanding, Application and Skill) with the dimensions, as stated in the specification of objectives of the Achievement Test in Chapter-III.
REFERENCES


6. "Sequential Test of Educational Progress in Science for Grades: 4-6, 7-9, 10-12, 13-14". - Cooperative Test Division, 1957.


10. "Scholastic Attainment Test in Chemistry (Mohsin) for Class - VIII". - Educational and Vocational Guidance Bureau, Bihar.


13. "Scholastic Attainment Test in Physics" for Class-VIII (Mohsin) - Educational and Vocational Guidance Bureau, Bihar.

14. "Attainment Test in General Science, for Classes IX and X". (Gupta) - The Department of Education, Muslim University, Aligarh, 1966.


