Chapter 1

Introductory

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1.1.0 Introduction:

Many living organisms have born on the earth from the time of the birth of organisms and some of them have extinguished. The organisms who have extinguished were not able to adopt atmosphere and situation. But among all these organisms man is the only organism who has survived and progressed in all sphere. Thus, he proved himself the best among all the organisms. The reason for this is the growth of the mind. He can think, logically, understands the situation and can bring solutions of the problems. As a result, he is considered as an intelligent organism.

In present conditions, intelligence is considered as a part of the ability in a general manner. Therefore, we can assume that abilities of man have been used in human evolution. Numerical ability, logical ability language ability, Mathematical ability, Music ability, Finger dexterity etc. are included in these abilities. Guilford has imagined 180 kinds of such abilities in his S. I. model.

Logical ability, which is one of the multi factor principles of Thurston (1938), is a special kind of ability in human, which plays an important role in the solution of problems. A child does not have logic at the time of his birth but his logical ability increases with his age. According to psychologist, it becomes maximum when a person becomes adult. These logical abilities are divided into different kinds by psychologists, which include verbal ability, Non-verbal ability, Numerical ability, Mathematical ability and Spatial ability.
Spatial ability is a special ability of making logic in the space in which it is decided in advance that how a physical object or figure would look like? For example, an architect prepares an imaginary model first and his Spatial ability plays an important role in making such models. In present times, any building is first of all constructed on a piece of paper and the model of it is prepared later on, but construction of it on a piece of paper is nothing but a 2-Dimensional form of a figure imagined by architect. Thus, ability to imagine in the Space is the Spatial ability.

Spatial ability is considered as a barometer of mental growth of students. It is an important ability for explanation and development of formless concepts. A student passing a higher secondary school has to decide his career. The standard of Spatial ability is the most important in the period of selection of profession and stream like medical, engineering etc.

Are the growth and the way of growth of Spatial ability of students of higher secondary schools satisfactory? Is the standard of their Spatial ability satisfactory? Whether Spatial ability plays any role in the studies and achievements of subjects like Physics, Mathematics, Logic, and Psychology? So many questions like these were raised in the mind of researcher. As such, the researcher is a teacher educator and therefore he wished to study, how this ability is related to study. Therefore, researcher decided to make research on this subject. The statement of the research selected by researcher for this is as follows.
1.2.0 Statement of problem :

The statement of the problem was worded out as follow.

"Construction and standardization of Spatial Ability Test for the pupils of higher secondary schools of Gujarat state"

1.3.0 Importance of the study :

Measurement of educational achievements of students generally depends on observation of the teachers. Sometimes it is measured by written exams also. But it is not proper to make valuation by using only these many particulars. For its measurement, it is necessary to measure special ability also along with its general abilities. It is necessary to measure all the abilities of his head, heart and hand. Based on a measurement one can be guided for his future career.

According to K. G. Desai (1978), intelligence test predicts ability to learn achievements of the students but in the present time, when new opportunities are taking place all over the world. Then only intelligence test is used in profession selection cannot be considered as systematic because in many profession special aptitudes are also required along with intelligence. Thus, possibility of becoming completely successful in a particular profession depends on a person's special ability.

In the developed countries of the world, after completion of school studies by students, when time comes to select
profession, then more weightage is given on their aptitudes. Thus, a person is selected by measuring his aptitudes. Therefore, every student in those developed countries becomes a partner as a future citizen in the progress of his nation.

A group of special abilities possessed by an individual or a student is a standard of measuring professional success. When concept of it becomes universally accepted, psychologists started making research on special skills possessed by an individual. In the first phase, with the help of Group factor or Specific factor, abilities like Verbal ability, Numeric ability, and Spatial ability were founded by them. But later on, they also found many aptitudes. Moreover, they divided it into many minor abilities. Guilford, a psychologist has invented 180 abilities. Which includes Clerical, Verbal, Numerical, Spatial, Hand expertism, Finger dexterity, Mechanical and Art appreciatory.

A test to measure aptitude was firstly constructed in U.S.A. in 1947. That Differential Aptitude Test was constructed to measure more than one aptitude, it was revised time to time, and a revised edition was subsequently published in 1952, 1959, 1963 and 1973. Thus in the developed countries of the west, Group factor test series like Differential Aptitude Test Battery (D. A. T. B.), General Aptitude Test Battery (G. A. T. B.), Flanagan Aptitude Classification Test (F. A. C. T.) and Thurston’s Primary Mental Abilities are popular.

In India and specifically in Gujarat state, a substantial work has been done in the intelligence measurement sector. But tests to measure aptitudes are available in less number. In
Gujarat, tests, which were constructed and standardized, are as under.

2. Urvashi Desai made Verbal Aptitude test. (1971)
3. Anil Ambasana’s Test for Art Appreciatory. (1981)
5. Rikhavchand Shah made Numerical Ability Test. (1972)
6. P. A. Trivedi made Mechanical Comprehensive Test. (1972)

Moreover, tests of D. A. T. like Verbal, Logical, Numerical, Spatial, Mechanical comprehension, Use of language are also used to guide students of Gujarat state, for this, some necessary changes have been made in its original structure and instructions.

According to K. G. Desai,¹

"It is necessary to standardize the whole D. A. T. by establishing norms on the groups of India."

In competitive exams held for recruitment of clerk or officer in public sector organizations like bank, L. I. C. or national talent research tests held by N. C. E. R. T. Spatial ability test is included. Moreover, in some schools and colleges, students are given various aptitude tests for purpose of measuring their aptitude before guiding them but these tests are not standardized. Spatial ability is basic requirement for professions like Engineering,
Architecture, Drawing, Designing, Home decoration etc. Some efforts have been made for measurement of this ability of students of Gujarat state. But it is just a translation of Spatial ability test of D. A. T. series. It is not in original form. Thus for whole Gujarat state, Spatial ability test is not standardized.

A large number of educational institutions have increased in the Gujarat state with the spread of education. Therefore, it is necessary to measure aptitude for purpose of guiding a proper student to proper stream. This subject is selected for the purpose of measuring Spatial ability and through this ability to guide them.

The state government has proposed a new system to give admissions to students in streams like Engineering, Architecture, Designing, Home decoration etc. and decided to construct and standardize a logical ability test for measurement of Spatial ability of students of standard – XIth and XIIth.

1.4.0 Objectives of the study:

The main objectives of the study were as follow.

1. To construct a Spatial Ability Test for the students of standard: - XIth and XIIth.
2. To standardize Spatial Ability Test for the students of standard: - XIth and XIIth.
3. To study the effect of area on spatial ability.
4. To study the effect of standard on spatial ability.
5. To study the effect of stream on spatial ability.
6. To study the effect of sex on spatial ability.
7. To study the relationship between Spatial Ability and Educational achievement of the pupils.

1.5.0 Hypotheses of the study:

Null hypotheses as mentioned below were formed for this study.

1. There will not be any significant difference of area on the result of Spatial Ability Test.
2. There will not be any significant difference on the result of Spatial Ability Test of XIth and XIIth students of higher secondary schools.
3. There will not be any significant difference of stream on the result of Spatial Ability Test.
4. There will not be any significant difference on the result of Spatial Ability Test of boys and girls of higher secondary schools.
5. There will not be any significant effect of educational achievements on the results of the Spatial Ability Test for the pupils of standard- XIth and XIIth.
6. There will not be a significant difference of main & interaction activities of independent variables.

1.6.0 Limitations of the study:

This study is performed subject to certain limitations as mentioned below.

1. The study is limited to pupils of Gujarati medium schools of Gujarat state only.
2. Among various aptitudes only Spatial ability is selected for the study.

3. This study is limited to students of standard- XI\textsuperscript{th} and XII\textsuperscript{th} in the age group of 15 to 17 years.

4. Marks achieved by students in the final tests at school level is taken into consideration for necessary educational achievements.

5. Schools in the central region districts like Ahmedabad, Gandhinagar, Kheda, Anand, Panchmahal, Vadodara and Sabarkantha were selected for standardization of the study.

1.7.0 Definitions of the terms:

Definitions of some important terms used in the title of the study is as follows.

Higher Secondary School:

An institution which provides education to standard- XI\textsuperscript{th} and XII\textsuperscript{th} and approved by Gujarat higher secondary board.

Spatial ability:

Spatial ability is an ability of a person to imagine formless figures in the space.

According to K. G. Desai, \textsuperscript{2}

"Ability to cause to swell two or three dimensional figures by imagining various figures in the space."

According to G. K. Bennet, H. G. Seashore and A. G. A. Wesman. \textsuperscript{3}

"The space relation test is a measure of ability to deal with concrete materials"
through visualization there are many vocations in which one is required to imagine how specified object would appear if rotated in a given way."

Reliable marks based on marks achieved in the test constructed is considered as Spatial ability.

**Spatial ability test:**

A test which measures an ability of a person to imagine such figures in the space which are not really in front of him.

**Standardization:**

According to Sonderson. 4

"The establishment of uniform conditions for administrating a test and interpreting test result."

According to Sonderson, John. 5

"A large number of individuals are tested in the same way to provide norms with which to compare any particular test scores."

1.8.0 Variables of the study:

Spatial ability test of students which performed in the context of some variables in this study are as follows.

1. Sex  
   (a) Boy  (b) Girl

2. Area  
   (a) City  (b) Semi-city

3. Standard  
   (a) Std.: XI\textsuperscript{th}  (b) Std.: XII\textsuperscript{th}

4. Stream  
   (a) Science  (b) General
1.9.0 Planning of the following chapters:

Chapter wise planning of research report prepared to present the study is as follows.

Chapter - 2: Theoretical Perspectives of the study:--

Contextual role of logical ability is presented in this chapter. Discussions relating to the form of logic, development of stages of logic, infirmly in logic. Procedure of correcting logical ability in students and individuals, methods to develop it, factors affecting the logical ability, types of logical ability, measurement of logical ability and necessary tests for it have been made.

Chapter - 3: Review of past studies:--

In this chapter, an outline of activities performed for aptitude is given by showing importance of study of literature related to research performed earlier. And by this importance of this study has been made more clear. Moreover, research graphs have been decided by doing critical analysis of summary of various researches.

Chapter - 4: Planning and procedure of the Test:--

A detailed planning of the test construction, population, sample and information regarding different try-outs are discussed in this chapter.

Chapter - 5: Analysis of Data:--

To test different objectives of the study, collected data are classified and its analysis is given in chapter-5.
Chapter – 6: Reliability and Validity of the Test:

Reliability and validity of the test have been discussed in this chapter. Reliability and validity of this test have been decided in different manners. Establishment of norms is also decided in this chapter.

Chapter – 7: Summary, findings and recommendation:

An import of whole essay is given in this chapter. Summary is presented after completion of all the process and recommendations and on which subjects researches can be made in future are mentioned.

1.10.0 Conclusion:

Thus, in this chapter, introduction, necessity of the study, problem statement, definitions of terms, objectives of the study, limitations of the study and planning of next chapters etc. are given. Principle information related to logical ability is discussed in the next chapter.
Endnotes


