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Chapter: 2
Review of Related Literature

2.1.0 Introduction

Statement of problem and its objectives, operational definitions of key words, importance of the present study and delimitations was discussed in the previous chapter. This chapter deals with review of related literature along with past researches carried out by different researchers.

Educational research provides the base for any educational system. This base can be strong only when the related literature is studied to improve quality and importance of any research work. The process of reviewing past researches and related literature helps a lot to researchers. It also provides necessary guideline to the researcher.

According to Brog Water R. (1996)¹

“The related literature in any field forms the foundation upon which all future will be built.”

2.2.0 Theoretical background

An account of different theoretical definitions related to Speed and Accuracy is given below.

- **Speed**: Time consumed to finish any work is called the Speed.

- **Accuracy**: Attitude to do any work, without any mistake, is called Accuracy in reference to that work.

According to K. G. Desai (1989)²;

“A Speed Test is like a psychological test in which the time, taken by a subject under experiment, in doing any work or answering some statements is to be measured. The subject under experiment has to try to give true responses as speedy as possible on such test. The minutes or seconds taken by him in completing that work is considered as his score.”
According to Somabhai T. Patel (2001)\textsuperscript{3},

\begin{quote}
"In speed test, the time limit is fixed. It is observed how much work an individual can do within this time limit. Generally, a speed test is constructed in such a way that each testee will not able to answer all the items included in that test. If most of testees get higher score on a particular test, it cannot be proved who is better in the characteristics under measurement."
\end{quote}

K. G. Desai (1970)\textsuperscript{4} indicates about a test constructed by Okoner that Okoner designed a test to measure finger dexterity and published it in 1978. It was a Speed and Accuracy Test. A pegboard like board having small holes in lines was used. A testee has to pick up pointed pins with his/her fingers or a pincer and set those pins in the holes. This test was used to measure finger dexterity of subjects who were studying standard IX and it was also useful up to the matured persons.

In this speed era, one has to acquire Speed and Accuracy. It is also necessary to know about components, which affect on Speed and Accuracy for the present study.

2.2.1 Components related to the Speed and Accuracy

Identification of components is very important for constructing a Speed and Accuracy Test. Here, two main components are associated to the Speed and Accuracy (I) Numbers (digits) (ii) Words (names)

Sub-components like Similarity, Contradiction, Signs, Order, Length, Appearance, Conjunct letters, Mathematical symbols, Repetition of letters etc were selected. The illustrative items for each component may be like:

(A) Components of Speed

(1) Similarity in words and digits

\begin{itemize}
  \item \textit{\textacuted} \textit{\textacuted} ______ \textit{\textacuted} \textit{\textacuted}
  \item \textit{\textacuted} ______ \textit{\textacuted}
  \item 93 \textbf{X} 93 \textbf{X} 93 ----- 93 \textbf{X} 83 \textbf{X} 93
  \item 576 ----- 573
\end{itemize}

One can observe that in each stated word, the same letters are used but their order is changed. ‘\textacuted’ and ‘\textacuted’ looks similar one but
when the place of consonant is changed, the whole name is changed. In this way, the digits like 9, 8 and 3 have similarity. In such situation, identification of similarity is an important component for speed.

(2) Contradiction in words and numbers

- 
- 
- 
- 52 ---- 25
- 72 ---- 27

Here when a consonant, in a word, is changed, the word expresses contradictory meaning. For example, when we use ‘ें’ is used in place of ‘खं’ in a word ‘खंग’, contradiction in meaning appears. Meaning of ‘खंग’ is ‘heap’ and ‘ेंग’ is ‘cheater’.

Interchange of digits also creates contradiction such as 52 - 25. Therefore, contradiction is an important component for Speed.

(3) Vowels of words and Mathematical symbols

- पोंपट——पोंपटी
- फ्लोजम शुर्टीजू——फ्लोजम शर्टीजू
- \( \sqrt{25} \times \sqrt{25} \) ---- \( \sqrt{25} \times \sqrt{25} \)
- \( 2 \div 2 \div 2 \div 2 \) ---- \( 2 \div 2 \div 2 \div 2 \)

Here, when the vowels such as ꝏ, ꝏ, ꝏ, ꝏ, ꝏ, are changed, the meaning of that word is also changed. For example, the word ‘पोंपट’ is a name of a bird but when vowel ‘ो’ is applied, it become ‘पोंपटी’ which is expresses the name of a colour.

When Mathematical symbols such as +, \( \times \), \( \div \), \( - \), \( \sqrt{\quad} \) are changed, the value also changes.
Difference in pronunciations of words and numbers

- ज्ञान___मंज्ञान
- वासुदे___वीसुदे
- कीकी___कीकी
- ५२___५२
- ४५४५४४___४५४५८४
- ५२१___५२२
- ३३६३___३६६३

When the words mentioned above are read speedily, their meanings are found different but pronunciations are similar. This creates possibility of committing the mistake.

The numbers of words and digits

- कपड़े सोरे___कपड़े सोरे
- अली शहा बंगार___अली शहा बंगार
- ४०००००___४०००००
- ७००००___७००००

In above examples, the numbers of words and digits are difference but when we read them speedily, mistakes can be committed. Counting of digits speedily is also a component of Speed.

Component of Accuracy

Association of words and digits

- वासुदे___वासुदे अलीसीम
- सुपुष्प___सुपुष्पत
- महत्त्व___महत्त्व
- \(2^3 \times 2^3 \times 2^3\)___\(2^3 \times 2^3 \times 2^7\)
- \(2^{\frac{1}{2}}\)___\(2^{\frac{1}{2}}\)

Here, both the parts individually express different meaning. Such a mistake can be occurred in values of digits too. Here, mistakes can be avoided when the given pair is read speedily but accurately.
(2) Appearance of words and digits

- नज़ारे नज़ारे
- चर्चा चर्चा
- पहचान पहचान
- दोहे दोहे
- $60000 + 60000 \neq 60000 \times 60000$
- $\sqrt{99} \times \sqrt{99} \times \sqrt{999} \neq \sqrt{99} \times \sqrt{999} \times \sqrt{99}$

Here, appearance of a letter or digit looks similar but when we perceive it carefully, it is found different. Appearance of a letter or digit is an important component of Accuracy.

(3) Space and order of words or digits

- कविता कविता
- अंक अंक अंक अंक
- $12315 \neq 12345$
- $3\sqrt{27} \neq 3.\sqrt{27}$

When one goes through the above illustrations, letters in words and order of used letters and digits used in numbers creates some confusions and results into decisive factor for responding.

(4) Repetition in letters and digits

- निर्देशी की निर्देशी की
- भविष्य भविष्य
- लक्ष्य लक्ष्य
- $11.11122 \neq 11.11121$
- $88773 \neq 88733$

In the above illustrations, one has to perceive the repetition of letters or digits. When we go through them speedily, they looks similar but when we watch them carefully and accurately, the perception of letters or digits is found, means repetition in letters or digits which becomes a factor of accuracy.
(5) Length of words and numbers

- ছাঁড়া - নিউজলেটার জীবাণু
- ছাঁড়া নিউজলেটার জীবাণু
- 7000000
- 636363

Here, when one observes words or numbers speedily, their length is found similar but the difference is found when we look at them carefully. The length of words and numbers are also an undivided part of accuracy.

The components mentioned above are important for the construction of the Speed and Accuracy test, say for item construction for the same, which throws light on the basic principles for the measurement of Speed and Accuracy by using psychological foundations, delusion etc.

2.2.2 Factors affecting on Speed and Accuracy

Speed and accuracy of students develops only when the teachers often creates opportunity to examine their speed and accuracy during their class-room teaching. It is often found that the teacher believes that the student works speedily and accurately but actually the presence of speed and accuracy is not found in the act of the students. Some obstructive factors are existed, which affect the speed and accuracy. They are listed below:

(1) Age

Experiences are being added with the increase of the age of any individual. We know that experience is the best teacher. Repetition of experiences increases the proficiency of Speed and Accuracy in the students. Therefore, the elder child has higher skills in catching anything and throwing it to the targeted goal with compare to the younger child. Therefore, age is an important factor to decide Speed and Accuracy of a person. Speed and accuracy depend on degree of experiences attained by the person. In such a case, one can say that age is an affecting factor for speed and accuracy of a person.
(2) Physical health

To attain speed and skill an individual has to repeat the process, keeping him stable. For that purpose, physical fitness is necessary. A child having weak health or over weighted, one cannot remain stable for a long time and concentrate to any work. As a result, such physical weakness becomes an obstructive factor for development of speed and accuracy.

(3) Experiences

The experience is treated as great teacher. Experiences mould the personality. The experiences nurture the person’s abilities and skills. Reading experiences raise the level of vocabulary. The experiences of the elite class children and deprived class children are different. They get different experiences in day-to-day activities. The frequency of repetition also plays an important role in enhancing Speed and Accuracy. In such case, little experiences attained by a child become the obstructive factor.

(4) Time and duration for measurement

It is our common experience that a person seems more fresh in morning, average at noon and tired in evening. What will be result if he/she is being measured at different time? What happens if the duration of measurement is only 10 minutes, 30 minutes and two hour? The ability of working of a person depends on time limit for performing the task. Too long duration decreases the working ability and the person feels tired. In this way both time and duration for measurement becomes an obstructive factor.

(5) Interest

One’s interests, likes-dislikes etc affect directly on one’s performance. If a student has no interest in Mathematics and he is frequently asked to do calculations, its effect will definitely affect on his speed and accuracy. Interest in particular area motivates the students to perform accurately. The interest of students belonging to Science stream will be more in doing experiments perfectly and
accurately than that of students studying in Arts stream. Therefore, if any one make a student to do activity opposite to his interest, it will be an obstructive factor for speed and accuracy.

(6) Language

The language development of a child/person is related to his/her age and experiences provided in the class-room and family background. Sometimes, many components of Speed and Accuracy tests are directly related to language skills. If the language skills of any student are not developed properly, his speed and accuracy will be lower. Hence, the inadequate language skills become an obstructive factor for speed and accuracy.

(7) Gender

In our social structure, male has to happen to remain more connected to external world than female. These contacts to exterior world strengthen his language. Less contact to external world becomes an obstructive factor in developing speed and accuracy. In the present time, contacts of exterior world are increased for both the gender due to attainment of education but due to physical differences in body structure of male and female, created by nature, the female has to put more efforts for blossoming. In such situation, gender is also one of the important obstructive factors for Speed and Accuracy.

(8) Occupation

Experiences attained by working on computers, typewriters and machine are different from those famers, independent business persons. A great difference is found between speed and accuracy of a person engaged in embroidery work and labour work on the farms. It is true that some Occupations are helpful to create speed and accuracy. The Occupations in which speed and accuracy are less important, the speed and accuracy of the person busy with Occupation surely will be lower. Thus, Occupation of a person is also an obstructive factor.
### (9) Seasons

There are five seasons in our country but three seasons, say winter, summer and rainy season are clearly experienced. Difference in the day temperature and humidity in atmosphere is felt during these seasons. Deep effect of both these factors is found on the performance of work of an individual. Due to that, the Speed and Accuracy of a person is different in various seasons. If the speed and accuracy of an individual is measured during those three seasons, difference will be found in it, so that it can be said that seasons are an obstructive factor for actual measurement of speed and accuracy.

### (10) Climate of the work place

If the work is done in airy, peaceful, and delightful atmosphere, one can perform properly and accurately. Even working climate of work place affects on the performance of the person. The both situations tell us that climate of work place affect on quality as well as Speed and Accuracy. Unsuitable atmosphere becomes an obstructing factor. Sometimes physical climate as well as emotional climate affects the speed and quality of the out-put. For example, if coworkers work enthusiastically, every worker will be inspired to do that work with joy but quarrel some and distressing climate will affect adversely. Hence, the climate of work place is also an affecting factor for achieving Speed and Accuracy.

### (11) Seating arrangement

Concentration is necessary for speed and accuracy. For concentration, a one should be in proper posture and the proper posture depends on his seat and place of seating. What will be result if students of Higher Secondary School or college are made to sit on the benches of small children for written examination? What will happen when a sculpture or painter has not a comfortable seat while painting? What will happen when five students are compelled to sit on one bench while the teacher is teaching? These examples prove that the improper
seating arrangement becomes an obstructive factor for development of speed and accuracy.

(12) Secrecy

Some skills are traditionally achieved and flows from one generation to the next generation. There are some secrets behind some skilled Occupations. For example, the art of ‘Patola’ prepared in Patan is taught only the daughter in law of that family and daughters are kept away from learning this art, so that secret art of weaving and design does not slip away to the other families. Due to this attitude, about 50 families were preparing ‘Patola’ in the ancient times. Because of this narrow mindedness, now a day; only one family has the skill of preparing ‘Patola’. In this way, mentality of secrecy has become an obstructing factor for speed and accuracy. Because of such secrecy, the glorious heritage of metallurgy has been also lasted out.

2.2.3 The remedies to remove obstructive factors

(1) Age

Being an obstructive factor on speed and accuracy, it can be removed by selecting and measuring the children having same age group.

(2) Physical Health

Weakness and psycho-physiological state of an individual is an obstructive factor on speed and accuracy. To remove this factor, subjects having equal physiological status should be included in the sample.

(3) Experience

Daily experience of a person, quantity and quality of experiences are affecting factors on speed and accuracy. To control this factor, one has to keep in mind while selecting the sample.
(4) **Time and duration for measurement**

Being an obstructing factor affecting on speed and accuracy, proper time and duration should be controlled while administrating the test.

(5) **Interest**

Interest of a person is also an obstructing factor affecting on the speed and accuracy. To remove this factor, those subjects who willingly want to join in taking a test may be included in the sample. The researcher can motivate the subjects for taking the test.

(6) **Language**

Language is also an obstructing factor affecting on speed and accuracy. This factor can be removed by selecting children having equal language skills and vocabulary while measuring the speed and accuracy.

(7) **Gender**

Gender is an obstructing factor affecting on speed and accuracy. To remove this factor, those children should be selected who have developed better relation to the external world.

(8) **Occupation**

Occupation of a person is an obstructing factor on speed and accuracy. To remove this factor, those persons should be included whose Occupations are same so that this obstructive factor can be controlled.

(9) **Season**

Season is also an obstructive factor on speed and accuracy. To remove this factor, testing must be carried out in one season only.

(10) **Climate of work place**

This factor can be removed by selecting proper climate at the time of administrating the test of Speed and Accuracy.
(11) **Seating arrangement**

While measuring the speed and accuracy, concentration is necessary. This factor can be controlled by arranging good seating arrangement for all test-takers.

(12) **Secrecy**

This factor tries to provide propagation to students to respond on such tests. To remove fear within them, the investigator has to establish rapport with the testees and also take them in confidence about the results of Speed and Accuracy Test. Necessary instructions to testees may bring confidence among them and they will feel security. They will feel that nobody will know about their performance.

**2.3.0 Importance of the Research Review**

There are two major objectives to the study of the past researches and related literature.

1. To find out topic for research
2. To get guidance after selecting topic

The study of related literature provides sources for beginning the journey on the path of research in lights of past. Vision of the researcher becomes clear after reviewing past researches. Even it provides red signals to the researcher. The researcher can take decision about certain objectives to be set and methods to be used for the said research. The researcher gets detailed information about tools to be used/designed for collection of data.

Difficulties, which are to be aroused during entire study can be perceive and ways and means are to be planned out to overcome the difficulties by the researcher. This kind of knowledge or experiences proves to be inspirable and guide in the journey of research.

Knowledge explosion is found in every field. Knowledge increases every year. Plentiful literature is published every day in the form of books, magazines, newspapers and other sources. The investigator has to be familiar with the places where the information are available.
Reference books, Encyclopedia, Yearbooks, Biographies, Books, Booklets, and Card catalogs are sources for reviewing related literature and also past researches.

It is mandatory for every researcher to review the past researches to avoid duplication of work. Some important researches are identified and are reviewed as follow.

2.4.0 Review of Past Researches

The researcher had identified 19 past related researches. Out of which five were international researches, five were of National level and remaining nine were State level researches. International researches were downloaded from websites. National and State level researches were traced out from journals, different Survey of Educational researches published by NCERT coined out by Buch, M. B. Over and above, some unpublished theses were also reviewed as the primary source. All the reviews are listed below along with necessary information.

(A) International Researches

2.4.1 Researchers :- Bott, Lewis; and et. al.\textsuperscript{4}

- Title :- On the Reliability and Validity of Numerical Reasoning Speed Dimension Derived from Response Times Collected in Computerized Testing.
- Place :- Orlando
- Source :- Journal of Memory and Language
- Scalar implicatures are inferences that arise when a weak expression is used instead of a stronger alternative. For example, when a speaker says, “Some of the children are in the classroom,” she often implies that not all of them are. Recent processing studies of scalar implicatures have argued that generating an implicature carries a cost. In this study we investigated this cost using a sentence verification task similar to that of Bott and Noveck (2004) combined with a response deadline procedure to estimate speed and accuracy independently. Experiment 1 compared implicit upper-bound interpretations (“Some” [but not all]) with lower-bound
interpretations ("Some" [and possibly all]). Experiment 2 compared an implicit upper-bound meaning of "some" the explicit upper-bound meaning of "only some". Experiment 3 compared an implicit lower-bound meaning of "some" with the explicit lower-bound meaning of 'at least some'. Sentences with impoicatures required additional processing time that could not be attributed to retrieval probabilities or factor relating to semantic complexity. The result provides evidence against several different types of processing models, including verification and non-verification default implicative models and cost-free contextual models.

2.4.2 Researchers :- Maris, Gunter; and et. al.⁵
- Title :- Speed-Accuracy Response Models : Scoring Rules Based on Response Time and Accuracy
- Year :- 2012
- Place :- New York
- Source :- Psychometrika

Starting from an explicit scoring rule for time limit tasks incorporating both response time and accuracy and a definite trade off between speed and accuracy, a response model is derived. Since the scoring rule is interpreted as sufficient statistic, the model belongs to the exponential family. The various marginal and conditional distributions for response accuracy and response time are derived, and it is shown how the model parameters can be estimated. The model for response accuracy is found to be the two-parameter logistic model. It is found that the time limit determines the item discrimination, and this effect is illustrated with the Amsterdam Chess Test II.
2.4.3 **Researchers** :- Davison, Mark L.; Semmes, Robert et. al.⁶

- **Title** :- On the Reliability and Validity of Numerical Reasoning Speed Dimension Derived from Response Times Collected in Computerized Testing.
- **Year** :- 2012
- **Place** :- California
- **Source** :- Educational and Psychological Measurement.

Data from 1810 college students were used to assess whether math reasoning item response times in computerized testing can provide valid and reliable measures of a speed dimension. The alternate forms reliability of the speed dimension was 0.85. A two-dimensional structural equation model suggests that the speed dimension is related to the accuracy of speeded responses. Speed factor scores were significantly correlated with performance on the ACT mat scale. Results suggest that the speed dimension underlying response times can be reliably measured and that the dimension is related to the accuracy of performance under the pressure of time limits.

2.4.4 **Researchers** :- Goldhammer, Frank; Rauch, Wolfgang A. et.al.⁷

- **Title** :- Differential Effects of Intelligence, Perceptual Speed and Age on Growth in Attention Speed and Accuracy.
- **Year** :- 2010
- **Place** :- Orlando
- **Source** :- Elsevier. 6277 Sea Harbor Drive, Orlando, FL, 32887-4880

The study investigates the effect of intelligence, perceptual speed and age on intraindividual growth in attention speed and attention accuracy over the course of a 6 minute testing session. A sample of 193 subjects completed the Advanced Progressive Matrices and the Vienna Matrices Test representing intelligence, the test Alternes a dn GoNogo representing simple perceptual processing, and the Frankfurt Adaptive Concentration-Performance Test, A measure of executive attention. Growth
curve modeling demonstrated an increase of attentional speed and accuracy performance following linear and logarithmic trajectories, respectively. For attentional speed, intelligence significantly predicted baseline performance, but not performance growth, while for perceptual speed the reverse pattern of results held. For attentional accuracy, intelligence did not have an effect, neither on baseline performance nor on performance growth, whereas perceptual speed influenced both baseline performance and performance growth. The intelligence was not associated with the ability to learn to perform the attention task quickly and accurately. Age differences were mainly related to baseline performance. Results indicate that the concurrent performance aspects, speed and accuracy, are distinct in the shape of growth and in the predication of growth curve parameters by intelligence, perceptual speed, and age.

2.4.5 Researchers :- Andreou, G. ; Karapetsas, A.⁸

- Title :- Accuracy and Speed of Processing Verbal Stimuli among Subjects with Low and High Ability in Mathematics.
- Year :- 2002
- Place :- Greece
- Source :- Educational Psychology : International Journal of Experimental Educational Psychology.

Investigates the accuracy and processing speed of verbal stimuli among students with low and high ability I Mathematics, focusing on native Greek students (n=60) ages 15 to 18. Demonstrates that students with high ability gave faster responses and made fewer errors for the rhyme and semantic judgments. Includes references. (CMK)
(B) National level Researches

2.4.6 Researcher :- Ramesh\textsuperscript{9}

- Title :- Development of Objective-based Science Curriculum and to study its Efficacy in the Acquisition of Process Skills among High School Science Students.
- University :- Kutch University
- Year :- 1984
- Level:- Ph. D., Education
- Place :- Rapar District.

The research questions of the study were to find out (i) whether the objective-based curriculum was superior to the conventional curriculum of science at high school level in terms of achievement, (ii) whether intelligence contributed to an achievement, (iii) whether the objective-based curriculum was superior to the conventional curriculum of science at high school level in terms of acquisition of process skills, (iv) whether intelligence contributed significantly to the acquisition of process skills among high school science students, (v) whether personality traits (extraversion and introversion) contributed to the acquisition of process skills among high school science students, (vi) whether there was a significant effect of the interaction between types of curriculum and intelligence on achievement, and acquisition of process skills, (vii) whether the effect of the interaction between intelligence and personality traits was significant, (viii) whether personality of the learner interacted with the mode of curriculum and (ix) whether there was significant can interaction between the learner’s characteristics (personality and intelligence) and the design of the curriculum.

A sample of 150 students was selected randomly from class X students from government and privately run schools of Rapar district. A (2x3x2) factorial design was used in the study. Independent variables in the study were curriculum design (objective-based and traditional), intelligence (High, average and low) and personality (extraversion and introversion). The criterion variable were achievement in science (knowledge, comprehension
and application) and acquisition of process skills. The students were exposed to an objective-based curriculum developed in three topics of chemistry, keeping in view educational objectives expressed in behavioural terms. The tools used in the study were (i) an achievement test developed locally; (ii) a test to measure process skills of observing, measuring objects and phenomena, seeing a problem and seeking ways to solve it, formulating hypotheses, solving the problem by giving reason, interpreting the data and drawing conclusions. The test-retest reliability of this test was 0.70 and it had content validity, (iii) the jolota Group Test of General Mental Ability and (iv) the Nymann-Kohlstedt Diagnostic Test for Introversion and Extraversion.

**Major findings:**

1. The objective based curriculum and conversional curriculum in chemistry were equally effective so far as achievement in science as concerned. However, students taught through the objective based curriculum scored significantly higher in comprehension than those thought through the conventional curriculum.
2. The high ability group performed better than the average and low ability groups.
3. The high ability group following the objective based curriculum achieved higher mean scores than the group following the conventional curriculum.
4. For average and below average ability students, the conventional curriculum was equally suitable.
5. The extraversion and introversion traits were not responsible for any variance in achievement. The personality of the learner did not account for differential achievement.
6. The mean scores of the group thought the objective-based curriculum was more effective with respect to acquisition of process skills than the traditional curriculum group.
7. The above average intelligence group had higher mean scores on the process skills test than average and below average intelligence groups.
8. The personality of the students namely extraversion and introversion did not affect the acquisition of process skills.

2.4.7 **Researcher : R. B. Naik**

- Title : Construction and standardization of Aptitude Test of office work.
- University : Mumbai University
• Year : 1970
• Level: Ph. D.,( Education)

Objectives :

(1) To measure clerical aptitude of students
(2) To measure verbal aptitude of students
(3) To measure numerical aptitude of students
(4) To measure checking and supplementation aptitude of students
(5) To study the clerical aptitude of students in the context to their age
(6) To study the clerical aptitude of students in the context to their standards

Sample :

The test was tried out on 120 students studying in std- X and std-XII in schools of Mumbai for pre-primary try out after necessary corrections. It was given to 400 students for item analysis. Only 290 students had filled it correctly and completely. Item analysis of responses of 290 students was made. For final try out, the test was given to students of std-X and std-XII and college students studying in first year in Arts and Commerce faculty. It was also given to persons associated to educational as well as industrial institutions. The final test was given to total 9150 persons.

Tools

The test constructed for primary tryout was consisted seven subtests. The test prepared for final try out consisted of six sub tests. Such as checking, filings, computation, file drawer, digit symbol substitution, and classification. The test was validated with the Clerical Aptitude Test constructed by Indian Career Guidance Institution.

Data Analysis

The item analysis was made using Flanagan’s Table. Age norms and level norms were decided according to different age language and genders. Median value of the test was found out. Reliability of the test was decided using Test-retest method.
Major Findings

The Coefficient of correlation for N=282 was found 0.67 which indicates that the test is very good and measures clerical aptitudes successfully.

The level of Clerical aptitudes changes according to age and year of study.

2.4.8 Researcher : K. Gupta

- Title : Construction and Standardization of Clerical Aptitude Test in Hindi
- University : Bhuvneshwar University
- Year : 1969
- Level: Ph. D.,( Education)

Objectives

1. To construct the clerical aptitude test in Hindi
2. To standardize the constructed test

Sample :

This test was tried out on 1500 clerks who have passed the intermediate exam. Total 1440 male and 60 female were included in the sample.

Tools

The test was consisted of 389 items. There were seven sub tests in this test, they were (1) Intelligence test, (2) Numerical ability test, (3) Questions on language usage, (4) Classification test, (5) Filling blanks test, (6) Copying test, and (7) Examining Test

Data Analysis

Different methods of analysis were used to find out percentile and stenine score. The reliability coefficient was found between 0.949 and 0.978. The validity of test was examined by using multiple correlation method.
Major Findings

(1) This test could measure the clerical aptitude
(2) The results of the sub-test were significant at 0.01 levels
(3) No effect of gender was found on clerical aptitudes.

2.4.9 Researchers: S. Chettarji and M. Mukharji

- Title: Testing Validity of an Aptitude Test used for purgative prediction
- University: Bengal University
- Year: 1967
- Level: Research Project

Objectives:

(1) To measure ability of persons studying in different faculties such as Science, Home science, Anthropology, Commerce, Agricultural science, Fine arts
(2) To measure Mathematical knowledge and aptitudes of the students
(3) To measure clerical aptitudes of the students
(4) To test knowledge in English subject of the students

Sample

Total 1042 students of std. – VIII studying in Bengali medium secondary schools were included in the sample. The sample selection was made by using systematic randomized sampling technique.

Tools

A group test consisting following sub-tests was used to collect required data.

(1) Knowledge of English and abstract writing
(2) Clerical aptitude test
(3) Knowledge and Aptitude of Mathematics
(4) Knowledge and Aptitude of Science
(5) Mechanical Aptitude
Data Analysis

Median and standard deviation was calculated based on score of test. Reliability of test was established by using Split-half method. Multiple regression equation was used for predication of students. The marks obtained by students in annual exam of Std - IX were taken as criteria. Students were divided into three levels: Higher, Medium and lower according to their marks in Maths and English subjects.

Major Findings

(1) When students were classified based on marks in Mathematics, the result was less reliable in compassion to aptitude test in prediction about students. The results of boys differed specifically.
(2) Students, having less marks in Mathematics, had 50% opportunity of passing in study of science stream.
(3) Students, having better result in Mathematics, had obtained more marks in study related to humanity.
(4) For the prediction of success in any field, marks in English were more helpful than in Mathematics

2.4.10 Researcher : M. Mukherji

- Title : Construction and standardization of a test to measure different Aptitude
- University : Kolkata University
- Year : 1966
- Level: Ph. D.,( Education)

Objectives :

(1) To measure Aptitudes in English language of students of Std. VIII
(2) To measure verbal and logical Aptitudes of students of Std. VIII
(3) To measure clerical Aptitudes of students of Std. VIII
(4) To measure Mathematical Aptitudes and Scientific Attitudes of students of Std. VIII
(5) To measure Mechanical Aptitudes of students of Std. VIII
Sample

In all, 2000 students of Std. VIII were selected by stratified sampling technique. Another group having same characteristics was selected for feedback.

Tools

The test was consisted of six sub tests. The sub-tests were (1) English language Aptitude, (2) Clerical Aptitude, (3) Mathematical Aptitude, (4) Verbal and logical Aptitudes, (5) Scientific Aptitude and (6) Mechanical Aptitude.

Data Analysis

Coefficient of correlation between both tests was found out.

Major Findings

1. Scores on English knowledge were found less than those on other subjects.
2. This test measured verbal, mechanical and clerical aptitudes.
3. The results obtained on tests on Mathematics and Science were significant at 0.05 level.
4. Coefficient of correlation was found out 0.70 between score of this test and score of annual examination.

(C) State level Researches

2.4.11 Researcher: Goswami J. T.¹⁴

- Title: A case study of students of std – 8 of in Rajkot city having lower reading speed in context to reading comprehension, intelligence level, language aptitudes and language achievement.
- University: Saurashtra University Rajkot (Ph.D., Education)
- Year: 1997
- Level: Ph. D.,( Education)
Objectives

(1) To examine the students of Std- VIII who are higher in reading comprehension, intelligence, language aptitude and language achievement but lower in reading speed.

(2) To examine the students of Std- VIII who are higher in reading comprehension, intelligence, language aptitude and language achievement and also having higher and lower in reading speed.

(3) To examine the students of Std- VIII who are lower in reading speed in context to their reading comprehension, intelligence, language aptitude and language achievement.

(4) To prepare a multiple regression equation to decide ability of prediction of reading speed, reading comprehension, intelligence, language aptitude and language achievement.

(5) To examine multiple relation of reading speed with reading comprehension, intelligence, language aptitude and language achievement.

Sample

Students of Std. VIII, studying in Gujarati medium schools situated in Rajkot city, were the population of the study. Total 221 students of Std. VIII, studying in Gujarati medium schools, were included in the sample.

Tools

Desai-Bhatt Group Intelligence Test was used for Intelligence Quotient. Verbal Aptitude Test constructed by Urvashi Desai, a Passage reading test and Individual Progress Record were used as tools.

Data Analysis

Analysis was made by using descriptive statistics in which mean, standard deviation, percentage and coefficient of correlation were computed. A multiple regression equation was worked out for making different predictions related to various variables under investigation.
Major Findings

(1) Reading speed of students of Std. VIII has positive relation to their reading comprehension, intelligence, language aptitude and language achievement.

(2) Multiple regression equation of reading comprehension, intelligence, language aptitude and language achievement have accurate and effective aspect with reading speed.

(3) Positive partial relation of reading speed of students was found with their reading comprehension, intelligence, language aptitude and language achievement.

(4) About 11.76% students among the whole sample were under achievers, which indicate the third place in comparison to other groups.

2.4.12 Researcher: Jani K. R.\textsuperscript{15}

- Title: A study of relation of verbal ability on Clerical Aptitude with Verbal Ability and Numerical Ability of Higher Secondary students in Rajkot city
- University: Saurashtra University, Rajkot
- Year: 1991
- Level: Ph. D., (Education)

Objectives

(1) To examine the effect of verbal ability on clerical aptitude of higher secondary students and to examine effect of their gender, academic achievement and stream

(2) To examine the verbal clerical aptitude of higher secondary students and effect of their gender, academic achievement and stream on the relation of verbal clerical aptitude and verbal clerical ability
To examine the effect of numerical ability on clerical aptitude of higher secondary students and the effect of their gender, academic achievement and stream

To examine the effect of numerical ability on numerical aptitude of higher secondary students and the effect of their gender, academic achievement and stream

Sample

The students of Std. XI and Std. XII of Arts, Science, Commerce and Home Science streams studying in private as well as Government schools were included in the population of this study. Total 485 students studying in eight higher secondary schools in Rajkot city were selected for the sample.

Tools

Verbal Ability Test constructed by Urvashi Desai, Numerical Ability Test by Shantibhai Bhavsar and Clerical Aptitude Test constructed by K. G. Desai were used as tools in this study.

Data Analysis

Descriptive statistics like Mean, SD were computed strata wise and test wise. Hypotheses were tested by using ‘t’ test.

Major Findings

(1) Higher Secondary students, having diverse verbal ability, differed from their clerical aptitudes. Higher clerical aptitude was found in students having higher verbal ability and little clerical aptitude was found in students having less verbal ability.

(2) Boys of Higher Secondary schools, having diverse verbal ability, differed from their clerical aptitudes. Higher clerical aptitude was found in boys having higher verbal ability and little clerical aptitude was found in boys having less verbal ability.

(3) No difference in numerical clerical aptitude was found among students of commerce stream, having diverse numerical ability, studying in higher secondary schools.
(4) No difference in numerical clerical aptitude was found among girls of Home Science stream, having diverse numerical ability, studying in higher secondary schools.

(5) A significant difference in numerical clerical aptitude was found among students, having diverse numerical ability, studying in higher secondary schools.

2.4.13 **Researchers : Dhanani D. A.**

- Title: A study of relation of verbal achievement with reading speed and verbal aptitudes of students of std. 10 in Rajkot city
- University: Saurashtra University, Rajkot
- Year: 1986
- Level: Ph. D., (Education)

**Objectives**

(1) To examine the relation of reading speed with verbal achievement of students of Std. X in Rajkot city
(2) To examine the effect of gender, age and school level between the relation of reading speed and verbal achievement.
(3) To examine the relation between reading speed and verbal achievement of students of Std. X in Rajkot city
(4) To examine the effect of gender, age and school level between the relation of verbal aptitude and verbal achievement.

**Sample**

Total 5975 students (3351 boys and 2424 girls) studying in Rajkot city were included in population. Total 410 students (195 boys and 215 girls) were selected for the sample.

**Tools**

Three tools were used for data collection.

(1) A paragraph consisting of 300 words
(2) Desai Verbal Ability Test and,
(3) Result sheets of S. S. C. examination
Data Analysis

The analysis was done by using ‘t’ test and correlation.

Major Findings

(1) Positive relation was found between verbal achievement and reading speed of the students.

(2) No effect of gender, level of school or age was found between verbal achievement and reading speed of the students.

(3) Positive relation was found between verbal achievement and verbal aptitude of the students.

(4) No effect of gender, level of school or age was found between verbal achievement and verbal aptitude of the students.

(5) Less verbal achievement was found in students having lower reading speed with compare to those having higher reading speed.

(6) Less verbal achievement was found in students having lower verbal aptitude with compare to those having higher verbal aptitude.

2.4.14 Researcher: Upadhyay N. B.17

- Title: A study of effect of intelligence level and verbal aptitude on reading speed of students
- University: Saurashtra University, Rajkot
- Year: 1985
- Level: Ph. D.,( Education)

Objectives

(1) To examine the relation of reading speed of students of std. X with their intelligence level in Rajkot city.

(2) To examine the relation of reading speed of students of std. X with their verbal aptitude in Rajkot city.
To examine the reading speed of students having higher and lower intelligence level

To examine the reading speed of students having higher and lower verbal aptitude

Sample

Population was formed by students, studying in total 40 Gujarati medium secondary schools, in std. X in Rajkot city. Total students studying in those schools were 5975 in all in std. X. Total 410 students were selected for the sample in which 194 boys and 216 girls were included.

Tools

1. Desai-Bhatt Group Test of Intelligence
2. Verbal Aptitude Test constructed by Urvashi Desai
3. A Passage of 300 words for reading test

Data Analysis

Descriptive statistics like Mean, SD, t were computed. Hypotheses/objectives were tested using ‘t’ test.

Major Findings

1. Reading speed of students has positive relation to their intelligence level and verbal aptitude.
2. Students having higher intelligence level have faster reading ability than those having lower intelligence level.
3. Students having higher intelligence level have faster reading ability than those having lower verbal aptitude.
4. Significance correlation of reading speed was found between intelligence level and verbal aptitude.

2.4.15 Researcher :- Sharma, R. S.

- Title :- Performance on Ability / Aptitude Tests – A Study of the Effect of Practice and Some Demographic Variables.
- Year :- 1984
Objectives

The investigation was an attempt to study the effect of practice/exposure and demographic variables on psychomotor performances. The main hypotheses were: (1) Demographic variables like age, education and experience would show a significant relationship with the performance on the tests of strength of grip, motor coordination, manual dexterity, finger dexterity, perceptual motor coordination, and simple and choice reaction time. (2) Each of the above demographic variables would have a significant contribution in the performance on the selected ability / aptitude. (3) Groups differing in age, education, experience, state ethnicity and rural-urban background would differ significantly in the performance on the selected ability/aptitude. (4) Practice/exposure would show significant improvement in the performance on the selected ability / aptitude.

Sample

The sample of the study comprised 2,318 subjects out of which 930 were operatives from 12 textile mills of Gujarat State. The remaining 1,388 were fresh apprentice seeking employment as operatives in the textile industry in five different states of India.

Tools

An analysis of the job performed by the selected operatives was made to identify the various aptitudes that seemed relevant for performing the hobs. On the basis of this identification, the psychomotor tests numbered 8 to 12 from GATB measuring three aptitudes, namely, Motor Coordination (K), Manual Dexterity (M) and Finger Dexterity (F). Hand dynamometer for measuring physical strength, pursuit motor for measuring perceptual motor coordination and reaction-time apparatus for measuring simple and choice reaction-times were used in the study.
Data Collection and Analysis

For the purpose of testing the effect of practice/exposure on the performances on aptitude tests 41 operatives were tested four times, keeping an interval of 30 days between testings. Correlational analysis, multiple regression analysis, analysis of variance, factor analysis, etc. were carried out to test the hypotheses.

Major Findings

(1) Demographic variables like age, education and experience had their own distinct relations with their performance on the aptitude tests.

(2) Each of the three demographic variables distinctly revealed their significant contribution to the variance in the performance on certain aptitude tests.

(3) The groups differing in age; education, experience, state ethnicity and rural-urban background showed a significant difference in the performance on the aptitude tests.

(4) There was a significant effect of practice on the test scores.

2.4.16 Researcher :- Patel, B. N.\textsuperscript{19}

- Title :- An Investigation into the Readability Levels of Different Writing Styles of the Passages and the Reading Ability of Pupils Studying in Different Grades as Predictors of Cloze Scores

- Year :- 1983

- Place :- Sardar Patel University, Vallabh Vidyanagar

- Level: Ph. D.,( Education)

Objectives

(1) to select the appropriate reading passages deciding reading speed and its readability for the grades VII and IX

(2) to determine the writing style of the passages selected on a judgmental basis
(3) to assess the readability of the selected passages by using Aukerman's formula (iv) to select reading passages from different writing styles having uniform readability levels

(4) to rewrite the selected passages into 'easy' and 'difficult' versions

(5) to prepare Cloze Tests of the passages having different writing styles at three readability levels

(6) to administer the cloze tests to good and poor readers of grades VII and IX

(7) to test the effect of four independent factors—writing style, readability levels, grades, reading ability—and their interactions separately in relation to Cloze Scores (ix) to assess the functional relationship between the writing styles of the passages and the Cloze Scores of the pupils

(8) to assess the functional relationship between the readability levels of the reading passages and the scores of the pupils on the Cloze tests.

Tools

(1) The Reading ability test standardized by Satish B. Jain for pupils of Class VII

(2) The Reading ability test by Trivedi and Patel for pupils of classes VIII, IX and X.

(3) Cloze Tests, prepared on the paragraphs selected by keeping in view the writing styles, namely, narrative, descriptive and expository. The reliability of the tests used for collecting data were 0.94 and 0.91 and 0.89 and 0.71 respectively.

Sample

Initially the data were collected from 1580 pupils of classes VII and IX. In all, 790 students from each grade were selected as the sample.

Data Analysis

The passages of different levels of readability-easy, average and difficult, were written and 2 x 2 x 3 x 3 factorial design was used.
Analysis of variance was used for testing the significance of the difference between means.

**Major Findings**

(1) Writing style was one of the important predictors of the pupil's Cloze scores. Narrative style was comprehended more freely than the expository style. In fact, expository style was the toughest of all the three styles.

(2) Among the different levels of readability, 'easy' level was most suited to both the categories of the readers. Between easy and average difficulty there was no significant mean difference.

(3) The grade of the pupils was one of the important predictors of pupils' Cloze scores. Grade IX pupils were found to be better in comprehending the reading material than grade VII pupils.

(4) Reading ability turned out to be the most powerful and dominant predictor of the Cloze score. Reading ability even surpassed the other two important predictors of grade and writing style.

(5) Out of seven predictors of Cloze score, three turned out to be of an interactive nature. These were readability levels x grade x reading ability accounting for 9.36 percent of variance, readability levels x reading ability accounting for 5.26 percent of variance, and writing style x reading ability accounting for 3.51 percent of variance in the structure of Cloze scores.

### 2.4.17 Researcher: A. A. Roy

- **Title:** Construction of Common Aptitude Test for clerks and supervisors working in textile industry in context to their Occupational ability
- **Place:** Gujarat University, Ahmedabad
- **Year:** 1982
- **Level:** Ph. D., (Education)
Objectives

(1) To examine Clerical and Mechanical Aptitudes of people working in textile industry

(2) To prepare a test to measure the competencies of candidates in the field of account

Sample

Total 230 clerks working in the clerical department and 170 supervisors working in the technical branch in three textile mills located in Ahmedabad city were included in the sample.

Tools

Two standardized Performance Inventories were used in this study. They were (1) Clerical Aptitude Inventory and (2) Numerical Ability Inventory

Data Analysis

Mean and SD of both the groups were calculated separately. ‘F’ test and ‘t’ test were used for analysis. Internal correlation was computed by using coefficient of correlation.

Major Findings

(1) No significant difference was found between mean score on tests of both the performance inventories.

(2) Average score of workers having 26 to 35 years experience was found higher than those having less than 25 years experience.

(3) Higher scores were obtained by workers, having Matriculations and graduations.

2.4.18 Researcher : S. J. Bhavsar

- Title: Construction and standardization of Clerical Aptitude Test for pre university students
- Place: Saurashtra University, Rajkot
- Year: 1974
Objectives

(1) To examine the difference in gender in clerical aptitudes
(2) To compare the clerical aptitudes among students of Arts, Science and Commerce stream

Sample

Total 1476 students were selected as a sample. It consists of 954 boys and 522 girls of Rajkot city. All the students, studying in first year degree in Arts, Science or Commerce stream, were treated as population.

Tools

The Clerical Aptitude test was consisted of six sub-tests.

(1) Comparison of names
(2) Comparison of sentences
(3) Comparison of numbers
(4) Addition and subtraction
(5) Usage of tables and sheets
(6) Arranging words/names in alphabetical order

Data Analysis

Mean, median, SD, standard error of mean and skewness of scores on the Clerical Aptitude test were computed. Reliability of the test was decided by using Test-retest method, which was 0.73. Validity was established by using factorial analysis.

Major Findings

(1) Gender difference was not found in clerical aptitudes.
(2) No different was found in clerical aptitude of students studying in various academic faculties
2.4.19 **Researcher: Bhanushanker Girijashankar Pandya**

- **Title:** A study of Clerical Aptitudes in relation to some variables
- **Place:** Gujarat University, Ahmedabad
- **Year:** 1962
- **Level:** Ph. D., (Education)

**Objectives**

1. To study Clerical Aptitudes in relation to gender
2. To study Clerical Aptitudes in relation to age and experience

**Sample**

Students of std. XI and std. XII and male and female working as clerks in industrial institutions and Government offices were randomly selected.

**Tools**

Two types of tests were used.

1. Test on Mathematical knowledge
2. The Speed and Accuracy Test constructed by K. G. Desai

**Data Analysis**

Percentile ranks of testees were computed with the help of manual, prepared by K. G. Desai. The comparison of Speed and Accuracy among students was made by using ‘t’ test.

**Major Findings**

1. Higher age is not needed for the person having more speed and accuracy.
2. No gender difference was found in clerical aptitudes.
3. Gender difference can be possible in case of born specific clerical ability instead of clerical interest. This gender difference in interest was created due to surroundings and effect of society.
The investigator had studied total 19 past researches including five international, five national and nine state level studies. To analyze various findings emerged out from different past research work. To get over view of findings they were tabulated and are presented as table – 2.4.0

### 2.5.0 Analysis of different findings.

After comprehensive of the past researches, one has to analyses the findings derived by all the past related researchers. It can help the researcher to identify research gaps. The investigator has tried to tabulate the different findings in the light of variables. The tabular form of the analysis of different findings are presented in table 2.5.0
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Note: ✓ - Significant difference of variables was found in that particular study.
X - Significant difference of variables was not found in that particular study.
It is observed from the table 2.5.0 that:

1. Goldhammer et.al (2010), Andreou, G, et.al (2002), R. B. Nayak (1970) had selected age as a variable. Age was found a significant variable in these studies.

2. Not a single investigator had selected area, type of Occupation or academic achievement as a variable of the study.


4. According to Jani K. R. (1991), no significant effect of stream was found on speed and accuracy.

5. According to R. B. Nayak (1970), significant effect of standard was found.


7. According to Goldhammer et. al. (2010), Upathaya N.B. (1885), significant effect of intelligence was found on Speed and Accuracy.

8. Significant effect of time was found on Speed and Accuracy in researches of Maris et. al. (2012), Davison et. al. (2012).


11. Significant effect of verbal reasoning aptitude on Speed and Accuracy was found in study of M. Mukherji (1966)

12. According to B. G. Pandya (1962), significant effect of clerical interest was found on Speed and Accuracy of students.
2.6.0 Research Gaps

After comprehensive analysis of past researches, it was found that not a single research on variables such as area of residence, type of Occupation of fathers and academic achievement was conducted in the past. One study for each variable such as stream, intelligence level and verbal reasoning aptitude was found. To fill up this research gap, it was decided by the researcher to examine the effect of area, father’s Occupation and academic achievement on Speed Accuracy of students.

Beside this, contradictions were found in findings of different researches about gender. To solve such contradiction, study on gender was felt necessary. Therefore, the investigator had included gender as a variable in the present study.

2.7.0 Distinctiveness of the present study

(1) The present study undertaken by investigator is new and innovative with compare to past 19 research studies.

(2) Relevance of the past standardized tests on Speed and Accuracy is a question mark in the present era. In such situation, the investigator had constructed fresh and standardized Speed and Accuracy Test and was used in the present study.

(3) Students were selected from Gujarati medium Higher Secondary schools, having all three streams, from five districts of Gujarat state in this study.

(4) The Speed and Accuracy Test had been passed through all tryouts and its norms were established.

(5) Generally, two or three methods are used to decide reliability but the investigator had decided reliability by using six methods such as Test-retest Method, Split-half Method, Rullone Method, Flanagan Method, Rational Equivalence (KR-20), and Cronbach’s α etc. This is the most positive part of the present study.

(6) All the retrieved data was entered in Excel Spread Sheet and computed with the help of Excel programme and NRTVB-99 (A software designed by Pror. Navnit Rathod, Bhavnagar University) was done. It has provided error free results.
2.8.0 Conclusion

In this chapter, the theoretical perspectives of Speed and Accuracy, abstracts of past researches and their review, analysis of findings and distinctiveness of the present study is mentioned. The components of methodology like Population, sample, selection of tools, research method and technique of data collection are to be discussed in the next chapter.
References


(20) A. A. Roy (1882), “Construction of Common Aptitude Test for clerks and supervisors working in textile industry in context to their Occupational ability” (Unpublished Ph.D. thesis, Saurashtra University, Rajkot)
