

**RESEARCH PAPER****Tools and Techniques of Data Collection: A Study****Shubaranjan Pradhan<sup>1</sup>, Sanjeet Kumar Tiwari<sup>2</sup> and Jubraj Khamari<sup>1</sup>**

1 Department of Education, Sambalpur University, Odisha

2 School of Education, MATS University, Raipur, Chhattisgarh

Corresponding Author's Email: [sanjeetstiwari@gmail.com](mailto:sanjeetstiwari@gmail.com)Received: 3<sup>rd</sup> August 2018, Revised: 10<sup>th</sup> September 2018, Accepted: 14<sup>th</sup> September 2018**ABSTRACT**

A good number of scientists and researcher find it very difficult in carrying out their research work successfully due to lack of good knowledge of data collection. Various ways are used for data collection in research work depending on the research being done by the researcher. A researcher requires many data gathering tools or techniques, which help him in evaluation, analysis and interpretation of data. This topic enlightens on different tools and techniques like-inquiry form, observation, interview, sociometry, etc for collection of data from different sources.

**Key words:** Tools, Techniques, Data collection

**INTRODUCTION**

In every research work, it is essential to collect factual material or data, which can be obtained from many sources, direct or indirect. It is necessary to adopt a systematic procedure to collect essential data.

Relevant data, adequate in quantity and quality should be collected to conduct the research work successful.

**DATA COLLECTION:**

It is a process of collecting information from all the relevant sources to find answers to the research problem, test the hypotheses and evaluate the outcomes.

Generally it is of two types.

Primary data collection methods: when the data is collected directly by the researcher for the first time, it is original in nature and is specific to a research problem under study.

Secondary data collection method: Data are already available in books, journals, magazines i.e. which have already been collected and analyzed by someone else and the researcher recollect the data from available sources.

**TOOLS:**

For checking new, unknown data required for the study of any problem we may use various devices, instruments, apparatus and appliances. For each and every type of research we need certain instruments to gather new facts or to explore new fields. The instruments thus employed as means for collecting data are called tools.

**TECHNIQUES:**

The selection of suitable instruments or tools is of vital importance for successful research. Different tools are suitable for collecting various kinds of information for various purposes.

The research worker may use one or more of the tools in combination for his purpose.

The systematic way and procedure by which a complex or scientific task is accomplished is known as the technique. Techniques is the practical method, skill or art applied to a particulate task. So, as a researcher we should aware of both the tools and techniques of research.

The major tools of research in education can be classified broadly into the following categories.

- INQUIRY FORMS (Questionnaire, Checklist, Schedule, Rating Scale, Score card, Attitude Scale)
- OBSERVATION
- INTERVIEW

- SOCIOMETRY
- PSYCHOLOGICAL TEST (Achievement Test, Aptitude Test ,Intelligence Test, Inventory, Personality measure)

## QUESTIONNAIRE

A questionnaire is a form prepared and distributed to secure responses to certain questions. It is a systematic compilation of questions that are submitted to a sampling of population from which information is desired.

Questionnaire relies on written information supplied directly by people in response to questions. The information from questionnaires tends to fall into two broad categories – ‘facts’ and ‘opinions’. It is worth stressing that, in practice, questionnaires are very likely to include questions about both facts and opinions.

### PURPOSE:

The purpose of the questionnaire is to gather information from widely scattered sources. It is mostly used in cases where one can not readily see personally all of the people from whom he desires responses. It is also used where there is no particular reason to see them personally.

### TYPES:

Questionnaire can be of various types on the basis of its preparation. They are like:

#### 1. Closed v/s Open Questionnaire:

The question that calls for short check responses are known as restricted or closed form type. For Example, they provide for marking a yes or no, a short response or checking an item from a list of responses. Here the respondent is not free to write of his own, he was to select from the selected from the supplied responses.

On the other hand, increase of open ended questionnaire, the respondent is free to response in his own words. Many questionnaire also included both close and open type questions (Semi structure). The researcher selects the type of questionnaire according to his need of the study.

#### 2. Structured v/s Unstructured Questionnaire:

The structured questionnaire contains definite, concrete and directed questions, where as Unstructured questionnaire is often used in interview and guide. It may consist of partially completed questions.

#### 3. Fact and Opinion:

In case of fact questionnaire, the respondent is expected to give information of facts without any reference to his opinion or attitude about them.

But in case of opinion questionnaire the respondent gives the information about the facts with his own opinion and attitude.

### CHARACTERISTICS OF A GOOD QUESTIONNAIRE:

1. Questionnaire should deal with important or significant topic to create interest among respondents.
2. It should be as short as possible but should be comprehensive.
3. Directions should be clear and complete.
4. It should be represented in good Psychological order proceeding from general to more specific responses.
5. Double negatives in questions should be avoided.
6. Putting two questions in one question also should be avoided.

### ADVANTAGES:

1. Questionnaires are economical. In terms of materials, money and time.
2. It is easier to arrange.
3. It supplies standardized answers.
4. It permits wide coverage if the collection of data is from large scale. It helps in conducting depth study

**DISADVANTAGES:**

1. It is reliable and valid, but slow.
2. Pre-coded questions can bias the findings towards the researcher.
3. Postal questionnaire offer little opportunities to check the truthfulness of the answers.
4. It can't be used with illiterate and small children.
5. Irrespective of the limitations general consensus goes in favour of the use of questionnaire. It's quality should be improved.

**SCHEDULE**

Schedule is a device consisting of a set of questions which are asked and filled in by an interviewer in a face to face situation with another person. It differs from the questionnaire in that the former is administered personally to the respondent or a group of respondents while the latter is usually mailed.

**IMPORTANT FEATURES OF SCHEDULE:**

1. The schedule is presented by the interviewer. The questions are asked and the answers are noted down by him.
2. The list of questions is a mere formal document, it need not be attractive.
3. The schedule can be used in a very narrow sphere of social research.
4. In the schedule the list of questions is preplanned and noted down formally and the interviewer is always armed with the formal document detailing the questions.
5. Thus interviewer not to depend upon the memory.

**MERITS:**

1. Higher percentage of responses.
2. Possible to observe personality factors.
3. Establishment of rapport to respondent is possible.
4. Removal of doubts is possible because face to face interaction is there.
5. It is possible to know about the defects of the interviewee.

**DEMERITS:**

It may not be possible to contact personally all the respondents either individually or in a group.

**CHECKLIST**

A checklist is a type of informational job aid used to reduce failure by compensating for potential limits of human memory and attention. It helps to ensure consistency and completeness in carrying out a task. A basic example is 'to do list'.

The checklist consists of a list of items with a place to check, or to mark yes or no.

**PURPOSE:**

The main purpose of checklist is to call attention to various aspects of an object or situation, to see that nothing of importance is overlooked.

For Example, if we have to go for outing for a week, we have to list what things we have to take with us. Before leaving home, if we will check our baggage with the least there will be less chance of forgetting to take any important things, like toothbrush etc. it ensures the completeness of details of the data. Responses to the checklist items are largely a matter of fact, not of judgment. It is an important tool in gathering facts for educational surveys.

**USES:**

As it is useful in over daily life, it is also useful in educational field in the following way.

1. To collect acts for educational surveys.
2. To record behavior in observational studies.
3. To use in educational appraisal, studies- of school buildings, property, plan, textbooks, instructional procedures and outcomes etc.

**MERITS:**

1. Students can measure their own behavior with the help of checklist.
2. Easy and simple to use and frame the tools.
3. Wanted and unwanted behaviors can be included.
4. Personal - Social development can be checked.

**DEMERITS:**

1. Only the presence or absence of the ability can be tested.
2. Yes or no type judgment can only be given.
3. How much can't be tested through checklist.

For Example, we want to test the story telling skill of a student. we can check only whether the student developed or not developed the skill but we can't study how much he has developed? When we want to check 'yes' or 'no' of any ability, checklist is used.

**RATING SCALES**

Rating scale refers to a scale with a set of points which describe varying degrees of the dimension of an attribute being observed.

Rating scales record judgment or opinions and indicates the degree or amount of different degrees of quality which are arranged along a line is the scale.

By 'Rating' is meant the judgement of one person by another.

Barr, Davis and Johnson (1953)

For example: How good was the performance?

This is the most commonly used instrument for making appraisals. They try to measure the nature or degree of certain aspects or characteristics of a person or phenomenon through the use of a series of numbers, qualitative terms or verbal descriptions.

BELOW AVERAGE	AVERAGE	GOOD	VERY GOOD	EXCELLENT
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**PURPOSE OF RATING SCALE:**

Rating scales have been successfully utilized for measuring the following:

1. Performance/Effectiveness
2. Personality, anxiety, stress, emotional intelligence etc.
3. School appraisal including appraisal of courses, practices and programmes.

**TYPES OF RATING SCALE:**

1. Numerical scales
2. Graphic scales
3. Standard scales
4. Rating by cumulative points
5. Forced choice ratings

**ADVANTAGES:**

1. Rating methods consume much less time than methods of pair comparisons and rank order.
2. Rating method can be used with raters who have minimum of training.
3. They have much wider range of application and can be used for teaching ratings, ratings, school appraisal, sociological and educational surveys etc.

**DISADVANTAGES OF RATING SCALE:**

1. The error of central tendency
2. The logical error
3. The contrast error
4. The proximity error

**SCORE-CARD**

Score card is an elaborate form of rating scale. It usually provides for the appraisal of a large number of aspects or characteristics. The presence of each aspect is evaluated in terms of a "numerical point value" and the evaluation of the object observed is done with the help of total weighted score.

Score cards are commonly used in evaluating schools, textbooks, building sites, laboratories or any educational institution. The limitations and problems in constructing the score card are similar to those of rating scale.

**ATTITUDE SCALE**

Attitude scale is a form of appraisal procedure and it is also one of the enquiry terms. Attitude scales have been designed to measure the attitude of a subject or group of subjects towards issues, institutions and groups of people.

*"An attitude may be defined as a learned emotional response set for or against something."*

---Barr David Johnson

**PURPOSE OF ATTITUDE SCALE:**

In educational research, these scales are used especially for finding the attitudes of persons on different issues like:

1. Co-education
2. Religious education
3. Corporal punishment
4. Democracy in schools
5. Linguistic prejudices

**CHARACTERISTICS OF ATTITUDE SCALE:**

Attitude scale should have the following characteristics.

1. It provides for quantitative measure on a one-dimensional scale of continuum.
2. It uses statements from the extreme positive to extreme negative position.
3. It generally uses a five-point scale as we have discussed in rating scale.
4. It could be standardized and norms are worked out.

**EXAMPLES OF SOME ATTITUDE SCALE:**

Two popular and useful methods of measuring attitudes indirectly, commonly used for research purposes are:

1. Thurstone Techniques of scaled values.
2. Likert's method of summated ratings

**LIMITATIONS OF ATTITUDE SCALE:**

1. An individual may express socially acceptable opinion and conceal his real attitude.
2. An individual may not be a good judge of himself and may not be clearly aware of his real attitude.
3. He may not have been controlled with a real situation to discover what his real attitude towards a specific phenomenon was.
4. There is no basis for believing that the five positions indicated in the Likert's scale are equally spaced.

**OBSERVATION**

Observation offers the researcher a distinct way of collecting data. It does not rely on what people say they do, or what they say they think. It is more direct than that. Instead, it draws on the direct evidence of the eye to witness events first hand. It is a more natural way of gathering data. Whenever direct observation is possible it is the preferable method to use.

Observation method is a technique in which the behavior of research subjects is watched and recorded without any direct contact. It involves the systematic recording of observable phenomena or behavior in a natural setting.

**PURPOSE:**

The purpose of observation techniques are:

1. To collect data directly.
2. To collect substantial amount of data in short time span.
3. To get eye witness first hand data in real like situation.
4. To collect data in a natural setting

**TYPES OF OBSERVATION:**

On the basis of the purpose of observation may be of varied type like:

1. Structured and Unstructured
2. Participant and Non-participant

**STRUCTURED AND UNSTRUCTURED OBSERVATION:**

In the early large stage of an investigation, it is necessary to allow maximum flexibility in observation to obtain a true picture of the phenomenon as a whole. So in the first stage of observation, the observation is wide and unstructured and as the investigation proceeds observation gets restricted and structured.

**PARTICIPANT AND NON-PARTICIPANT OBSERVATION:**

In participant observation, the observer becomes more or less one of the groups under observation and shares the situation as a visiting stranger, an attentive listener, an eager learner or as a complete participant observer, registering, recording and interpreting behavior of the group.

In non-participant observation, the observer observes through one way screens and hidden microphones. The observer remains a look from group. He keeps his observation as inconspicuous as possible. The purpose of non-participant observation is to observe the behavior in a natural setting. The subject will not shift his behavior or the will not be conscious hat someone is observing his behavior.

**ADVANTAGES OF OBSERVATION:**

1. It is reliable and valid technique of collecting data and information. We get first hand data through this method.
2. Record of observation is also available immediately.

**DISADVANTAGES OF OBSERVATION:**

1. It is time consuming process
2. In case covert behavior, which can't be observed, it is not useful.
3. Establishing validity is difficult.
4. Subjectivity is also there.
5. It is a slow and laborious process.

**INTERVIEW**

Interviews are an attractive proposition for the project researcher. Interviews are something more than conversation.

Questionnaire involves indirect data collection, whereas Interview data is collected directly from others in face to face contact. As we know, people are hesitant to write something than to talk. With friendly relationship and rapport, the interviewer can obtain certain types of confidential information which might be reluctant to put in writing.

**IMPORTANCE OF INTERVIEW:**

Whether it is large scale research or small scale research, the nature of the data collection depends on the amount of resources available. Interview is particularly appropriate when the researcher wishes to collect data based on:

1. Emotions, experiences and feelings.
2. Sensitive issues.
3. Privileged information.
4. It is appropriate when dealing with young children, illiterates, language difficulty and limited, intelligence.

5. It supplies the detail and depth needed to ensure that the questionnaire asks valid questions while preparing questionnaire.

**TYPES OF INTERVIEW:**

**Structured Interview:** If question is predetermined related to the topic.

**Unstructured Interview:** If question is not predetermined.

**Semi-Structured Interview:** If question is predetermined but changes the question with regard to the mood of the interviewer.

**Single Interview:** This is a common form of semi structured or un-structured interview. It involves a meeting between one researcher and one informant.

**Group Interview:** In case of group interview, more than one informant is involved. The numbers involved normally about four to six people.

**ADVANTAGES:**

1. It provides an opportunity to the interviewer to question thoroughly certain areas of inquiry.
2. The interview permits greater depth of response which is not possible through any other means.
3. It also enables an interviewer to get information concerning feelings attitudes or emotions in relation to certain questions.

**DISADVANTAGES:**

1. It is a time consuming technique
2. The effectiveness of the interview depends greatly upon the skill of the interviewer on the part of the interviewer.
3. One sided and incomplete research
4. Result may be affected due to the difference in mental outlook of interviewer and interviewee.

**CONCLUSION**

The quality and success of a research work depends on knowledge of data collection method and application. From the above discussion we gathered a bunch of knowledge regarding the collection of data from different sources. By knowing the merits and demerits of each technique we can choose the appropriate technique in a particular situation to conduct the research valid and useful. Hence a broad and wide knowledge about the tools and techniques of data collection makes a researcher successful in his research work.

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