Lectures on Research Methods in LIS

What is Research?

- Research means again and again, to search again.
- R “Rational way of thinking”
- E “Expert and exhaustive treatment”
- S “Search for solution”
- E “Exactness”
- A “Analysis”
- R “Relationship of facts”
- C “Critical observation”
- H “Honesty and hardship”

Research is an inquiry process that has clearly defined parameters and its aims to discover or create knowledge, to build theory, to test it, confirmation of theory, revision of theory, refutation of theory; and investigation of a problem for decision making.

Research is a systematic process of identifying research problem, collecting data by specific means, analyzing it statistically and reporting the results.

Research means “a systematic investigation and study of materials and sources in order to establish facts and reach new conclusions.

Characteristics of Good Research

- Originate with a research problem

- Divide main problem into sub-problem that must be tied in unit

- Highlight specific research objective/goals

- Guided by specific research questions or hypothesis

- Accept all critical assumptions

- Follow a complete methodological research plan with strong justification

- In-depth review of previous studies should be given

- Population should be well defined

- Mention the sampling technique

- Demonstrate objectivity

- Offer verifiability

- All assumptions should be documented

- Research limitation and delimitation should be documented

- Offer mathematical accuracy
- Impartiality

Research Pitfalls

- Self-enlightenment
- Comparing data set
- Correlating data set
- Problems with yes and no
- Gathering information from books
- No contribution in existing body of knowledge

Understanding Research Process

- The research process consists of various steps that are required to be followed in order to carry out research actively. The most salient aspects of the research process include the followings:

Step by Step Guidelines

- Identification of a research problem (literature gape, practical problems, human behavior, perception of people, attitude)

- Carry out an extensive literature review

- Develop research hypothesis or research question or research objectives

- Selection of an appropriate research methodology

- Selection of population/respondents

- Selection of sample
- Development of research instrument/tool

- Collection of data from the respondents
- Analyzing of data

- Test the hypothesis
- Interpret results and provide discussions

- Drawing Conclusions & Recommendations

What is Literature Review?

- It is a process of reviewing the existing body of literature on the topic. Through literature review a researcher came to know that what has already been done on a topic and what is required to be done.

- Literature reviews require the researcher to consider the important scholarly research and a process that serves to frame the research they are preparing to undertake.

Purpose of Literature Review

- A literature review's main purpose is to summarize the existing scholarship.

- It is a standard part of a research report whose role is to introduce themes and topics in previously published articles and books that orient the reader to the conversation about the topic.

- Literature reviews start most writing that reports original research, including journal articles, theses, dissertations, and sometimes student papers.

- When the literature review is a part of a larger work, it comprises about 20% of that piece of work.

Sources of Identifying Literature

1. Encyclopedias
2. Books on related subjects
3. Databases (ScienceDirect, Emerald, SAGE, etc.)
4. HEC Website
5. Subject Directories (DOAJ)
6. Search Engines
7. Research Repository
8. Open Access Digital Libraries
9. Theses & dissertations

Benefits of Literature Review

- While conducting literature review we learn about the conversation around the topic of interest, and figuring out where in that conversation the new work will fit.

- We learn that what is already known about the topic, what current theories are accepted, what challenging theories there may be.

- A review of the literature also helps the researcher narrow the question by identifying overlaps, gaps, and ways questions have been framed already in the literature.

- Research literature helps the researcher to identify a specific research purpose, question, or testable hypothesis.

- After examining the existing research in a problem area, a researcher may arrive at a creative idea that is *not* a direct extension of existing research.

Quantitative Research

- Quantitative research is a systematic research process through which we collect numeric data from the respondents and analyze it by applying statistical measures to answer the specific research questions.

Qualitative Research

- Qualitative research is a process o f enquiry that draws data from the context in which events occur, in an attempt to describe these occurrences, as a means of determining the process in which events are embedded and the perspectives o f those participating in the events, using induction to derive possible explanations based on observed phenomena.

Understanding the Differences

Sr. No.	Quantitative Research	Qualitative Research
1	Based on scientific approach	Naturalistic approach
2	Use numeric data	Use verbal data
3	Based on positivists paradigm	Interpretivist inquiry
4	Objective reality of social facts	Study social constructs and complexities
5	Statistical analysis	Text analysis
6	Components analysis	Context based, natural setting
7	Use quantitative methods i.e experiments, non-experiments methods	Qualitative methods i.e narrative research, ethnographic studies, case studies etc
8	Data collected through questionnaire	Interviews, observations, note-taking, recording memos, video cameras, etc.
9	Data analyzed through statistically	Data analyzed through content analysis, thematic analysis through detailed description
10	Use deduction techniques	Use induction methods (bottom up)

Characteristics of Qualitative Research

1. *Context*

Qualitative research draws data from the context or environment in which events occur. Put another way, qualitative research is contextual in that it uses the natural setting in which events occur as an 'observation post' from which data are gathered.

Description:

Qualitative research attempts to describe occurrences. Using tape recorders, video cameras, notes on paper, photographs, personal records o f participants, diaries and memos, this type o f research proceeds anecdotally to describe w hat happened at a specified time and place.

Process:

It is not so much the end result o f an event, the final construction o f that event or activity, that concerns qualitative researchers as the process, the entire event itself.

Induction:

Putting it all together, that is, the context, the description o f occurrences, understanding o f the process and presentation o f participant perspectives, is no easy task. Research is not merely the reporting o f events; rather, the context, description, process and participant perspective must be analysed in a meaningful and coherent manner.

Characteristics of Quantitative Research

- **Context**
  Like qualitative research, quantitative research is interested in context, but the quantitative researcher often focuses up on only a few, selected contextual factors thought to be o f importance or relevance. Sometimes these are tested in a quasi-experimental environment.

- **Description *through* norms *and numbers***
  Quantitative research uses numerical representations to quantify occurrences, while the latter uses words to present anecdotal descriptions.

Results rather than process

It is the end result of processes that more often concerns quantitative researchers, who hope that variables can be identified and their relationships measured. As noted, in qualitative research the whole process is of potential interest.

- ***Deduction rather than induction***
  Whereas qualitative researchers often use the ‘bottom -up ’ approach known as induction when analysing data, their quantitative counterparts usually rely on deduction. That is, they begin with certain assumptions (questions, hypotheses) and then look for data to support or contradict these assumptions.

Research Design

- Research design involves determining how your chosen method will be applied to answer your research question. The design of your study can be thought of as a blueprint detailing what will be done and how this will be accomplished.

- Key aspects of research design include: research methodology; participant/sample collection and assignment (if different conditions are being explored); and data collection procedures and instruments.

Various Concepts in Research

- Research Objectives

Research problem is divided into research objectives to address the research topic. These are the part of your research topic. Research objectives represent the goals of entire study that you want to achieve through your research work.

- Research objectives are based on statements that represent the purpose of study.

- These narrate what we are trying to get from the study. These highlight our expected results.

- Research Questions

Research questions are more specific as compared to research objectives. Research questions come after research objectives. It is a way to present research problem in a questioning way by narrowing its focus.

- Hypothesis

A shrewd intelligent guess. A tentative solution of a problem that is required to be tested statistically. Something that has yet not been proved to classify as a theory but believed to be true by the researcher is labeled as a hypothesis.

- **Theory**:

A plausible, reasonable explanation of the phenomenon.

When facts are assembled in ordered and seen in relationship they constitute theory. It is a set of interrelated ideas.

- Universe

  The theoretical aggregation of all units or elements that apply to a particular survey. For example, if one were surveying librarians, the study universe would include all librarians, regardless of type, location, and so on. Universe is not frequently used today; it is often used synonymously with “population” and is essentially a useless term.

- Population—the total of all cases that conform to a prespecified criterion or set of criteria. It is more specific or better defined than a universe and is in effect a designated part of a universe. For example, American academic librarians would be part of the universe of librarians and could represent the population for a survey study.

- Population stratum—a subdivision of a population based on one or more specifications or characteristics. A stratum of the population of all U.S. academic librarians could be U.S. academic librarians of libraries with a collection of at least one million volumes or with a budget of a certain size.

- Target Population

  Set of particular respondents certain group of population for your study.

Theoretical Framework

A theoretical framework consists of concepts and, together with their definitions and reference to relevant scholarly literature, existing theory that is used for your particular study.

The theoretical framework must demonstrate an understanding of theories and concepts that are relevant to the topic of your research paper and that relate to the broader areas of knowledge being considered.

Data Collection Tools

Followings are the most used data collection tools in research:

- Questionnaire
- Interview
- Observation

- Questionnaire

It is a form containing a set of questions, especially one addressed to a statistically significant number of subjects as a way of gathering information from a survey. It has several advantages to collect data from the respondents.

- Advantages:

1. The questionnaire, especially the mail, email, and Web-based questionnaire, tends to encourage frank answers. This is in large part because it is easier for the researcher to guarantee anonymity for the respondent when using a mail questionnaire.

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3. This is in large part because it is easier for the researcher to guarantee anonymity for the respondent when using a mail questionnaire.
4. The respondent can complete the questionnaire without the researcher's being present.

5. Questionnaire produce frank answers and also eliminates interviewer bias.
6. The fixed format of the questionnaire tends to eliminate variation in the questioning process.
7. The manner in which a mail questionnaire is distributed and responded to also allows it to be completed, within limits, at the leisure of the participants.

8. Questionnaires can be constructed so that quantitative data are relatively easy to collect and analyze.
9. Questionnaires can facilitate the collection of large amounts of data in a relatively short period of time.
10. Questionnaires are usually relatively inexpensive to administer.

- Interview

It is a conversation between researcher and interviewee to explore various issues on a particular topic.

The interview involves the training of interviewers. Even if one is working with experienced interviewers, they need to become familiar with the researcher's particular questions. It can be conducted face to face and telephonically.

Conducting the Interview

The interviewer should avoid asking more than one question at a time. In contrast to mail, email, or Web-based questionnaires, the reactions of the researcher can affect the respondent's answers.

The interviewer must be careful not to show surprise or other emotions as a result of any of the interviewee's responses.

In obtaining or encouraging responses, the interviewer may find it necessary to repeat certain questions. In order to obtain an adequate response from the interviewee.

To obtain as many responses as possible, the interviewer must also learn how to deal with “don’t knows.

One should be conservative or cautious in encouraging a response when the interviewee seems reluctant to provide one.

Free-answer responses should be recorded verbatim, if at all possible, to facilitate subsequent analysis and to prevent the loss of data. Tape recorders provide one relatively easy method of recording answers word for word.

Observation:

Observe means to watch attentively in a scientific or systematic manner. In an observational study, the current status of a phenomenon is determined not by asking but by observing. Observation is sometimes treated as a research method, sometimes as a data collection technique to be utilized with a research method.

As a data collection technique, it is used in both basic and applied research and in quantitative and qualitative studies.

As a data collection technique, observation has several important advantages, including the following:

1. Observation allows one to compare what people actually did with what they said they did.

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3. Participants in a study may consciously or unconsciously report their behavior as different from the way it in fact occurred; the observed behavior may well be more valid.

4. Observational techniques can identify behavior, actions, and so on that people may not think to report because they seem unimportant or irrelevant.
5. With observational techniques, a researcher can study subjects who are unable to give verbal reports.
6. The use of observation is generally independent of the subjects' willingness to participate.

Analysing Quantitative Data

Level of Measurement:

There is different type of data that s analyzed by different ways.

Quantitative variables are in several forms, frequently called levels of measurement, It affect the data analysis process. We classify data into given groups:

1. Nominal
2. Ordinal
3. Ratio

- Nominal Data

Nominal data is a classification of categorical variables, that do not provide any quantitative value. We only label it. It has meaning in Yes and No form only.

- Nominal data will always be in form of a nomenclature, i.e., University libraries, may include a question such as the one mentioned in this case. Here, statistical, logical or numerical analysis of data is not performed. We can check percentage only.

- Most nominal data is collected via questions that provide the respondent with a list of items to choose from:

- University library
- Public library
- Special library
- Personal library

Ordinal Data:

It is a type of data that is found in ranked order. It involves some order; ordinal numbers stand in relation to each other in a ranked fashion. Like positions, I, II, III., military rank etc.

Interval Scale/Data:

Interval scales are numeric scales in which we know both the order and the exact differences between the values. The classic example of an interval scale is Celsius temperature because the difference between each value is the same. For example, the difference between 60 and 50 degrees is a measurable 10 degrees, as is the difference between 80 and 70 degrees. Here zero is not true zero.

Ratio Scale:

It is a type of data with true zero. Here we find results. The attributes of a ratio variable are assumed to have equal intervals and a true zero point. For example, age is a ratio variable because the negative age of a person or object is not meaningful and, thus, the birth of the person or the creation of the object is a true zero point.

Introduction to Descriptive Statistics

Three familiar and commonly used measures of central tendency. These include mean, median and mode.

The mean, or arithmetic average, is calculated by summing the observations and dividing the sum by the number of observations.

- The median—calculated by determining the midpoint of rank-ordered cases—can be used with ordinal, interval, or ratio measurements and no assumptions need be made about the shape of the distribution. The median has another attractive feature: it is a resistant measure. That means it is not much affected by changes in a few cases.

The mode is determined by finding the attribute that is most often observed. That is, we simply count the number of times each attribute occurs in the data, and the mode is the most frequently occurring attribute. It can be used as a measure of central tendency with data at any level of measurement. However, the mode is most commonly employed with nominal variables and is generally less used for other levels.

- Inferential Statistic

  These are used to make inferences for the data by applying various statistical tests on data such as t-test, ANOVA test etc.

Data Analysis in Qualitative Research

When fieldwork ends, the researcher begins the equally important chore of formal data analysis. Data analysis is the process of bringing order, structure and meaning to the mass of collected data. While there are numerous approaches to the analysis of qualitative data.

Such analysis as a combination of:

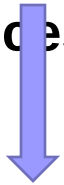
1. Data reduction
2. Data display
3. Conclusion drawing and verification

The researcher, must move between the role of the scientist and that of the artist. During data reduction the researcher-scientist condenses volumes of data into quantifiable analytical units; data are manipulated and reconfigured in an attempt to discover patterns and connections not
previously apparent.

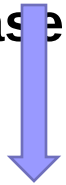
The researcher-artist then summarizes complex data in charts, graphs and other illustrations requiring creative, interpretive skills to draw out the full meaning of relationships between units and to integrate these interpretations into a meaningful account.

The qualitative researcher must moderate convergent thinking and work to remain open to the
ambiguity of emergent themes and patterns.

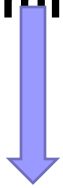
Researcher-as-research-instrument functions as information processor



Uses selective perception to tease out notable events or comments



Determines preliminary units of data



Creates initial broad categories for data units

Data analysis is a test of the researcher's ability to think and process information in a meaningful and useful manner. Furthermore, your cognitive skills enable identification of the interconnections between separate events and observations.

During the initial stages of data analysis the researcher uses a form of selective perception to tease out events or comments of note from the data. During this stage relevant terminology and notable themes are identified, and those with
apparently significant characteristics and attributes guide the categorization of data.

Using innate creative abilities, the researcher begins to piece together the puzzle of understanding and description o f the investigation

Another step would be to write a sentence defining the category and clarifying the context when appropriate. After broad categories have been created in this initial reading you might then group them into like categories.

Qualitative data analysis is thus a complex task.

Two strategies will assist you during this stage of preliminary data analysis:

- *Writing.* Use your reflexive journal to formalize reflective, creative thinking about the data.
- *Discussing.* Schedule regular meetings with a 'peer debriefer' to discuss your analysis techniques or patterns that may be emerging.

Detailed data analysis involves reconfiguring the units of data in order to view the phenomena from fresh perspectives, and watching for emergent theories pertinent to the enquiry.

To achieve the required understanding of what an investigation has discovered, and to interpret it meaningfully and contextually, researchers employ numerous methods of qualitative data analysis.

These methods include:

1. Affixing codes to a set of field notes
2. Noting reflections or other remarks in the margins of notes (discussed below in the section on memos)
3. Sorting and sifting data to identify key events, phrases, relationships between variables, patterns, themes
4. Confirming patterns and themes through additional data collection and analysis.
5. Developing new theories or contributing to existing theories.

Sampling Technique

- Non-Probability & Probability

With a nonprobability sample, the researcher cannot state the probability of a specific element of the population being included in the sample. In fact, one cannot be assured that a specific element has any probability of being included in the sample. Therefore, nonprobability samples suffer from important weaknesses. When selection probabilities are unknown, one cannot make legitimate use of statistical inference.

- That is, a nonprobability sample does not permit generalizing from the sample to the population because the researcher has no assurance that the sample is representative of the population. Nor can the researcher, relying on a nonprobability sample, evaluate the risks of error involved in making inferences about the sample.

Types:

- Accidental sampling
- Quota sampling
- Convenient sampling
- Snoball sampling
- Purposive sampling
- Self-selected sampling
- In-complete sampling

Probability Sampling

- The primary purpose of sampling is to select elements that accurately represent the total population from which the elements were drawn. Probability sampling enhances the likelihood of accomplishing this objective and also provides methods for estimating the degree of probable success; that is, it incorporates probability theory, which provides the basis for estimating population parameters and error.

Types:

- Simple random sampling
- Systematic random sampling
- Stratified sampling
- Cluster sampling

Research Ethics

- Research ethics provides guidelines for responsible conduct of research. In addition, it educates and monitors scientists conducting research to ensure a high ethical standard.

The following is a general summary of some ethical principles:

- Research should be conducted honestly in all process i.e data collection analysis and reporting.

- Researcher ensure objectivity in all processes, data interpretation, peer review, personnel decisions, grant writing, expert testimony, and other aspects of research.

- Researcher should show integrity and keep his promises and agreements; act with sincerity; strive for consistency of thought and action.

- Careful Behavior
  - Avoid careless errors and negligence; carefully and critically examine the research work and the work of peers. Keep good records of research activities.

- Openness:
  - Show openness to all possible assumption.

- Ensure Respect for Intellectual Property
  - Copyrights, and other forms of intellectual property. Do not use unpublished data, methods, or results without permission. Give credit where credit is due. Never plagiarize.

- **Confidentiality:**

Protect confidential communications, such as papers or grants submitted for publication, personnel records, trade or military secrets, and patient records.

- Publish in order to advance research and scholarship, not to advance just your own career. Avoid wasteful and duplicative publication.

- **Responsible Mentoring:**

Help to educate, mentor, and advise students. Promote their welfare and allow them to make their own decisions.

- **Respect for Colleagues:**

  Respect your colleagues and treat them fairly.

Research Proposal

- It is a proposed request to conduct a research on a given topic. It identifies the literature gape and significance of the topic to be explored through research process.

Important Components:

- Introduction
- Statement of the Problem
- Significance of the Topic
- Research Methodology
- Literature Review
- Scope of the study

- Limitation of the study
- Organization of the study
- Definition of the terms
- References and Bibliography

Report Writing in Quantitative Research

"Report is an ultimate results of your research".

- How to Write?

1. Write Introduction and plan of the work
2. Present chapterization
3. Establish relationship of the study
4. State the objective of the study
5. Develop research questions/hypothesis
6. Develop methodology plan
7. Discuss scope/population of the study
8. Mention limitation of the study

9. Discuss results and discussions
10. Provide practical value
11. Draw conclusions
12. Provide recommendations
13. Develop abstract
14. Careful about references & bibliographies
15. Careful about appendices
16. Provide good proof reading

Evaluation of Research

Following are the parameters to evaluate any research work:

1. Does the study answer the research question posed?

- Did the investigator conduct a literature search prior to the project's initiation? If so, was the study then related to past, similar investigations?

- What are the conclusions of the research? Are conclusions based on research findings?
- Can conclusions of the study be generalized to a larger population?

- Are the conclusions linked to other assertions so that findings can be incorporated into existing theory?

- Is the methodology adequate for the research problem under investigation?
- Is it suitable for research questions raised?

- What about research assumption?
- Have assumptions been explicitly identified, and are they reasonable and acceptable?

- Are the instruments or indexes used by the investigator adequate reflections of the conceptual variable of the study?

- Is it peer-reviewed? Was it pilot tested?
- Does it adequately cover the research objectives?

- If a test or experiment was conducted as a part of the research, are the results sufficiently conclusive so that the hypotheses can be accepted as tentative, theoretical know ledge or put to practical use?

- What were the independent and dependent variables of the research?
- Did investigators appear to be aware of any intervening variables, and, if so, how did the researchers account for them?

- Was the methodology explained in an understandable manner so that it can be easily replicated?
- Did the investigator make recommendations for future study?

- Was the research report written in a factual, straightforward, honest, and lucid manner, and was it free of incorrect grammar, spelling errors, and emotionally laden words and phrases?

Take Care of yourself

Thank you