RESEARCH METHODS IN GEOGRAPHY

18KP3G09

UNIT I: Meaning and definition of research–Objectives of Research-Types of Research- Research approaches - Significance of Research- criteria of good research - Research and Scientific Method - Role of Computer in research.

UNIT I

RESEARCH METHODOLOGY - INTRODUCTION

Research methodology is a means of taking decision from the results obtained from the collective, natural or social phenomena. The primary goal of research methodology is to understand immediate, distant and past social problems in order to gain a better measure of control over them. Well designed and tested research techniques are scientifically used for research purposes. Research in general sense can be regarded as a search for knowledge. Research can be carried out in different fields via social, economics, politics, education etc. Research is not a search that yields infallible truths; rather it can be regarded as a search that provides knowledge for solution of problems. The knowledge of research methodology is must for all those who desire to keep themselves abreast of the latest techniques developed in the field of research.

Research has become an important aspect of human activity. It is through research that knowledge grows and develops, ultimately leading to the extension of the boundaries of knowledge and scholarship. It is considered that the progress made by our society is due to the result of research.

Research: Meaning and Definition

Research is a matter of raising a question and then trying to find an answer. In other words, research, means a sort of investigation describing the fact that some problem is being investigated to shed for generalization. Therefore, research is the activity of solving problem which adds knowledge and developing of theory as well as gathering of evidence to test generalization.

Research is composed of two words "re" and "search" which means to search again, or to search for new facts or to modify older ones in any branch of knowledge. The Webster's International Dictionary proposes a very inclusive definition of research as "a

careful critical inquiry or examination in seeking facts or principles diligent investigation in order ascertain something"

A careful investigation carried out to understand or re-examine the facts or to search for new facts or to modify older ones in any branch of knowledge. Research is an academic activity. According to Coiffure Woody research comprises defining and redefining problems, formulating hypothesis, collecting, organizing and evaluating data, making deductions and reaching conclusions; and at last carefully testing the conclusions to determine whether they fit the formulating hypothesis.

The term "research" refers to the systematic method consisting of enunciating the problem, formulating a hypothesis, collecting the facts or data, analyzing the facts and reaching certain conclusions either in the form of solutions towards the conceded problem or in certain generalizations for some theoretical formulation

Encyclopedia of social sciences defines research as “the manipulation of things, concepts or symbols for the purpose of generalizing to extend, correct or verify knowledge, whether that knowledge aids in construction of theory or in the practice of an art”. This definition throws light on four connotations, as 1.Manipulation of things, 2.Generality, 3.Extending knowledge and 4.Building up theory or practice.

Research process

- Statement of the Problem
- Review of Literature
- Formulation of Hypothesis
- Research Design
- Data collection
- Data analysis
- Reporting the Findings

Objectives of Research

The objective of any research is broadly studied under two headings namely (i) Academic and (ii) Utilitarian Manipulation the things, finding new Propositions or concepts resulting to generalizations and discovery of truth. The purpose of research is to discover answers to questions through the application of scientific procedures. The

main aim of research is to find out the truth which is hidden and which has not been discovered as yet. The main objectives of research are given below:

- ❖ Study the difference between two variables.
- ❖ Find out certain conclusion.
- ❖ Draw out an exact nature of individual group or situation.
- ❖ To achieve new trends in the phenomenon.

Thus research looks at people's needs for information and literature of all kinds, and is concerned with some problems.

TYPES OF RESEARCH

Research can be studies under **two** divisions, First, according to the methods and second, according to the purpose.

Types of research by method

The study of method is called methodology. A method is a path of achieving or approaching to a problem. The path involves certain steps. These steps are to occur in an order of occurrences, All sciences are methodological (or based on methods).Every methodology is pointed towards solutions of human problems; existing or to exist in future. A research methodology involves the following kinds of research methods.

Historical Research

This explores the use of histories as method and the ways in which this research can contribute to new understandings about the experiential relationships between libraries and users. The critical examination of past event or happenings order to know truth and later on, to generalization is known as historical research. History is key subject for study of different subjects. It is worth to mention the famous English Dramatist George Bernard Shaw view that "the past is not behind the group. It is within the group". This means a proper study of past provide key to the present. Historical research is carried out by an individual and may not always carry hypothesis. The reasoning is inductive. By historical research, previous efforts on the topic convey the depth of knowledge and filling up of effort to the present state of knowledge on the subject Therefore, this method of research is important to methodology. It studies people and their problems but not the period. The style of reporting the result is mostly narrative. One can create a sense of continuity and a

consciousness of unity among people by doing research under this method. In this method data are drawn from observations and experiences of others. For this the documents provide primary sources of information.

Descriptive Research

It is one of the fundamental methods of research methodology. This research is often referred to as questionnaire or opinion study. It may serve as a reconnaissance phase of an investigation in a new area in which the purpose is to identify factors which are most promising for experimental investigation. This method is (1) used as a check on laboratory findings in real life and (2) used as a tool in identifying norms of standards with which to present conditions for planning future. It describes and interprets what it is with reference to conditions or relationships that exists, opinions that are held, processes that are going on, effect that are evident, or trends that are developing, it is known as non-experimental research, deals with relationship between variables. It is helpful in behavioral subjects and sciences, humanities.

Ex-post-: facto Research

In this type of research, the researcher has no control over the independent variable: more than this, randomization is not possible, which means he takes things as they are and try to extricate them. Descriptive vs. Analytical:

Descriptive research includes surveys and fact-finding enquires of different kinds. The major purpose of descriptive research is description of the state of affairs as it exists at present. In social science and business research quite often use the term Ex post-facto research for descriptive research studies. The main characteristic of this method is that the researcher has no control over the variables; he can only report what was happened or what is happening. Most ex post-facto research projects are used for descriptive studies in which the researcher seeks to measure such items as, the methods of research utilized in descriptive research are survey methods of all kinds, including comparative and correlation methods. In analytical research, on the other hand, the researcher has to use facts or information already available, and analyze these to make a critical evaluation of the material.

Experimental Research

Experimental research is considered to be the prototype of the scientific method. It involves procedure for gaining knowledge by collecting new or fresh observations under

controlled conditions. Further it reveals the causal relation and interactions. Hence, it calls for precision and accurate observation, careful observation and immediate correct recording of the data and to be closely attended to. In experimental research the independent variable as well as dependent variable are involved where the former can be manipulated as an experimental variable in order to see the effect on the latter. The experimental research is again divided

(a) Laboratory experiment and (b) field experiment.

The field experiment aims at the dual purpose of bringing about social change and combining to basis social research. This is possible when the experiment is practically-oriented. The most common features of the field experiment research are practically-oriented.

This method of research suffers with two problems viz. *(a)* the investigator though has power of manipulation, is faced in identifying and selecting independent variables and (b) the problem of randomization. The researcher is guided more by negativism than optimism. (c) Lack of precision in the sense. The dependent variables sometimes are lacking sensitive to pick up the behavior of independent variables. However the field experiment has three excellent features. They are: (a) the variables in the field experiment, usually have a strong effect compared to laboratory experiment. In other words the more realistic the research situation. The stronger the variables, (b) the interaction of groups have studied fruitfully in the field experiment mid (c) In testing of theory as well as of solution to practical problems; the field experiment is well fitted.

Types of research by purpose

Research may be motivated by the desire to know or understand for the sake of knowing called 'pure' or 'basic' research or by the desire to know In order to use this knowledge for practical concerns called 'applied' research

Pure research

Developing scientific theories or basic principles are called 'pure' or 'basic' or 'fundamental' research. Pure scientist desires to see for increasing knowledge in the field of enquiry. To him, the challenge of not knowing is paramount. Technology advance is the corresponding forward in the development of theories as well as principles from pure research. Pure research (a) helps in developing general principles, (b) helps in to find out the central factors in practical

problems, (c) becomes a standard procedure for researcher to find out an answer to the problem.

Applied research

In applied research, the problem is identified and the results are accepted to be applicable in the improvement of the practice or solution to a problem producing material gains. Like pure research, applied research also contributes to the development in the following manner

- It can contribute new fact
- It can put theory to test
- It may aid in conceptual classification
- It may integrate theory of previous study

Action research

In this type of research, the researcher appears as a participant rather observer; and therefore is actively and even emotionally involved in the results and their application. It is a special type of research in the sense, testing of application in accordance with a certain set of situation and modified according to the local prevailing conditions as well. Another feature is that it adapts itself to the changes that have taken place in the particular community. Thus, action research is similar to applied research but differs from the action process. Action research is depended upon the feed-back of information supplied.

Evaluation research

Evaluation research aims at evaluating programme that have been implemented or actions that have taken in order to get an objective. Evaluation means some sort of measurement of the end-product and impact of an effort in the light of the stated goals for which the programmed undertaken. There are so many programmes in which economic gains are not visible, the evaluation of which calls for special techniques. There are three types of evaluations.

Concurrent evaluation means continuous process and part takes the nature of an inspection and social audit. This evaluation stimulates a sort of guidance and counseling to the policy-maker with feed-back. Periodic evaluation means a distinctive phase or stage completion on which the evaluation takes place.

Terminal evaluation means evaluation is done after the completion of the programme or project. One should be of very clear with the objectives of the programme or project in evaluation of it.

Inter-disciplinary research

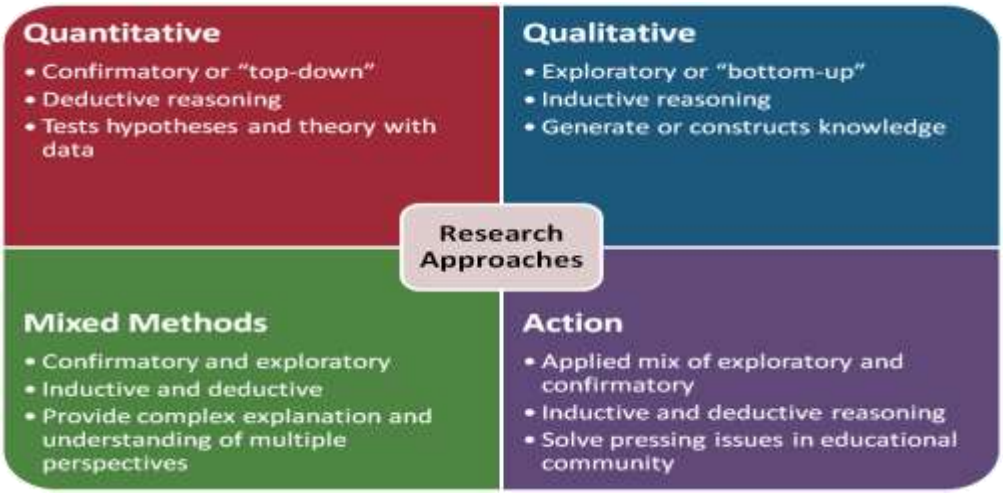
Information has now become inter-disciplinary in nature. The old division of knowledge into separate disciplines has virtually broken down. Each discipline is now interacting with other disciplines and in the Process. New interdisciplinary information is generated. Shear stated that "today there are unmistakable indications that all higher education is moving away from vertical toward a horizontal dimension that transcends traditional disciplinary boundaries to seek a universal function common to all curricula."

Field study

This method distinguishes the field experiment study with respect to the design of the research. The field experiment has purposes: (a) Discovers significant variables in the field, (b) discovers variables relations, and (c) lays a ground work for testing hypothesis.

The field study is strong in realism, theory-orientation, and heuristic quality. Its most weakness is It ex-post-facto character. Another weaknesses arc methodological issues like lack of precision in the measurement of variables.

RESEARCH APPROACHES



Quantitative research

Quantitative research is generally associated with the positivist/postpositivist paradigm. It usually involves collecting and converting data into numerical form so that statistical calculations can be made and conclusions drawn. Objectivity is very important in

quantitative research. Consequently, researchers take great care to avoid their own presence, behaviour or attitude affecting the results (e.g. by changing the situation being studied or causing participants to behave differently). They also critically examine their methods and conclusions for any possible bias.

Qualitative research

Qualitative research is the approach usually associated with the social constructivist paradigm which emphasises the socially constructed natureof reality. It is about recording, analysing and attempting to uncover the deeper meaning and significance of human behaviour and experience, including contradictory beliefs, behaviours and emotions. Researchers are interested in gaining a rich and complex understanding of people's experience and not in obtaining information which can be generalized to other larger groups.

Qualitative research often involves a smaller number of participants. This may be because the methods used such as in-depth interviews are time and labour intensive but also because a large number of people are not needed for the purposes of statistical analysis or to make generalizations from the results.

Pragmatic approach to research (mixed methods)

The pragmatic approach to science involves using the method which appears best suited to the research problem and not getting caught up in philosophical debates about which is the best approach. Pragmatic researchers therefore grant themselves the freedom to use any of the methods, techniques and procedures typically associated with quantitative or qualitative research. They recognize that every method has its limitations and that the different approaches can be complementary.

SIGNIFICANCE OF RESEARCH

- Provides guidance to social planning
- Enlightenment of knowledge
- Suggest effective remedial measures
- Basis for prediction
- Social welfare
- Social progress/ growth

- Solution to new problems
- Solution to endless social problems
- Advancement of the subject
- Improvement in tools and techniques of research
- Formulation of new laws

SCIENTIFIC METHOD

The **scientific method** is an empirical method of acquiring knowledge that has characterized the development of science since at least the 17th century. It involves careful observation, applying rigorous skepticism about what is observed, given that cognitive assumptions can distort how one interprets the observation. It involves formulating hypotheses, via induction, based on such observations; experimental and measurement based testing of deductions drawn from the hypotheses; and refinement (or elimination) of the hypotheses based on the experimental findings. These are principles of the scientific method, as distinguished from a definitive series of steps applicable to all scientific enterprises.

Though diverse models for the scientific method are available, there is in general a continuous process that includes observations about the natural world. People are naturally inquisitive, so they often come up with questions about things they see or hear, and they often develop ideas or hypotheses about why things are the way they are. The best hypotheses lead to predictions that can be tested in various ways. The most conclusive testing of hypotheses comes from reasoning based on carefully controlled experimental data. Depending on how well additional tests match the predictions, the original hypothesis may require refinement, alteration, expansion or even rejection. If a particular hypothesis becomes very well supported, a general theory may be developed.

Scientific method is the process of creating knowledge using empirical observations and logical analysis according to the conventions of the scientific community. The scientific method includes at least 5 stages:

1. Observe or have a question about some aspect of the world.
2. Propose a tentative statement, called a hypothesis, that is consistent with your observation or question.
3. Make predictions based on the logical implications of the hypothesis.
4. Test those predictions with further observations and analysis and modify the hypothesis in the light of your results.

5. Repeat steps 3 and 4 until there are no unsatisfactory discrepancies between hypothesis and observation.

Scientific method is the application of logic and objectivity to the understanding of phenomena.

Deductive Reasoning: reasoning from a general principle to a specific situation Inductive Reasoning: reasoning from specific facts to a general situation

Null Hypothesis: a statement that there is no difference between the parameters involved Hypothesis: a tentative assumption made in order to test its logical or empirical consequences

Theory: a plausible or scientifically acceptable general principle offered to explain phenomena

Elements of scientific research

The scientific method describes the processes by which scientists gain **knowledge** about the world. It's characterized by six key elements:

- questions,
- hypotheses,
- experiments,
- observations,
- analysis,
- conclusion

Characteristics of scientific research

- Verifiability
- Ethical neutrality
- Systematic exploration
- Accuracy
- Abstraction
- Predictability
- Inter-subjective reliability

- ❖ Objectivity
- ❖ Quantifiability
- ❖ Theoretical orientation
- ❖ Universality

ROLE OF COMPUTER IN RESEARCH

Characteristics of computer

Important characteristics of a computer

1. **Speed:** computers can perform calculations in just a few seconds that a human beings would need weeks to do.
2. **Storage:** end number of data can be stored in the computer and retrieved when needed. Whereas a human mind can remember limited information and unimportant data can be forgot sometimes.
3. **Accuracy:** the computer's accuracy is consistently high. Almost without exception, the errors in computing are due to human rather than to technological weakness. i. e. due to imprecise thinking by the programmer or due to inaccurate data or due to poorly designed system.
4. **Automation:** the computer programmes are automatic in nature. Individual instructions to perform which programme is needed sometimes.
5. **Diligence:** being a machine computer does not suffer from human traits of tiredness and lack of concentration. A computer can perform *n* number of calculations continuously with the same accuracy and speed.

Use of computer in research

1. Symbolic Representation of Social Data

2. Searching and Synthesizing the Literature

3. Simulating, Modeling and Planning

4. Managing Data

5. Analyzing Quantitative Data

6. Analyzing Qualitative (textual) data

6.1 Encoding Text for Machine Reading

6.2 Organization

6.3 The creation and analysis of Field Notes

6.4 Recording

7. Graphing

8. Writing and Rewriting

Advantages

- Easy Communication
- Comparatively Inexpensive
- Quick Dispersion of Information
- Wealth of Information:
- Sending E-mail Messages
- Receiving Feedbacks

Uses of computer in different phases of research

Phases of Research Process

There are five major phases of the research process. They are:

1) Conceptual phase
2) Design and planning phase
3) Empirical phase
4) Analytic phase and
5) Dissemination phase

1) Role of Computer in Conceptual Phase

The conceptual phase consists of formulation of research problem, review of literature, theoretical frame work and formulation of hypothesis.

Role of Computers in Literature Review: Computers help for searching the literatures (for review of literature) and bibliographic references stored in the electronic databases of the world wide webs. It can thus be used for storing relevant published articles to be retrieved whenever needed. This has the advantage over

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UNIT II

Logic in research- Hypothesis, Concepts and Facts, Principles and Law, Theory - Role of Models –Research problems - selecting the research problem - defining the problem - Research paper - article - workshop - Seminars - Conference and Symposia.

RESEARCH HYPOTHESIS

A hypothesis is a tentative statement about the relationship between two or more variables. It is a specific, testable prediction about what you expect to happen in a study.

For example, a study designed to look at the relationship between sleep deprivation and test performance might have a hypothesis that states, "This study is designed to assess the hypothesis that sleep-deprived people will perform worse on a test than individuals who are not sleep-deprived."

The Hypothesis in the Scientific Method

In the scientific method, whether it involves research in psychology, biology, or some other area, a hypothesis represents what the researchers think will happen in an experiment. The scientific method involves the following steps:

1. Forming a question
2. Performing background research
3. Creating a hypothesis
4. Designing an experiment
5. Collecting data
6. Analyzing the results
7. Drawing conclusions
8. Communicating the results

The hypothesis is a prediction, but it involves more than a guess. Most of the time, the hypothesis begins with a question which is then explored through background research. It is only at this point that researchers begin to develop a testable hypothesis. Unless you are creating an exploratory study, your hypothesis should always explain what you *expect* to happen.

In a study exploring the effects of a particular drug, the hypothesis might be that researchers expect the drug to have some type of effect on the symptoms of a specific illness. In psychology, the hypothesis might focus on how a certain aspect of the environment might influence a particular behavior.

Remember, a hypothesis does not have to be correct. While the hypothesis predicts what the researchers expect to see, the goal of the research is to determine whether this guess is right or wrong. When conducting an experiment, researchers might explore a number of factors to determine which ones might contribute to the ultimate outcome.

In many cases, researchers may find that the results of an experiment do not support the original hypothesis. When writing up these results, the researchers might suggest other options that should be explored in future studies.

Formulating a Hypothesis

In many cases, researchers might draw a hypothesis from a specific theory or build on previous research. For example, prior research has shown that stress can impact the immune system. So a researcher might hypothesize: "People with high-stress levels will be more likely to contract a common cold after being exposed to the virus than people who have low-stress levels."

In other instances, researchers might look at commonly held beliefs or folk wisdom. "Birds of a feather flock together" is one example of folk wisdom that a psychologist might try to investigate. The researcher might pose a specific hypothesis that "People tend to select romantic partners who are similar to them in interests and educational level."

Elements of a Good Hypothesis

When trying to come up with a good hypothesis for your own research or experiments, ask yourself the following questions:

- Is your hypothesis based on your research on a topic?
- Can your hypothesis be tested?
- Does your hypothesis include independent and dependent variables?

Before you come up with a specific hypothesis, spend some time doing background research. Once you have completed a literature review, start thinking about potential questions you still have. Pay attention to the discussion section in the journal articles you read. Many authors will suggest questions that still need to be explored.

In order to form a hypothesis, you should take these steps:

- Collect as many observations about a topic or problem as you can.
- Evaluate these observations and look for possible causes of the problem.
- Create a list of possible explanations that you might want to explore.
- After you have developed some possible hypotheses, think of ways that you could confirm or disprove each hypothesis through experimentation. This is known as falsifiability.

CONCEPTS

Concepts are defined as abstract ideas or general notions that occur in the mind, in speech, or in thought. They are understood to be the fundamental building blocks of thoughts and beliefs. They play an important role in all aspects of cognition. As such, concepts are studied by several disciplines, such as linguistics, psychology, and philosophy, and these disciplines are interested in the logical and psychological structure of concepts, and how they are put together to form thoughts and sentences. The study of concepts has served as an important flagship of an emerging interdisciplinary approach called cognitive science.

In contemporary philosophy, there are at least three prevailing ways to understand what a concept is:

- Concepts as mental representations, where concepts are entities that exist in the mind (mental objects)
- Concepts as abilities, where concepts are abilities peculiar to cognitive agents (mental states)
- Concepts as Fregean senses, where concepts are abstract objects, as opposed to mental objects and mental states

Concepts can be organized into a hierarchy, higher levels of which are termed "super ordinate" and lower levels termed "subordinate". Additionally, there is the "basic" or "middle" level at which people will most readily categorize a concept. For example, a basic-level concept would be "chair", with its super ordinate, "furniture", and its subordinate, "easy chair".

When the mind makes a generalization such as the concept of tree, it extracts similarities from numerous examples; the simplification enables higher-level thinking. A concept is instantiated by all of its actual or potential instances, whether these are things in the real world or other ideas.

Concepts are studied as components of human cognition in the cognitive science disciplines of linguistics, psychology and, philosophy, where an ongoing debate asks whether all cognition must occur through concepts. Concepts are used as formal tools

or models in mathematics, computer science, databases and artificial intelligence where they are sometimes called classes, schema or categories. In informal use the word concept often just means any idea.

FACT

In science, a **fact** is a repeatable careful observation or measurement (by experimentation or other means), also called empirical evidence. Facts are central to building **scientific** theories.

A **fact** is an occurrence in the real world. The usual test for a statement of fact is verifiability that is whether it can be demonstrated to correspond to experience. Standard reference works are often used to check facts. Scientific facts are verified by repeatable careful observation or measurement by experiments or other means.

For example, "This sentence contains words." is a linguistic fact, and "The sun is a star." is an astronomical fact. Further, "Abraham Lincoln was the 16th President of the United States." and "Abraham Lincoln was assassinated." are both historical facts. Generally speaking, facts are independent of belief.

Fact may also indicate findings derived through a process of evaluation, including review of testimony, direct observation, or otherwise; as distinguishable from matters of inference or speculation. Fact is a statement that is considered obviously true such that any rational person would confirm it.

Facts may be checked by reason, experiment, personal experience, or may be argued from authority. Roger Bacon wrote "If in other sciences we should arrive at certainty without doubt and truth without error, it behooves us to place the foundations of knowledge.

Any non-trivial true statement about reality is necessarily an abstraction composed of a complex of objects and properties or relations. Facts possess internal structure, being complexes of objects and properties or relations." Facts may be understood as information that makes a true sentence true. Facts may also be understood as those things to which a true sentence refers.

The following are common approaches to establishing facts.

- Self-Evidence
- Anecdotal Evidence
- Argument from Authority
- Consensus
- Objectivity
- Empirical Evidence
- Coherence
- Logic

Three kinds of facts

Sourced facts

What they are: Facts that somebody else figured out first: statistics, quotes, descriptions, and the like.

Where they come from: Books, articles, papers, web sites, television programs, podcasts . . . you know, "secondary sources."

How can you be sure they are true: Trust reputable sources, such as polls from established pollsters, daily newspaper sites, peer-reviewed research, and other trusted news sources. You can also quote corporate sources if you believe their methodology was sound. When you see a fact in print, track down where it came from. Sometimes this takes two, three, or four links, or a Google search, but you're better off if you can get down to the original source and see if you trust it, rather than somebody else who quoted it.

What you should put in the text: List the name of the source. If that isn't ideal for the place you're writing, include a footnote or a link to the original source, so people can verify it for themselves and because reputable writers give credit to those who found the facts they're using.

How to get permission to use them: Facts and short quotes aren't protected by copyright.

What happens if you use too many: No one wants to read warmed-over information from somewhere else. Secondary sources are fine, but anything worth writing also includes the other kinds of facts and opinions.

First-hand facts

What they are: Descriptions of things you experienced yourself, like speeches you heard or places you visited.

Where they come from: Your memory.

How can you be sure they are true: How could they be false after all, you experienced them? Of course, recollection can be faulty. Where you can, bolster your memory with other contemporary information.

What you should put in the text: Use the word "I" to clue people in that you're describing something you saw or hear first-hand.

What happens if you use too many: You've created a memoir. That's fine, if that's what you're aiming for. But be careful about assuming that what you experienced is typical.

Facts you created

What they are: Results of primary research. These could be interviews with others, surveys you've conducted, or other research you did.

Where they come from: Hard work. Creating new facts takes effort and expense.

How can you be sure they are true: Verify them with the original source

What you should put in the text: Use words that clue people in that you conducted original primary research.

How to get permission to use them: For interviews, before you begin, indicating that conversation is on the record.

What happens if you use too many: The more original research, the better your writing will be.

PRINCIPLES AND LAW

Principles are ideas based on **scientific** rules and laws that are generally accepted by **scientists**. They are fundamental truths that are the foundation for other **studies**. ... They are more like guiding ideas that **scientists** use to make predictions and develop new laws. A **principle** is a general and fundamental truth that may be used in deciding conduct or choice.

A **principle** is a proposition or value that is a guide for behavior or evaluation. In law, it is a rule that has to be or usually is to be followed, or can be desirably followed, or is an inevitable consequence of something, such as the laws observed in nature or the way that a system is constructed. The principles of such a system are understood by its users as the essential characteristics of the system, or reflecting system's designed purpose, and the effective operation or use of which would be impossible if any one of the principles was to be ignored.

Principles are ideas based on scientific rules and laws that are generally accepted by scientists. They are fundamental truths that are the foundation for other studies. Principles are **qualitative**. They aren't really rules that can be written down with mathematical symbols. They are more like guiding ideas that scientists use to make predictions and develop new laws.

Principle of Relativity: Physical laws take the same form in all systems of reference. (Albert Einstein)

Principle of Special Relativity: The speed of light is the same for all observers. (Albert Einstein)

PRINCIPLE

A principle is a concept or value that is a guide for behavior or evaluation. In law, it is a rule that has to be, or usually is to be followed, or can be desirably followed, or is an inevitable consequence of something, such as the laws observed in nature or the way that a system is constructed. The principles of such a system are understood by its users as the essential characteristics of the system, or reflecting system's designed purpose, and the effective operation or use of which would be impossible if any one of the principles was to be ignored.

Examples of principles are entropy in a number of fields, least action in physics, those in descriptive comprehensive and fundamental law: doctrines or assumptions forming normative rules of conduct, separation of church and state in statecraft, the central dogma of molecular biology, fairness in ethics, etc.

Principle is a substantive and collective term referring to rule governance, the absence of which, being "unprincipled", is considered a character defect. It may also be used to declare that a reality has diverged from some ideal or norm as when something is said to be true only "in principle" but not in fact.

LAWS

A **scientific law** is the description of an observed phenomenon. It doesn't **explain** why the phenomenon exists or what causes it. The explanation of a phenomenon is called a **scientific theory**.

Scientific laws and theories are supported by a large body of empirical data, accepted by the majority of scientists within that area of scientific study and help to unify it; they are not the same thing.

"Laws are descriptions often mathematical descriptions of natural phenomenon; Newton's law of gravitational attraction describes how objects are influenced by gravity. If you drop an apple, it will fall. If you throw an apple in the air, it will follow a specific path while falling down. Newton's laws don't tell us **why** the apple falls or **what causes** it to fall, just that it does fall.

Similarly, the law of conservation of mass says that mass can't be created or destroyed. It doesn't say **why** this is true; neither does it say **how** it is true. It just says what happens mass is always conserved.

Scientific laws can be written as mathematical equations, so they are called **quantitative**. However, there aren't very many laws in biology. They are more common in physics and chemistry.

Scientists begin with a hypothesis, which is sort of a guess of what might happen. When the **scientists** investigate the hypothesis, they follow a line of reasoning and eventually formulate a theory. Once a theory has been tested thoroughly and is accepted, it becomes a **scientific law.**

Scientific law or Law of Science are statements, based on repeated experiments or observations, that describe or predict a range of natural phenomena.The term law has diverse usage in many cases (approximate, accurate, broad, or narrow) across all fields of natural science (physics, chemistry, astronomy, geosciences, biology). Laws are developed from data and can be further developed through mathematics; in all cases they are directly or indirectly based on empirical evidence. It is generally understood that they implicitly reflect, though they do not explicitly assert, causal relationships fundamental to reality, and are discovered rather than invented

Scientific laws summarize the results of experiments or observations, usually within a certain range of application. In general, the accuracy of a law does not change when a new

theory of the relevant phenomenon is worked out, but rather the scope of the law's application,

THEORY

A theory is a contemplative and rational type of abstract or generalizing thinking, or the results of such thinking. Depending on the context, the results might, for example, include generalized explanations of how nature works. The word has its roots in ancient Greek, but in modern use it has taken on several related meanings.

Theories guide the enterprise of finding facts rather than of reaching goals, and are neutral concerning alternatives among values. A theory can be a body of knowledge, which may or may not be associated with particular explanatory models. To theorize is to develop this body of knowledge.

As in Aristotle's definitions, theory is very often contrasted to "practice" (from Greek praxis, πρᾶξις) a Greek term for doing, which is opposed to theory because pure theory involves no doing apart from itself. A classical example of the distinction between "theoretical" and "practical" uses the discipline of medicine: medical theory involves trying to understand the causes and nature of health and sickness, while the practical side of medicine is trying to make people healthy. These two things are related but can be independent, because it is possible to research health and sickness without curing specific patients, and it is possible to cure a patient without knowing how the cure worked.

In modern science, the term "theory" refers to scientific theories, a well-confirmed type of explanation of nature, made in a way consistent with scientific method, and fulfilling the criteria required by modern science. Such theories are described in such a way that any scientist in the field is in a position to understand and either provide empirical support ("verify") or empirically contradict ("falsify") it.

Scientific theories are the most reliable, rigorous, and comprehensive form of scientific knowledge, in contrast to more common uses of the word "theory" that imply that something is unproven or speculative (which is better characterized by the word hypothesis). Scientific theories are distinguished from hypotheses, which are individual empirically testable conjectures, and from scientific laws, which are descriptive accounts of how nature behaves under certain conditions.

A **theory** is a related set of concepts and principles about a phenomenon the purpose of which is to explain or predict the phenomenon.

Why theory is important?

1. Theory provides concepts to name what we observe and to explain relationships between concepts. Theory allows us to explain what we see and to figure out how to bring about change. Theory is a tool that enables us to identify a problem and to plan a means for alteringthesituation.

2. Theory is to justify reimbursement to get funding and support and needs to explain what is being done and demonstrate that it works.

3. Theory is to enhance the growth of the professional area to identify a body of knowledge

with theories from both within and without the area of distance learning. That body of knowledge grows with theory and research. Theory guides research.

Development of theories

Theory is constantly revised as new knowledge is discovered through research. Three stages of theory development in any new science

1) **Speculative** - attempts to explain what is happening.
2) **Descriptive** - gathers descriptive data to describe what is really happening.
3) **Constructive** - revises old theories and develops new ones based on continuing research.

Theory development process

1) **Theory-practice-theory** take existing theory in education, apply to distance learning, develop new theory
2) **Practice-research-theory** see what is happening in distance learning, submit to research, develop theory from results
3) **Theory-theory-research/practice** build on an initial theory to develop a second theory, then apply and test it

ROLE OF MODELS

A **scientific model** is a representation of a particular phenomenon in the world using something else to represent it, making it easier to understand. A scientific model could be a diagram or picture, a physical model like an aircraft model kit you got when you were young, a computer program, or set of complex mathematics that describes a situation. Whatever it is, the goal is to make the particular thing you're modeling easier to understand. When we do that, we're able to use it to predict what will happen in the future. For example, predicting what will happen as our climate changes would be easy if we could make a fully accurate model of the atmosphere.

Role of different models in research

Formal versus Informal Models

Since a **system** model is a representation of a system, many different expressions that vary in degrees of formalism could be considered models. In particular, one could draw a picture of a system and consider it a model. Similarly, one could write a description of a system in text and refer to that as a model. Both examples are representations of a system. However, unless there is some **agreement** on the meaning of the terms, there is a potential lack of precision and the possibility of ambiguity in the representation.

Physical Models versus Abstract Models

The United States "Department of Defense Modeling and Simulation (M&S) Glossary" asserts that "a model can be [a] physical, mathematical, or otherwise logical

representation of a system" (1998). This definition provides a starting point for a high-level model classification. A **physical model** is a concrete representation that is distinguished from the mathematical and logical models, both of which are more abstract representations of the system.

Descriptive Models

A **descriptive model** describes logical relationships, such as the system's whole-part relationship that defines its parts tree, the interconnection between its parts, the **functions** that its **components** perform, or the test cases that are used to **verify** the system **requirements**. Typical descriptive models may include those that describe the functional or physical **architecture** of a system, or the three-dimensional geometric representation of a system.

Analytical Models

An **analytical model** describes mathematical relationships, such as differential equations that support quantifiable analysis about the system parameters. Analytical models can be further classified into dynamic and static models. Dynamic models describe the time-varying state of a system, whereas static models perform computations that do not represent the time-varying state of a system. A dynamic model may represent the performance of a system, such as the aircraft position, velocity, acceleration, and fuel consumption over time. A static model may represent the mass properties estimate or **reliability** prediction of a system or component.

Hybrid Descriptive and Analytical Models

A particular model may include descriptive and analytical aspects as described above, but models may favor one aspect or the other. The logical relationships of a descriptive model can also be analyzed, and inferences can be made to reason about the system. Nevertheless, logical analysis provides different insights than a quantitative analysis of system parameters.

Domain-Specific Models

Both descriptive and analytical models can be further classified according to the domain that they represent.

System Models

System models can be hybrid models that are both descriptive and analytical. They often span several modeling domains that must be **integrated** to ensure a consistent and **cohesive** system representation. As such, the system model must provide both general-purpose system constructs and domain-specific constructs that are shared across modeling domains. A system model may comprise multiple views to support planning, requirements, design, analysis, and **verification**.

Simulation versus Model

The term **simulation**, or more specifically **computer simulation**, refers to a method for implementing a model over time (DoD 1998). The computer simulation includes the

analytical model which is represented in executable code, the **input** conditions and other input data, and the computing infrastructure. The computing infrastructure includes the computational engine needed to execute the model, as well as input and **output** devices.

Integration of Models

Many different types of models may be developed as artifacts of a MBSE effort. Many other domain-specific models are created for component design and analysis. The different descriptive and analytical models must be integrated in order to fully realize the benefits of a model-based approach.

RESEARCH PROBLEMS

A research problem is a statement about an area of concern, a condition to be improved, a

difficulty to be eliminated, or a troubling question that exists in scholarly literature, in

theory, or in practice that points to the need for meaningful understanding and deliberate

investigation.

A research problem is a specific issue, difficulty, contradiction, or gap in knowledge that you will aim to address in your research. You might look for practical problems aimed at

contributing to change, or theoretical problems aimed at expanding knowledge. The research problem is the first step towards knowing exactly what you'll do and why.

SELECTING A RESEARCH PROBLEM

The type of research problem you choose depends on your broad topic of interest and the type of research you want to do.

Step 1: Identify a broad problem area As you discuss and read about your topic, look for under-explored aspects and areas of concern, conflict or controversy. Your goal is to find a gap that your research project can fill.

1) Practical research problems: You can identify a problem by reading reports, following up on previous research, and talking to people who work in the relevant field or organization. You might look for: Issues with performance or efficiency in an organization Processes that could be improved in an institution Areas of concern among practitioners in a field Difficulties faced by specific groups of people in society.

2) Theoretical research problems: Theoretical research focuses on expanding knowledge and understanding rather than directly contributing to change. You can identify a research problem by reading recent research, theory and debates on your topic to find a gap in what is

currently known about it. You might look for: A phenomenon or context that has not been

closely studied A contradiction between two or more perspectives OR A situation or relationship that is not well understood OR A troubling question that has yet to be resolved

Step 2: Learn more about the problem: Next, you have to find out what is already known

about the problem, and pinpoint the exact aspect that your research will address.

- Context and background
- Who does the problem affect?
- Has it been an issue for a long time, or is it a
- newly discovered problem?
- What research has already been done?
- Have any solutions been proposed?
- What are the current debates about the problem,
- and what do you think is missing from them?
- Specificity and relevance
- What particular place, time and/or people will you
- focus on?
- What aspects will you not be able to tackle?
- What will be the consequences if the problem is not resolved?
- Whose will benefit from resolving the problem (e.g. the management of an organization or future researchers)?

Choosing a Research Problem

- Your professor provides you with a general topic from which you study a particular aspect;
- Your professor provides you with a list of possible topics to study and you choose a topic from that list; or,
- Your professor leaves it up to you to choose a topic

Step 1: Identify concepts and terms that make up the topic statement.

Step 2: Review related literature to help refine how you will approach examining the topic and finding a way to analyze it.

Step 3: Since social science research papers are generally designed to encourage you to develop your own ideas and arguments, look for sources that can help broaden, modify, or strengthen your initial thoughts and arguments.

Choose a topic that you find interesting in some way, or that is controversial and that you have a strong opinion about, or has some personal meaning for you. You're going to be working on your topic for quite some time, therefore, choose one that you find interesting and engaging or that motivates you to take a position. Embrace the opportunity to learn something new!

How to Begin: Your professor leaves it up to you to choose a topic

Step 1: Under this scenario, the key process is turning an idea or general thought into a topic that can be configured into a research problem.

Step 2: If you lack ideas, or wish to gain focus, try any or all of the following strategies:

Treat an open-ended research assignment as an opportunity to gain new knowledge about something that's new or exciting to you related to the overall subject of the course.

- Review your course readings
- Search the USC Libraries Catalog for a good, recently published book
- Browse through some current journals in your subject discipline
- Think about essays you have written for past classes, other courses you have taken
- Academic lectures and programs you have attended.
- Search online media sources

Step 3: To build upon your initial idea, use the suggestions under this tab to help narrow, broaden, or increase the timeliness of your idea so you can write it out as a research problem.

DEFINING THE PROBLEM

Components of research problem

- An individual or a group with some difficulty or problem.
- Objectives of research thatare to be attained.
- The environment in which the problem exists.
- Two or more course of action or Alternative means for obtaining the objective.
- Two or more possible Outcomes.
- Objective of the study

Sources of Research problem

(i) specialization,
(ii) instructional program pursued,
(iii) reading,
(iv) analysis of an area of knowledge,
(v) Co existing practices and needs,
(vi) repetition or extensions, and
(vii) "Offshoots" of studies under way.

Formulation of a research problem refers to state the problem in a researchable manner. Formulation of the research problem basically includes narrowing down the research area and formulating the objectives. Once the research problem is formulated, the topic becomes ready to undergo a scientific inquiry – the research.

5 ways to formulate the research problem:

- Specify your research objectives;
- Review its context or environment;
- Explore its nature;
- Determine variable relationships;
- Anticipate the possible consequences of alternative approaches.

RESEARCH PAPER / ARTICLE

Definition

A research article reports the results of original research, assesses its contribution to the body of knowledge in a given area, and is published in a peer-reviewed scholarly journal. A given academic field will likely have dozens of peer-reviewed journals. Once, research articles had only a limited audience consisting mainly of other scholars and graduate students. Today, websites such as Google Scholar and the proliferation of electronic academic journals have broadened the potential audience for research articles.

Features

Research articles generally consist of the following components: a title and abstract, an introduction, a methodology, results, discussion, and references. Before they are published, the editor of the journal to which the manuscript was submitted sends it to experts in the same field for review. These scholars will review the article for, among other things, the appropriateness of its methodology and its relevance to the field. They may suggest revisions. The peer review process is lengthy. It may be a year or longer between the time an article is submitted and its publication.

Title and Abstract

The title and abstract are key factors in determining whether the entire article will be read. A title should be descriptive, giving the reader an idea of the focus of the study. Because the Internet has made it possible to access so many research articles online, a title should contain enough keywords for an interested reader to find the article. The abstract, meanwhile, serves as a mini-summary of the study. Many readers will review the abstract and, based on the findings, will decide whether to read the entire article.

Introduction

The introduction of a research article should state the problem being studied and the reason for the study. To place the research in proper context, the introduction should contain a brief summary of the previous research in the area covered by the study. This literature review should include references, which should be listed in the references section at the end of the article. By presenting an overview of the previous research, the article's author(s) can explain how the study presented in the article will contribute to and advance the body of knowledge.

Methods

This section of the research article should outline the methodology the author(s) used

in conducting the study. Including information on methods used allows readers to determine whether the study used appropriate research methods for the question being investigated. It also makes it possible for other researchers to replicate the study and see if they obtain the same results.

Results

The results section will present the data, the meat of the study. It is easy to confuse the results section with the discussion section that follows, in which the article's author interprets the results of the study. The results section should only report the results from the data analysis, regardless of whether the study is qualitative or quantitative.

Discussion

The discussion section presents an interpretation of the results of the study. The authors will summarize the findings and assess them in the larger context of the existing knowledge, pointing out the ways in which their findings relate to those from prior studies. Any unusual or unexpected results will be discussed in this section as well. Finally, the authors will consider the larger theoretical implications of the study's results.

Citations

The citations (references) come at the end of the article and should list all books, articles, and other resources used and cited in the article. The references and the entire article should be written in the appropriate style (Modern Languages Association, American Psychological Association, Chicago, etc.).

SEMINAR

A **seminar** is a form of academic instruction, either at an academic institution or offered by a commercial or professional organization. It has the function of bringing together small groups for recurring meetings, focusing each time on some particular subject, in which everyone present is requested to participate.

A **seminar** is a format of instruction that may occur over several ongoing meeting times. Universities, professional organizations or commercial associations will generally offer a seminar on a topic to provide academic instruction in a small group setting. These recurring meetings may focus on one component within a broader topic category to provide comprehensive education with a combination of lecturing and group activities. Seminar presenters will use a variety of strategies including demonstrations, visual aids, lecturing and interactive activities to ensure mastery of material and provide opportunities for practice. Occasionally this hands-on practice may involve lab time or workshops to provide opportunities to interact with the content.

A seminar usually occurs over a longer period of time than a conference or a symposium, like several weeks or a semester. Additionally, a conference or symposium presents the latest research findings on a given topic, while a seminar is less focused on research findings, emphasizing the practical applications of current research instead.

A seminar may have several purposes or just one purpose. For instance, a seminar may be for the purpose of **education**, such as a lecture, where the participants engage in the discussion of an academic subject for the aim of gaining a better insight into the subject.

Types of seminar

Following are the four types of seminars that can be easily arranged in a seminar room:

- Community **seminar**
- Content Area **seminar**
- Faculty **seminar**
- School-Wide **seminar**

Research seminars help students refine their skills of **research**, text processing, searching scholarly information and presenting their work. Students also improve their understanding of study design, which includes **defining** the hypothesis, providing a rationale for it and selecting a line of argument.

Seminar and its importance

Seminars, workshops and conferences hold great **importance** of life of a student. They are platforms not only to learn new aspects, others perspectives and latest information, but also a good way of networking By learning about new topics and meeting leaders in their field student feels encouraged and motivated.

Attending a seminar has numerous benefits, including improving communication skills, gaining expert knowledge, networking with others and renewing motivation and confidence.

- Oral Communication
- Expert **Knowledge**
- **Networking**
- Renewed Motivation

Qualities of good seminar talks

- Never go over time.
- Seriously, NEVER EVER go over time.
- Contingency plans.

- Important ideas go first
- Frequently recall your logical flow
- Speak with enthusiasm
- Speak clearly
- Interact

WORKSHOP

A **workshop** is similar to a seminar but places more emphasis on practical applications and putting theory into practice. A workshop may be included as part of a seminar, conference, or on its own for as little as an hour. Usually, a seminar will include take-home materials or require the purchase of a textbook. The purpose of the seminar is to train participants in relevant research on a topic and to provide an opportunity for practical learning in a small group setting.

Purpose of a workshop

A **workshop** can introduce a new concept, spurring participants to investigate it further on their own, or can demonstrate and encourage the practice of actual methods. It's a great way to teach hands-on skills because it offers participants a chance to try out new methods and fail in a safe situation.

Objectives of workshop

- Be original and break new ground.
- Provide opportunities for professional development.
- Provide opportunities for collaboration and cooperation.
- Provide opportunities for work that results in a product

CONFERENCES

A **conference** is a formal meeting that allows participants to discuss a variety of topics and exchange views. Conferences usually take place over a series of a couple of consecutive days and may be held in a hotel so the participants can have convenient access to accommodations. Conferences are also held in universities, auditoriums or any location that has enough space to fit a large group.

A conference may be held for any topic and does not necessarily need to be academic in its nature. Frequently, a conference will offer overlapping sessions so that participants can choose the specific details they want to learn about, sometimes forcing difficult decisions between two simultaneous discussion sessions of interest. The purpose of

a conference is to bring together a large group of people interested in a given topic for discussion and consideration of the various components of that subject.

A **conference** is generally understood as a meeting of several people to discuss a particular topic. It is often confused with a convention, colloquia or symposium. An academic **conference** is a gathering of scientists or academicians, where **research** findings are presented or a workshop is conducted

Usually, but not always, a conference will have presenters that are experts in their field. A conference is a good opportunity for a burgeoning professional to present their work to their peers relatively early in their career. Like a seminar and a symposium, conference topics are frequently pre-arranged well ahead of time. Unlike a seminar or symposium, a conference usually invites those who have expertise in these subjects to participate by sending out a call for submissions several months before the conference is scheduled.

An academic **conference** (sometimes called a **research conference**, academic congress, academic **meeting** or symposium) is a **meeting** which **researchers** attend to present their findings and hear about the latest work within their field.

A meeting or conference for the discussion of some subject, especially a meeting at which several speakers talk on or discuss a topic before an audience. A collection of opinions expressed or articles contributed by several persons on a given subject or topic.

A conference may be held for any topic and does not necessarily need to be academic in its nature. Frequently, a conference will offer overlapping sessions so that participants can choose the specific details they want to learn about, sometimes forcing difficult decisions between two simultaneous discussion sessions of interest. The purpose of a conference is to bring together a large group of people interested in a given topic for discussion and consideration of the various components of that subject.

SYMPOSIUM

A **symposium** is generally **defined** as a meeting organized so that experts in a given field can meet, present papers, and discuss issues and trends or make recommendations for a certain course of action.

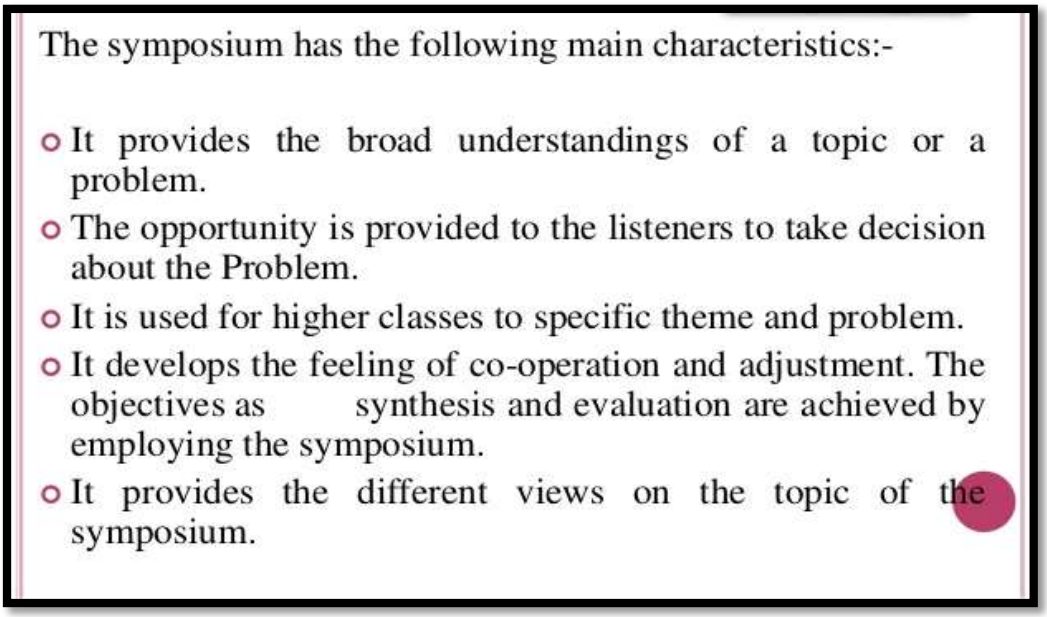
The Annual **Undergraduate Research Symposium** is an opportunity for undergraduates to present what they have learned through their **research** experiences to a larger audience. ... The **Symposium** includes presentations by students from all academic disciplines and all

three UW campuses, plus invited guests.

The purpose of a symposium is for industry experts to highlight their recent discoveries and the latest in **research** developments in a given field of study.

Unlike a conference or seminar, a symposium usually involved the presentation of original **research** by the researchers themselves.

A **symposium** generally has a much narrower focus than a research or academic conference. Often an event like this will cover just one topic, so **symposia** are often smaller and shorter than your average conference.



Seminar	Symposium
• Topics are related to recent trends and development in nursing • Multiple aspects of the topic under consideration is discussed. • Chairperson has to exert less control. • Less time of discussion involving participants. • Comparatively less preparation from the	• Topics are related to controversial issues in nursing. • Simple aspects of topic is discussed. • Chair person has to exert more control. • More time for discussion involving participants. • Demands more preparation from the side of participants.
