

Module 6

Research in Higher Education

Faculty Development Centre

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RESEARCH IN HIGHER EDUCATION

Objectives:

At the end of the course, the participants will be able to:

- provide research orientation to the faculty members.
- give strategy for writing proposals.
- disseminate information on conducting (discipline specific) research
- give information on publishing the research article in refereed journals.
- stimulate faculty members towards integrating research with pedagogy.

1. Understanding of research

1.1 Introduction:

Earlier it might have taken thousands of years to double up of the amount of knowledge but now this may happen every few years. Progress in any domain of knowledge be it natural science, applied science or social science won't happen without research.

What is research?

The systematic investigation into the study of materials and sources, in order to establish facts and reach new conclusions is research in any field. Research comprises creative and systematic work undertaken to increase the stock of knowledge for new applications. Forming something new is creativity. This kind of creativity is found in a number of disciplines, primarily psychology, business studies, and cognitive science, but also education, technology, engineering, philosophy, theology, sociology, linguistics, and economics etc., The creativity provides ability to perceive or to infer information. It has ability to understand logic, reasoning, planning and problem solving. Research helps in support old theorems and help in extending the research on old projects. So we can say that a research project may be the expansion of the past work. The study projects in the educational institutions will help to expertise the learners' knowledge.

Support theorems, or develop new theories. The methods of research and development are for the advancement of human knowledge.

Research approaches depend on both within and between humanities and sciences. According to the American Sociologist Earl Robert Babbie, "Research is a systematic inquiry to describe, explain, predict and control the observed phenomenon. Research involves inductive and deductive methods." To analyse the observed phenomenon is Inductive research method and to verify the observed phenomenon is deductive research method. Inductive approaches are associated with qualitative research and deductive methods are more commonly associated with quantitative research.

Check your understanding

- How do you define 'Research'?
- What did Robert Babbie say about research?
- How do you define 'inductive and 'deductive' methods of research?

Research is the life blood of any institute of higher learning what its name. Research is more than a set of specific skills; it is a way of thinking; it examines critically the various aspects of any professional work. It is a structured enquiry that utilises the acceptable scientific methodology to solve problems and create new knowledge that is generally applicable. The enquiry is aimed at understanding a thing or phenomenon or solving a problem. The term research comprises of two words, namely 're' and 'search'. Generally, 're' means again and 'search' means to find out. According to Advanced learner's dictionary research is a careful investigation or enquiry specially to search for new facts in any branch of

knowledge.



According to Creswell, “Research is the process of steps used to collect and analyse information to increase our understanding of the topic or issue”. From many definitions, there is a general agreement that research (i) is a process of enquiry and investigation, (ii) is systematic and methodical and increases the knowledge. Scientific method consists of systematic observation, classification, and interpretation of data. Research is basically scientific in nature to provide an objective, which is an unbiased evaluation of data. There is nothing like unscientific research approach even in case of social sciences. Research is like undertaking a journey, and one must know about its destination and which route to take. The sequence of steps during the journey is not absolute. At every step, there is multiplicity of methods, approaches, and procedures. Here, experience of guide comes handy to guide our actions to achieve our objectives.

As a teacher, the following questions may arise:

1. What are the common conditions prevalent among rural students?
2. What are the possible causes of such conditions?
3. What is the degree of satisfaction of parents with the teaching of school?
4. The change in level of understanding of students with the change in method of teaching.

The list of questions maybe endless. Researches have to be undertaken to find answers to these questions.

1.2 Research Objectives

Research adds that existing stock of knowledge. Demand is to discover answers to questions to the application of scientific procedures. The typical objectives of research can be summarised as follows:

1. Gain familiarity with a new phenomenon or develop new insight into a phenomenon.
2. Review and synthesised existing knowledge.
3. Investigate some existing situation or problem.
4. Offer solutions to the problem. Explore and analyse some general issues.
5. Construct and create a new procedure or system.
6. Generate new knowledge.

The actual research may encompass one or combination of any of the above objectives

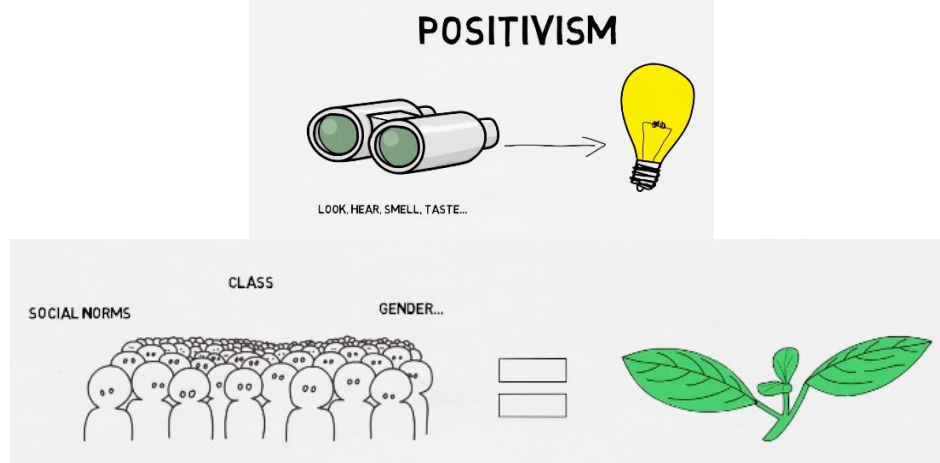
The research is basically about gaining knowledge for different purposes. To gain knowledge is a human quest. Different approaches were developed over the period to acquire the knowledge through research.

Metaphysics is branch of philosophy that deals with abstract concepts such as being, knowing, identity, time and space. It is intimately connected with epistemology. *Epistemology* is the study of knowledge. It deals with origin, nature, scope and methods to acquire knowledge. The term was first used by Frederick Ferrier. There are basically two ways to acquire knowledge-rationalism and empiricism.

Epistemology has to do with the nature of knowledge which entails two main questions.

1. What should be considered acceptable knowledge in the discipline?
2. Can the social world be studied according to the same principles as the natural sciences?

We have two possible mentalities to answer these questions. They are *Positivism* and *Interpretivism*.



Positivists believe that only the information provided by senses can result in scientific knowledge. It means that they advocate for the application of methods of natural sciences such as objective observation to the study of social reality. In this line of thought, humans are regarded as natural objects and their behavior can be explained by external forces that act on them such as the social norms they have been exposed to their social, class, gender etc.,



Interpretivists- though affirm that the subject matter of social sciences, people and their institutions is fundamentally different from that of the natural sciences. For this reason, investigating social actors requires different methods and procedures.



Their goal is to understand the individual's behaviour in an empathetic way or in other words to grasp their point of view about the reality in which they live. In this manner interpretivism makes sense of the world from the individual's point of view instead of observing their behaviour and looking for relations of cause and effect.

Rationalism tends to believe that logic and reason as the means of acquiring knowledge. Mind is given the authority over *sensus*. This is basically a prior use of logic and reason come 1st to conclude something before experience. Rationalism is associated with deduction. Empiricists claim that sense experience is the ultimate starting point for all our knowledge. The senses gives us all our raw data about the world, and without this raw material, there would be no knowledge it all. This is termed as *Posteriori*. It is related to induction.

1.3 Research paradigms:

A paradigm simply means a way of looking at something that represents an established standard, a set of related ideas. Each set of research assumptions identifies a quite separate social scientific reality. To be located in a particular paradigm is to view the worlds in a particular way. The theory proposed by Burrell and Morgan's four paradigms helps us more easily make sense of the type of research we are reading and they provide a convenient way of locating one's own personal frame of reference.

The below are the two axes that form the four paradigms.



There is difference between natural sciences and social sciences, and so is the difference between research approaches relating to them. Hence, there are two competing paradigms to acquire knowledge. The paradigms are grouped as positivist and interpretive.

1. **Positivist paradigm:** It is associated with quantitative research strategies. There is one particular view of how research should be conducted, which suggests that we should carry out research in social sciences in ways that are similar to the methods within natural sciences. This is called the positivist or scientific approach. According to the positivist approach, the research design should be highly structured, the methods should be reliable, and the research design should aim to generate large-scale, statistically based studies.
2. **Interpretive paradigm:** It is usually associated with qualitative research strategies. It is specifically applicable in social sciences and as sociology, political science, etc., According to interpretive approach, their research design should be flexible and unstructured, the methods should be valid and the research design should send generate small-scale, and intensive data, using insider accounts and based on descriptions of what is seen and what is heard.

Verstehen: The term is closely associated with the works of the German sociologist, Max Weber. In social sciences, such as anthropology and sociology, *Verstehen* means a systematic interpretive process in which an outside observer of a culture attempts to relate to it and understand others. *Vestehen* roughly translates to “meaningful understanding” or “putting yourself in the shoes of others to see things from their perspective”. The method of natural sciences (Physics, chemistry, biology is explanation (*erklären*), whereas that of history and understanding (*verstehen*). The understanding about positivist and interpretive paradigms is crucial to differentiate between quantitative, qualitative and other types of approaches or methods that are basic types of research.

Theory: A theory is a set of systematically related statements, including some law- like generalisations that can be tested empirically. These generalisations provide hypothesis, and these hypothesis determine what must be measured.

1.4 Motivation in conducting research

Although there is some overlapping between the research objectives and motivation for undertaking research, they are different. Some factors, single or combined, for undertaking any research are as follows:

1. Acquire a research degree along with its consequential benefits.
2. Face the challenge in solving the unsolved problems.
3. Intellectual satisfaction of doing some innovative work.
4. Service to the society.
5. Designed to enhance the social status.
6. Input for policy decision-making.

However, the list for motivating people to undertake research studies is not exhaustive.

1.5 Research characteristics

There are certain common desirable characteristics in the research process. There is word of caution, there is overlapping in the meaning and scope of these characteristics. They ensure that research is free of prejudice and subject of errors.

- **Objectivity:** it means research is without any bias. All other characteristics are built around it. Researchers usually take utmost precautions that results are not affected by their own presence, behaviour and attitude. They critically examine the research methods to avoid any bias.
- **Reliability:** reliability in the context of research is consistency. It refers to the extent to which investigation produces consistent results. It can also be termed as verifiability. If any research yields similar results each time, it is undertaken with similar population in the given context and with similar procedure is, it is said to be a reliable research.

Suppose the research is conducted on the effects of watching television on the class performance of the children, and if the results conclude that watching TV causes low grades in class, and if another sample taken from the population shows the same results with the same research procedure, then we can say that the research procedure and the outcome are reliable. The more the similarity in the results, the more is the reliability of research. Coefficient of determination is also termed as reliability coefficient.

- **Validity:** Here, validity in research mainly stands for accuracy of procedures, research instruments, tests etc., On the concept of validity and also be understood by posing the question, “are we measuring or able to measure what we originally intended to measure? “. Validity means that research must be unbiased and free from any systematic error as this may impact the applicability of research. Without validity, research goes in the wrong direction. Generally, validity is termed to be much more important than reliability. To keep the research on the right track, it is must that the concepts are defined in the best possible manner so that no error occurs during measurement. Different types of validity are given below:
 - a) *Internal validity:* With higher internal validity, researcher is able to establish better casual relationship between two or more variables. This is specifically true in case of lab experiments where cause-and-affect relationship is supposed to be more clearly established.
 - b) *External validity:* it means that external factors that can affect the study must be controlled. For example, the response of the respondent in social sciences surveys may be affected by mere the presence of a non-participant observer. It also refers to the extent to which research outcome can be generalised and applied to other places that are not under study.

Sometimes, Internal validity is also termed as credibility and external validity is termed as generalizability transferability.

- c) *Face validity*: By valid, we mean that survey and questionnaire correctly measured what they're supposed to measure. For example, our participants who feel that a questionnaire meant for measuring certain personality traits agree that this exercise appear to measure those traits and not something very different.
 - d) *Content validity*: measures all aspects of the construct (concept as discussed earlier) and not just a part of it.
 - e) *Criterion validity*: indicator corresponds with and is predictive of measurement using related indicators.
 - f) *Construct validity*: The indicator measures the construct in a manner that is convergent with other measures in terms of direction. It also allows discrimination of opposing constructs.
- **Accuracy**: it is closely related to Validity. It is also the degree to which research processes, instruments, and tools are related to each other. Accuracy also measures whether the research tools have been selected in the best possible manner and research process and procedures suits the research problem or not.

Rigorous Scientific methods and procedures have been adopted and research, and each step in the research is tested for accuracy. Thus, choosing the best data collection tool improves the accuracy of research.

- **Credibility**: it is the use of best source of information and the best procedures in the research. The use of secondary data saves time and reduces cost. However, the excessive reliance on secondary data in the option of primary data is available entails the risk of reducing the credibility of the research. Hence, it has to be trade-off between primary data and secondary data.

The accurate reference in research enhances the credibility of research but fake references also decrease the credibility of research.

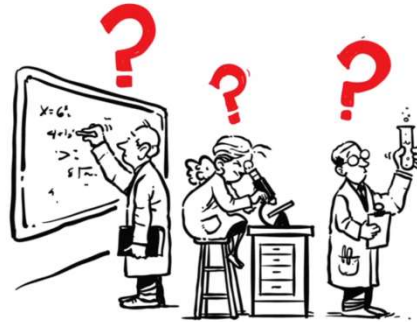
- **Generalizability**: it is closely related to Validity. It refers to the degree to which research findings can be applied to a large population. The sample considered is the representative of the whole population so the findings should also be applicable to the population.
- **Empirical research**: it is based on real-life experiences, direct experiences, or observation by the researcher. It implies that research is related basically to one or more aspects of the real situation and deals with concrete data that provides a basis for external validity to the results of the research.
- **Systematic**: For a research to be effective, it has to be systematic. It is the only approach to undertake any research work, and each step must follow the other. There are a set of procedures that have been tested over a period of time, thus, suitable to use in research. Research, therefore, should follow a definite procedure.
- **Controlled factors**: In real-life experience, there is always more than one factor that affects an outcome of an event. Similarly, in research, various factors may affect the outcome; some are taken as control factors, whereas the others are tested for possible outcome. The concept of control implies that, in exploring casualty in relation with the two variables, we set up a study in a way that minimises the effect of other factors affecting the relationship. The control factors or variables have to be controlled rigorously.

In physical sciences it is easier to control such factors as the experiments are conducted in Laboratory. In social sciences, it is extremely difficult as research is carried out on the issues related to human beings living in society, where

exerting such controls are not possible. Moreover, within social sciences, the level of control may vary significantly from one discipline to another.

- **Cyclical:** Research is a cyclical process but it starts with the problem and ends with a problem.
- **Logical:** The statement, a good research is logical, implies that research is guided by the rules of logical reasoning. Induction and deduction order of great value in research, which have been discussed and the types of research.
- **Replicable:** this characteristic allows the results of the research to be verified by replicating the study and there by building a sound basis for discussion.

2. Types of research



Here, it is important to mention that these approaches are not exclusive. The research is usually interdisciplinary. Depending upon the subject area, it is better that the research and specialises in any one form of research because all research methods have their own advantages and disadvantages.

Classification of research

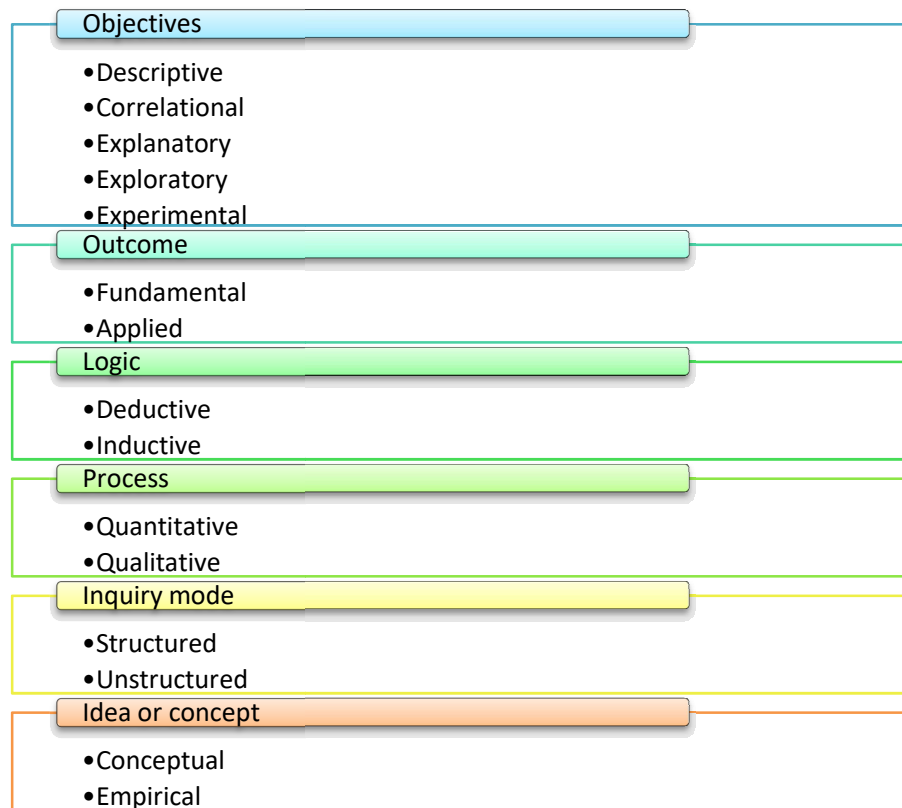


Table above enlists the basis for classification and the types of research that form a part of it. It is important to note that there is overlapping among different types of research.

2.1. Classification of research on the basis of objectives

From the purpose and objectives point of view, a research can be classified as follows:

- a) descriptive research
- b) correlational research
- c) explanatory research
- d) exploratory research
- e) experimental research.

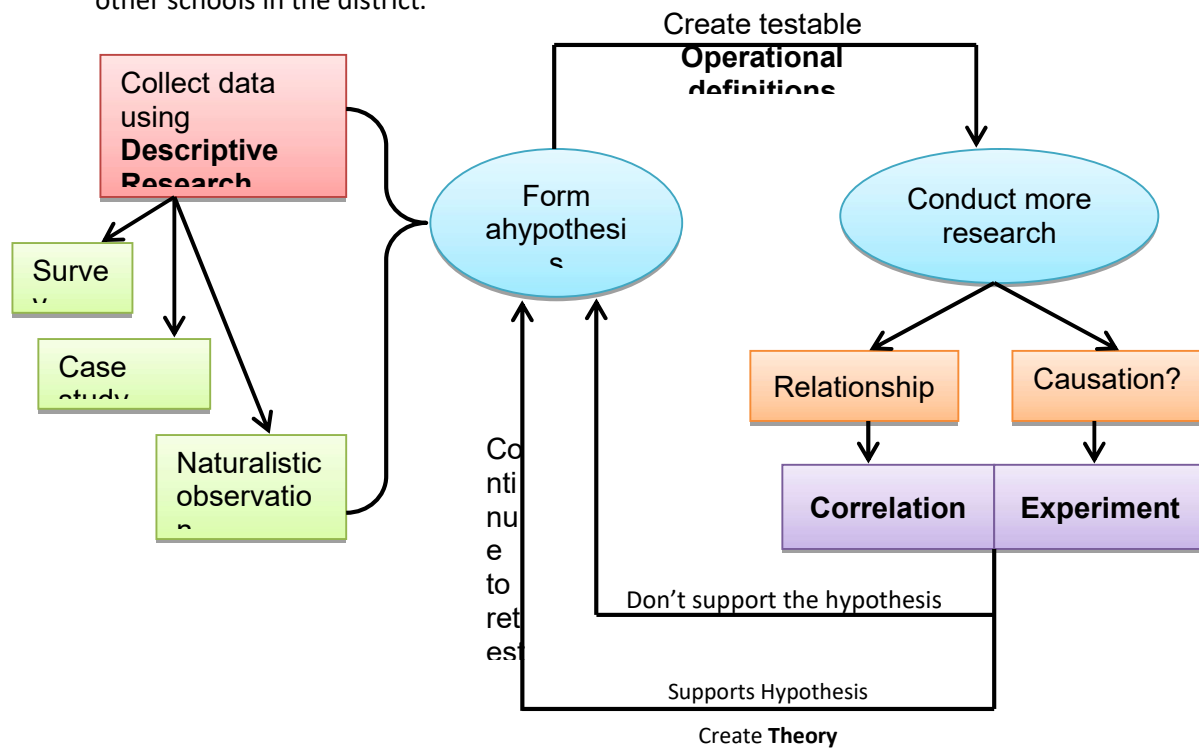
a) Descriptive research

Descriptive research can answer questions such as “what is” or “What was”. Here, the information is collected without changing the environment. Sometimes these are referred to as ‘correlational’ or ‘observational’ studies. It is any study that is not truly experimental.

It includes service and fact- finding enquiries with adequate interpretation. For example, in human research, the descriptive research can provide information about the natural occurring health status, behaviour, attitudes, or other characteristics of a particular group. Descriptive research can involve a one-time interaction with groups of people (Cross-sectional study) or study might follow individuals over time (longitudinal study).

Two specific examples are being given here

1. Ministry of agriculture would like to know about the crop patterns across different states in India and
2. School principal may be interested to know about the result of his own school in comparison to other schools in the district.



Descriptive research is closely linked with ex-post facto, historical, exploratory and analytical research, and sometimes these terms can be used interchangeably.

- ❖ Ex- post facto research
 - It is used in social sciences and business organisations.
 - It is conducted in context of a phenomenon and after it has occurred or at the time of its occurrence.
 - It basically deals with non-manipulated variables of a phenomenon.
- ❖ Historical research:
 - It is another dimension of descriptive research and somewhat similar to ex- post facto research.
 - It usually focuses on the historical aspects of an issue of interest or problem.
 - Examples are growth of trade union in India, evolution of modern education system in India etc.
- ❖ Analytical research
 - In this method the researcher uses facts or information already available.
 - It attempts to make critical evaluations of the material.

Descriptive → Describe

"...attempts to explore and explain while providing additional information about the topic."

a.) Builds on exploratory research.
b.) Usually requires lot of data.

b) Correlational studies

It is undertaken to discover out establish relationship or interdependence between two aspects of a situation. Two or more variables may occur together but that does not mean that one has caused the other to occur. It may identify factors leading to a certain situation. For example, ascertaining the degree of relationship between stress among students to perform in the exam and rote learning. What is the impact of promotional campaign on the sales of the product?

Case study:

In 2003 Italian researchers published a scientific article claiming that eating pizza can reduce the risk of certain cancers. That's right, one of the most consumed food on Super Bowl Sunday greasy cheesy salty pizza is lead to fighting cancer. Newspaper headlines, online blogs and editorials picked up on this astonishing study creating headlines like eating pizza cuts cancer risk, my pizza can fight cancer and pizza reduces cancer risk.



Now one may be thinking, can eating pizza really cut the risk of cancer, is there a causal relationship

between favourite food and healthy living. Well not exactly, 'Correlation does not imply Causation'. If 'A' is related to 'B', that doesn't necessarily mean 'A' caused 'B'. This is a common error in our thinking. Looking deeper into the research finding, there is much more than meets the eye. It is very tempting and even exciting for food lovers, to read these aforementioned headlines and think that eating pizza can cause a reduction in cancer risk. But other scientists and even authors of the study, caution readers to quickly make a causal relationship. It turns out that a Mediterranean diet is more likely the cause of fighting cancer and healthy living-a diet that is rich in olive oil, fish, grains, fruits and yes, tomatoes, one of the main ingredients on pizza.

“Why does correlation not imply causation?”

It is common to think that when two things relate to one another or appear linked, like money and happiness, violent video games and aggressive behaviour, and eating breakfast and success in school



That one caused the other. But there are several reasons to be cautious. For instance, maybe there is a variable. Often times, two variables appear to be linked to each other, but in actuality there is another unknown or third variable that is the real source of the link. Let's look at one of these examples. For decades, psychologists have investigated the link between first person killing games like grand theft auto and call of duty and aggressiveness in boys. One could argue that playing violent video games causes aggressive behaviour. This argument supports why politicians in the past have tried to put an age limit on purchasing violent video games. However, one could also make the argument that a child who is already aggressive is more likely to seek out and play violent video games because it connects to their personality.

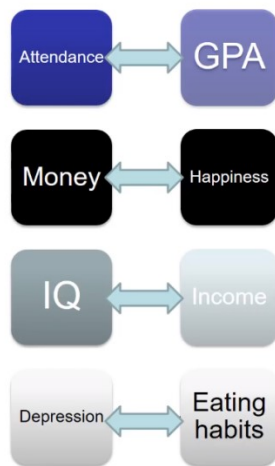


Of course, what about a third variable? Some studies have shown that exposure to family violence, like spousal and child abuse, is associated with youth violence and an increased risk for playing violent video games. This finding reminds us that we should not jump to conclusions when establishing links between two variables. It is also very common for people to see relationships between variables when none exist,

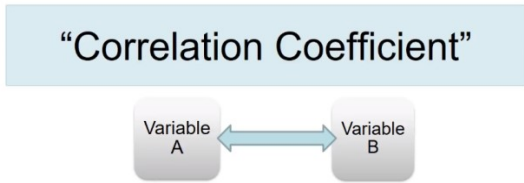
like eating candy and hyperactivity. This is called an illusory correlation.



Let's take a look at common example ubiquitous in sports: superstitions. Athletes are renowned for being superstitious. They often develop unusual rituals to keep hitting streaks alive or to end terrible slumps, for example, anything to get the bad juju off their back, whether wearing the same lucky socks or eating the same meal before every game. From a psychological perspective, athletes have convinced themselves that a relationship exists between performing specific rituals and performing well on the field. Unfortunately, this relationship is merely a fallacy. So, why do psychologists conduct correlational research? Foremost, psychologists are interested in the relationship between two variables. Specifically, how well one variable predicts the presence or absence of another variable is important.

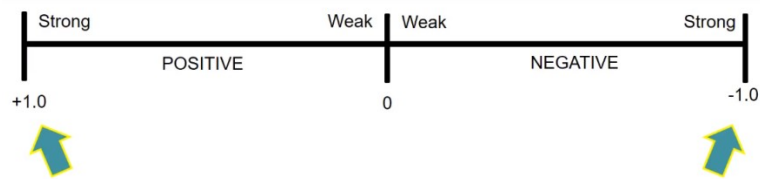


Psychologists study relationships in all walks of life, like the relationship between it and send GPA, money and happiness, intelligence and income, and depression and eating habits. Notice how the arrows are pointing in both directions. As It was stated previously, This is because it's very difficult to make a causal relationship between two variables.



Figuring out how closely two variables relate to predict one another is measured using a statistical measure called 'correlational coefficient' (r). This index measures the strength of the correlation.

Represented by Pearson's r , the value of a correlation can range from +1.0 to -1.0 - ETA being a perfect correlation; an r of 0 means no relationship exists between two variables.



$$r = .87$$

$$r = -.27$$

A correlation of .87, For example, would be considered very strong, while a -.27 would be considered weak. Before we move on, check your understanding of the strength of a correlation. Take a look at the following r values and identify the strength of the score.

Checking for Understanding:

.89 = Very strong

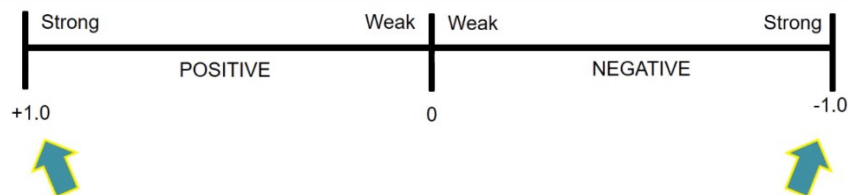
-1.0 =

-.53 =

.12 =

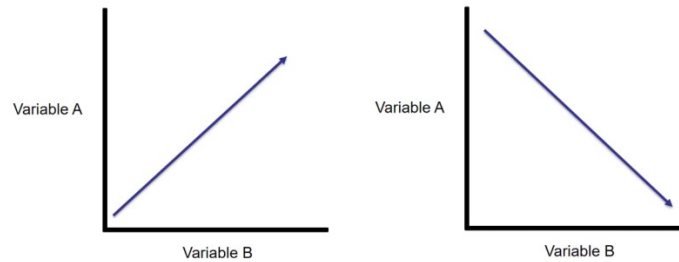
0 =

How'd you do? Think about the mistakes you made, if any, clarify any confusion.
 Answers: -1.0 = perfect, -.53 = moderate, .12 = very weak, 0 = no correlation.



It is important to note that positive doesn't mean good and negative does it mean bad, but rather positive and negative signifies the direction of the correlation. Specifically, a positive correlation implies that one variable predicts the presence of another variable. In other words, as the value of one variable increases, the value of the other variable increases as well. For example there is a positive correlation between the times spent on the treadmill in the number of calories burned. In other words, the more you run the more calories you lose. There is also a positive correlation between the amount of coffee you drink and level of alertness. The more coffee you drink the more alert you will be in the classroom at office. Conversely, negative correlation implies that one variable predicts the absence of another variable. In other words, as the value of one variable increases, the value of the other variable decreases. For example, there is a negative correlation between alcohol consumption and judgement. In other words, the more alcohol you drink, the less judgement one has.

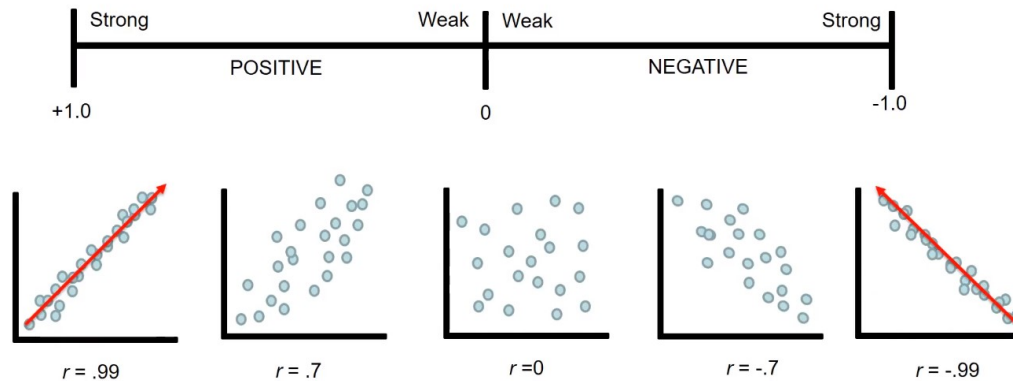
Checking for Understanding:



Check your understanding of positive and negative correlations. Look at the above given graph and brainstorm a few examples before going on. Lastly, how to psychologists graph correlations?

Correlations are grafted on 'scatterplot', like the ones seen below. The slope of the scatterplot indicates the direction of the correlation, while the scatter of the data points indicates the strength.

Each participant or event in a study is represented by a dot or a data point on the scatterplot.



The more scattered between data points, for example, would mean there is a weak correlation between two variables. The closer the data points are bunched together on the "line of best" would indicate a strong relationship. Before we finish, check your understanding of the correlational method.

Fill in the blanks to make the statement accurate.

1. Correlations measure the _____ between two variables or events.
2. Unlike an experiment, the limitation of using a correlation is that it cannot imply _____.
3. A(n) _____ correlation is the assumption that a relationship exists between two variables that are not related.
4. The correlation coefficient (r) can range from + _____ to - _____.
5. A positive correlation implies that one variable predicts the _____ of another variable.

Answers: 1. relationship, 2. causation, 3. Illusory, 4. 1.0 to 1.0, 5. presence.

c) Explanatory research

It attempts to answer how and why between two aspects of the situation or a phenomenon. For example, why examination related stress leads to rote learning? Why and how stress leads to heart disease?

➤ **Explanatory**

- ❖ *Sequential Design:*
Quantitative, then qualitative
- ❖ Qualitative phase to explain results of quantitative phase



Explanatory → Explain

“...tries to explain relationships between variables.”

- a.) Builds on both exploratory and descriptive research.
- b.) Finally explains WHY things happen.

d) Exploratory research:

it is generally done in the beginning of research. It is undertaken to explore an area where little is known to investigate the possibilities of undertaking a particular research study and is akin to feasibility study and pilot study. Small-scale study is undertaken to decide whether it is worth carrying out a detailed investigation. It attempts to clarify why and how there is a relationship between two or more aspects of a situation or phenomena. The purpose of Exploratory Research is to gain background information, to define, to clarify the problems, to develop hypothesis, to establish research priorities and objectives, and to develop questions to be answered. It makes use of secondary data, experience surveys, case studies, interviews, projective techniques and Delphic techniques.

Exploratory → Explore

“...the initial research into a hypothetical or theoretical idea.”

- a.) Taking well-defined theories and applying them in your area.
- b.) Developing your own theories from a scratch.

e) Experimental research or Casual Studies

It is cause and effect finding research; it seeks to uncover cause and effect relationships. An action or occurrence can cause other action, for example, smoking causes lung cancer. It brings up a definite

cause-and-effect relationship. It identifies the variable that changes the dependent variable. For examples, smoking causes weak lungs and not vice versa. If we are able to find out the cause of a problem, then we may be on the way to find the solution to the problem, as is the case in medical science.

Reflexivity refers to circular relationships between cause and effect. A reflexive relationship is bidirectional with both the cause and the effect affecting one another in a relationship in which neither can be assigned as cause or effects. For example, poverty is the main cause of unemployment; and unemployment is the main cause of poverty.

Case study: Correlation vs. Causation: How Ice cream kills!



UNDERSTANDING CAUSATION

Everyone enjoys a tasty scoop of ice cream. But, few people realize, is how dangerous an ice cream can be, first, there is the issue of obesity, second, there are higher crime rates, third, there is a loss of life due to a rise in the number of drowning deaths and finally as more ice cream is sold, there is an increase in forest fire.

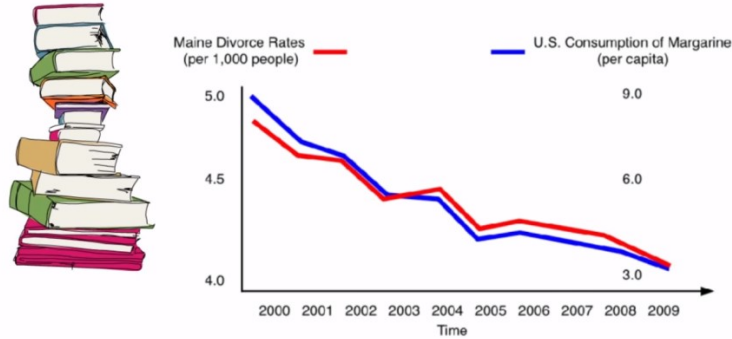


Given these indisputable facts while banning ice cream trucks from entering into your neighbourhood may sound far-fetched. When it comes to problem-solving A common issue is misunderstanding the difference Between correlation and causation. This misunderstanding can influence our decisions, sometimes serious consequences that ripple throughout a community.

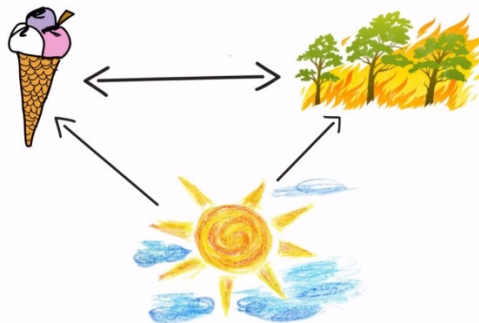
CORRELATION



Correlation is when two things are related but one does not cause the other. Usually this means the two are in some way related to either factor but not always. If you have a big enough pile of data you can find plenty of relationships that are purely coincidental like the strong relationship between the sale of margarine and divorce rates in the state of Maine.



With the sale of ice cream the third factor is weather; when it is hot outside people buy more ice cream. They are more likely to go for a swim and there is a general increase in people out and about enjoying the weather, helping improve conditions for a crime to take place as well as the dry conditions associated with forest fires.

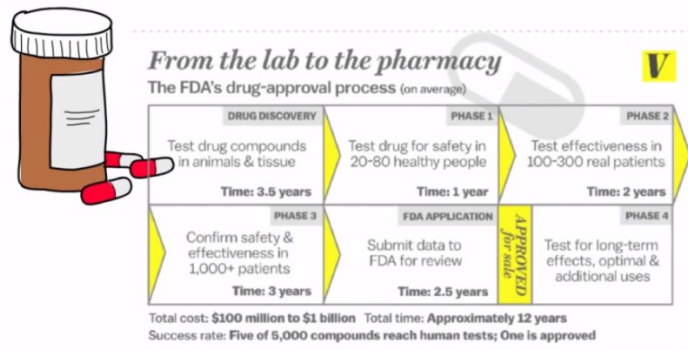


A note of caution there is a growing trend in our digital world called data dredging. This is using analytics to swift through mountains of data hoping to find useful relationships Instead of a problem in search of the solution dredging is a solution looking to find a problem. One has to concentrate on the discovery of causation.

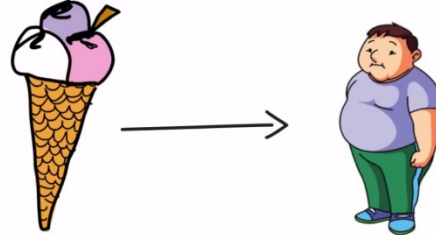
CAUSATION

$$X \longrightarrow Y$$

Unlike correlation, causation is when one claims that one thing causes another thing to happen; in order to make this claim the researcher need to be able to demonstrate an actual cause and effect relationship, preferably a strong relationship. An example most of us are familiar with is the pharmaceutical industry; in order to make the claim that a particular drug causes a certain effect such as minimising the level of cholesterol or growing hair, the FDA requires companies support those claims.



Putting the drug through a four phase twelve step process that takes approximately 12 years for testing. This process uses control groups in clinical trials to test the drug, making sure that X causes Y and that the drug is safe. The acceptable error rate can go as high as 5% for some drugs meaning that the clinical trials prove that there is a 95% chance the trunk does what it claims. Drugs with serious health implications such as those used to treat a heart condition are held to an even stricter standards requiring proof up to 99% effectiveness.



Back to ice cream, what about ice cream and obesity while it may seem like common sense that it does cause obesity, the fact is that we don't yet know the true strength of the relationship. If you look at the sale of ice cream there is actually an inverse relationship with weight. People gain weight in the winter sales are low and lose weight in the warm summer months when more ice cream is being consumed.



This might suggest ice cream is the new diet food, luckily you now know to be cautious of drawing conclusions of causation from correlation instead recent research on the subject has been looking at different types of sugars used in making a wide range of sweet foods.

What scientists have discovered is, it is the hypothalamus which is an area of the brain that regulates the human appetite which reacts differently when we consume food with fructose instead of glucose. This has researchers speculating that eating high fructose food such as ice cream may result in people not feeling full so they continue to eat. This theory proves difficult however, when we start considering apples and other natural fruits also contain fructose not just ice cream and chocolate cake. As you can see causation is quite a bit different than correlation. Finding correlations is easy, proving causation is hard. No wonder it takes 12 years just to prove that a pill causes hair to grow.

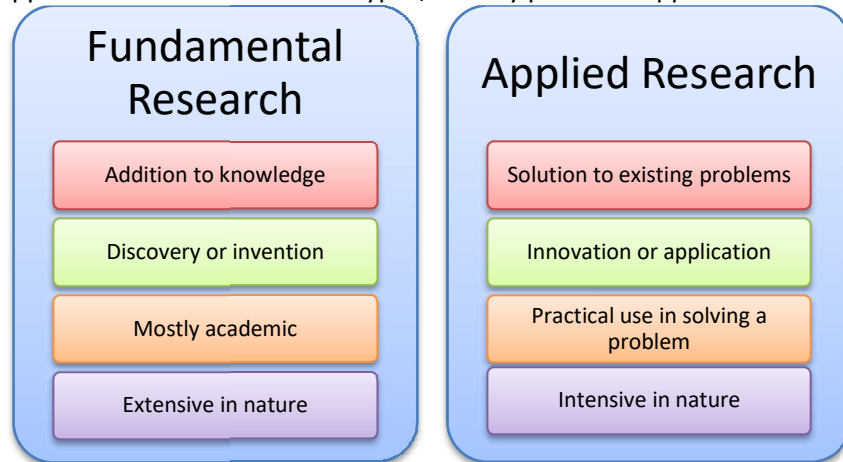
THE BOTTOM LINE



The bottom line on the news in boardrooms and coffee shops, everywhere you go you will hear claims that X causes Y; from politics to the weather, from the stock market to personal relationship, it is human nature to try and explain things, to create stories that make sense. Just keep in mind as you hear a claim of what causes what; that correlation is not causation.

2.2. Classification of research on the basis of application

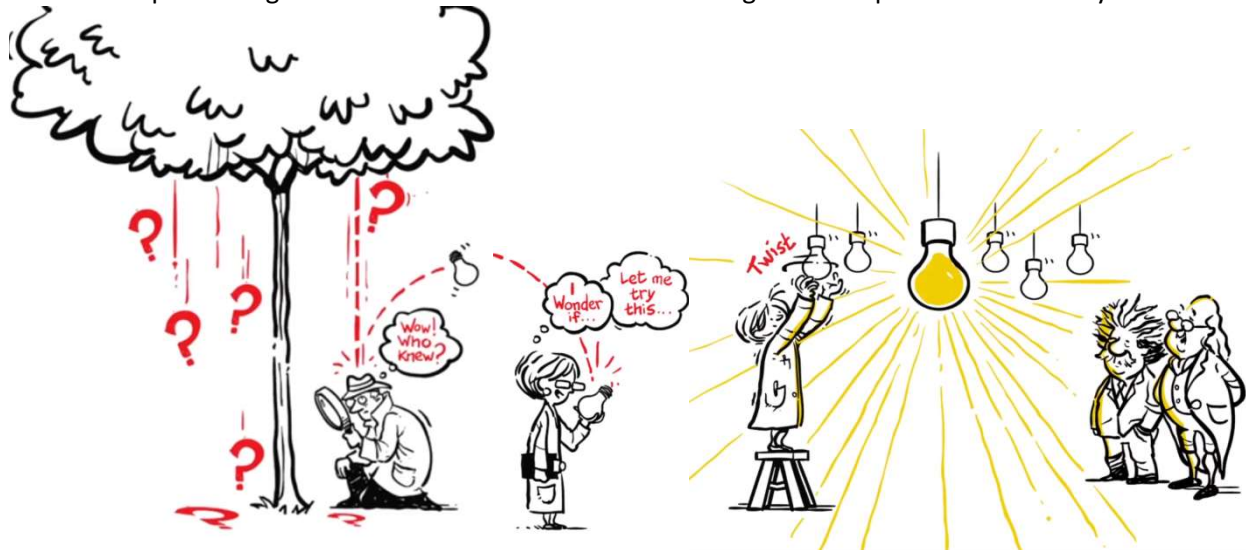
On the basis of application research is of two types, namely pure and applied research.



a) Fundamental (basic or pure) research

1. The main purpose of basic research is to add to the existing stock of knowledge and thus, can be intellectually challenging.
2. The knowledge produced through pure research is sought in order to add to the existing body of research methods.
3. It is not likely to have any particular practical application at the time or even in the future.

Every tiny thing in the past has led to a major breakthrough, something big that affects everyone. But the pioneering scientists who made those breakthroughs didn't quite see it that way.



They were more like private investigators searching for pieces of new knowledge. As they searched, they made discoveries, including things they didn't even know they were looking for and then some other scientists jumped on one of these findings and found practical use for it, something that transformed human life. This is the magic of basic scientific research. It's the little blocks that come together to build something extraordinary. This process can take years even decades and those

inquisitive minds need support. Our government has invested billions in basic research giving scientist freedom to explore fundamental questions and random mysteries. But these critical questions are increasing, while government spending is not keeping up. So who is going to help them get answered? Those basic scientific questions?



The research that leads to new technologies like saving cures and economic progress, the risk taking, time consuming, ground breaking experiments, the magical discoveries. Six foundations have come together to help boost private giving to discovery driven research.

The science philanthropy alliance

They've set a five year goal to increase funding for basic research from new philanthropic sources, more funding to help young creative scientists to solve nature's mysteries, more funding to help advance boldly into future as leaders in science, more funding towards changing our world. Basic scientific research is a high risk endeavour but the rewards are beyond the human imaginations. Investing in basic scientific research can open up a whole new universe for us.

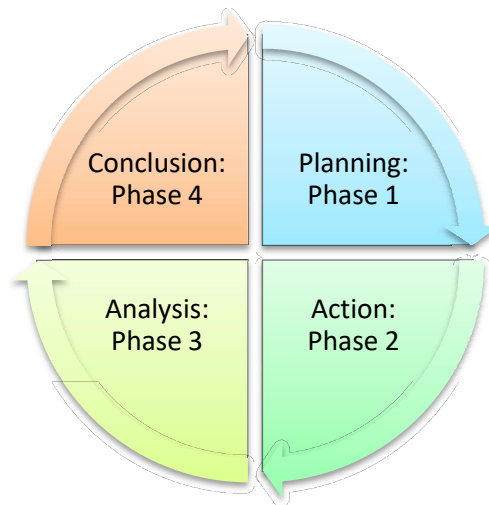
b) Applied research

1. Applied research is done to solve specific, practical questions facing the society.
2. It can be used for policy formulation, administration and undertaking of a phenomenon.
3. It is always done on the basis of basic research and can be carried out by academic or industrial institutions. For example, an academic institution, such as a University, will have a specific applied research program funded by an industrial partner interested in that program.

Action research

- ❖ The term 'action research' was coined during 1940s by Kurt Lewin, a German American psychologist who is widely considered to be the founder of this field.
- ❖ Action research refers to a wide variety of evaluative, investigative and analytical research methods designed to diagnose problems or weaknesses - whether organisational, academic, or instructional - and help researchers to develop practical solutions to address them quickly and efficiently. It may also be applied to programs or educational techniques that are not necessarily experiencing any problems but the researchers simply want to learn more about the techniques and improve their knowledge.
- ❖ The general goal is to create a simple, practical, repeatable process of interactive learning evaluation and improvement that leads to increasingly better results. Action research may also be called as a 'cycle of action' or 'cycle of enquiry' because it typically follows a predefined process that is repeated over time.

As a researcher, how will an individual know what's actually working? Well, the answer is action research. In this approach one should identify a question, then test out a strategy, gather data and determine if it works. The end result is something dynamic, innovative and tied directly to one's own main problem. Action research dissolves the barrier between the researchers and the participants. There are many action research frameworks but they generally follow a similar process.



1. Phase 1: Planning for research

Here, the researcher has to begin with an inquiry where a specific research question is defined, and it needs to be something that can actually be tested, and next a literature review should be conducted to gain the deeper understanding of the topic. Finally, the research should move into a design process where the researcher determines the data methods considering ethical issues, acquiring the required permissions, create one's own deadlines and set up the systems.

2. Phase 2: The Action phase

This is where the researcher gets engaged in the multiple cycles of experimentation and data collection. The data collection might include all the qualitative data like observations, artifacts and interviews or quantitative data like rubric scores, surveys or achievement data.

3. Phase 3: Analysis

It is often started with organising the data with charts or graphs and looking for specific trends. It can be discussed with peers, free write in journal or create a cluster map before eventually writing out the results.

4. Phase 4: Conclusion

This is the point where the researcher will share the research with the rest of the world and reflect on the daily practice, this will ultimately lead to newer questions and the cycle will continue as the researcher refines one's own craft as a better output.

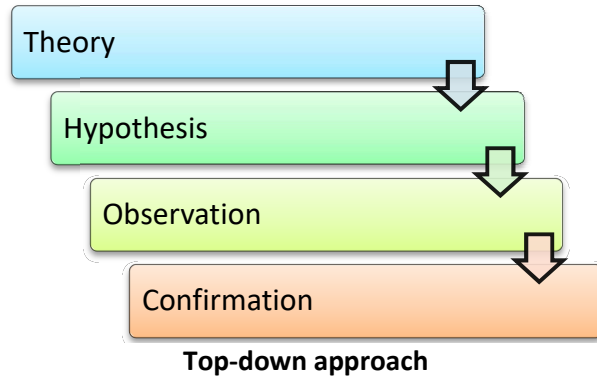
2.3. Classification of research on the basics of logic

In research, conclusions are based on two approaches known as the deduction and the induction.

a. Deductive approach:

It is also termed as top- down or general- to- specific approach. In deductive, we start from a theory and try to prove it right with the help of available information. The deductive method involved the following three steps:

1. State the hypothesis (based on theory or research literature)
2. Collect data to test the hypothesis.
3. Make decision to accept or reject the hypothesis.



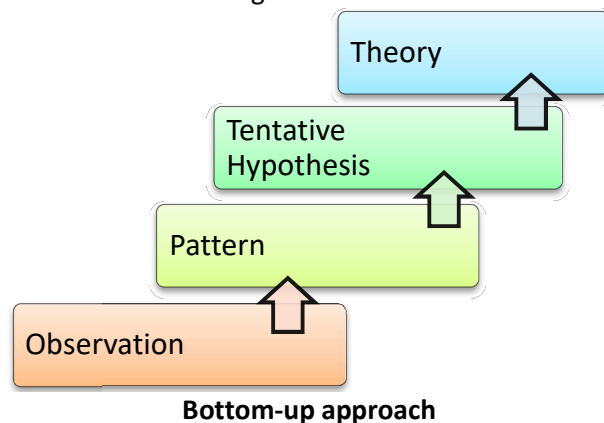
Example:

1. All men are mortal (general fact, applied to all men).
2. Socrates is a man.
3. (Therefore), Socrates is mortal (specific).

b. Inductive approach:

It is also termed as bottom - up approach. In inductive research, we move from specific to general. This approach also involves three steps.

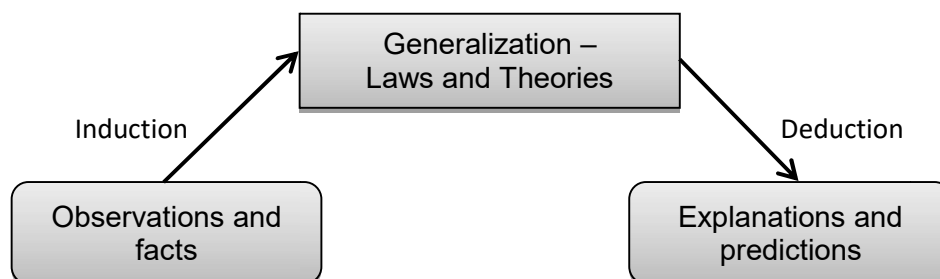
1. Observe the different phenomena in the world.
2. Make a search for a pattern in what is observed.
3. Make a generalisation about what is occurring.



Example:

1. Socrates is mortal (specific).
2. Alexander is mortal (specific), Pluto is mortal, and so on (specific).
3. All men are mortal (general).

Take another example: $3 + 5 = 8$ and eight is an even number. $7 + 59 = 66$ and the result is again an even number. Therefore, the conclusion is when an odd number is added to another odd number, the result will be an even number



The figure above shows the main components that form a part of inductive and deductive approach.

Bases of differences	Inductive approach to research	Deductive approach to research
Meaning	Inductive theory is an approach to research that starts with the observation and the end result of the research is THEORY.	Deductive theory is an approach to research that starts with the proposition of hypothesis and the end result of the research is Confirmation/ rejection
Hypothesis	Inductive approach to research does not have any place for hypothesis. So, researcher is free to alter direction of the study.	Deductive approach to research starts with the hypothesis itself. Researcher is bound not to alter direction of the study.
Structure	Inductive approach is less structured as there is no guiding factor.	Deductive approach is highly structured because there is some specific aim to be accomplished.
Size of the Sample	Inductive approach is appropriate for small sample projects because small numbers of samples are analyzed with greater gravity.	Deductive approach is appropriate for large sample projects because large numbers of samples are analyzed with less depth.
Scrutiny	More scrutinized information about the subject matter.	Less scrutiny in getting information regarding subject matter.
Time Factor	Inductive approach assumes that there is abundance of time; so depth analysis is possible.	Deductive approach assumes that there is shortage of time; so depth analysis of large number of sample is unattainable.
Theory	It is concerned with building a new theory.	It is concerned with testing an existing theory.
Approach	It is a bottom up approach Observation → Pattern → Theory General to particular.	It is a top- down approach Theory → Hypothesis → Observation → Confirm/ reject Particular to general.

2.4. Classification of research on the basis of inquiry mode

Basically, the approach adopted to find answers to the research questions involves two approaches- Structured and Unstructured.

a) Structured approach:

1. The structured approach to inquiry is usually classified as quantitative research.
2. Everything that forms the research process such as objectives, design, sample, and the questions that a researcher plans to ask of respondents is predetermined.
3. It is more appropriate to determine the extent of a problem, issue, or phenomenon by quantifying the variation. For example, how many people have a particular problem? How many people hold a particular attitude?

b) Unstructured approach:

1. The unstructured approach to inquiry is usually classified as qualitative approach.
2. It allows flexibility in all aspects of the research process.
3. It is more appropriate to explore the nature of a problem, issue, or phenomenon without quantifying it.

2.5. Classification of research in the basis of process

a) Quantitative research:

It is similar to deductive research. It is also termed as linear research as it typically follows a linear path.

1. Starting with testable hypothesis.
2. Collection of data.
3. Analysing the data.
4. Accepting or rejecting the hypothesis.

Quantitative research is generally associated with the positivist or post - positivist paradigm. It usually involves collecting and converting data into numerical form so that statistical calculations can be made and conclusions can be drawn.

b) Qualitative research:

1. This is basically an approach and not just a method to conduct research.
2. Qualitative research is basically inductive or spiral in nature and has a very different structure.

The researcher starts with a tentative idea or question; these questions become more specific with progress in research. Thus, a pattern may emerge in research. Thus, in qualitative research, one starts with observation and ends with a theoretical position or stance. Thus it is inductive in nature, i.e., the research moves from specific to theory.

Qualitative research is appropriate when:

1. The intended research area is not well studied or understood.
2. A subject needs to be studied in depth;
3. A holistic perspective is needed.
4. Behavioural aspects of people need to be studied;
5. Measurement techniques like questionnaires are not considered suitable;
6. A researcher is more interested in the process (how it works) and not the product (the outcome).

The important methods and approaches used in qualitative research have been discussed below:

1. Focus groups:

In this method, a researcher brings together a small number of subjects to discuss the topic of interest. The group size is kept deliberately small so that the members express themselves more openly and also get more time as well.

2. Direct observation:

The data is collected by an external observer.

3. In-depth interviews: it is unstructured and has face- to- face interviews.

4. Narrative research:

It is an approach to review the literature. Sometimes it is contrasted with a systematic review. It tends to be less focused than a systematic review and seeks to arrive at a critical interpretation of the literature that it covers.

5. Phenomenology:

It is a form of qualitative research in which the researcher attempts to understand how one or more individuals experience a phenomenon. For example, interviewing the wives of 10 prisoners of war and asking them to describe their experiences.

6. Ethnography:

It is the process of studying and describing a culture (a culture is the shared attitudes, values, norms, practises, language, and material things of a group of people). It intends to provide an insider's picture of a community under study. A researcher may go and live in that specific

community and study the culture and their educational practices.

7. Case study research:

It is focused on providing a detailed account of one or more cases. For example, case study of a class that was given a new curriculum of IT.

8. Grounded theory:

It is a qualitative approach to generate and develop a theory from data that the researcher collects. Role play, simulation, and diary methods are also used in qualitative research.

In qualitative study field, the depth of study is greater and the sample size is usually small, whereas in field survey, there is greater coverage of population but the depth of study may not be great.

Difference between Qualitative and Quantitative approaches:

Qualitative research focuses on generating meaning and understanding through rich description it can be a particularly useful approach for educational research. Understanding the complex social environments and the meaning that experience qualitative research in several ways is crucial. It typically addresses different problems from a different Philosophical view of the world, works to achieve different goals and uses different methods and design the table given below illustrates some of the key differences focus on qualitative research that which focuses on the quality of the experience trying to describe or understand the essence or nature of the human experience. Quantitative research on the other hand focuses on measurable factors asking question such as, how much, how many or how frequently. Qualitative research integrates more subjective human experience rather than purely objective external reality. It belongs to the school of constructivism.

How does qualitative research differ from quantitative research		
	Qualitative	Quantitative
Focus	Quality or meaning of experience	Quantity frequency and magnitude.
Philosophical roots	constructivism and interpretivism	positivism
Goals of investigation	understand describe and discover	Predict, control, confirm in test hypothesis
Design Characteristics	Flexible, evolve and emergent	Structured predetermined

This table describe some of the key differences. Qualitative research focuses on the qualitative experience trying to describe and understand the nature of human experience. Quantitative research focuses on more measurable asking questions such as how much, how many, how frequently.

Philosophical roots of qualitative research depend on constructivism and interpretivism whereas, quantitative research depends on positivism. Goals of investigation in qualitative research consists of understand describe and discover whereas in quantitative research consists of predict control, confirm in test hypothesis. Design characteristics qualitative research consists of flexible evolving and emergent whereas quantitative research consists of structure predetermined. It should a process that support structure of qualitative research no way just that it is discipline The design characteristics are suited to the goal the design characteristics used to these two types of research Qualitative research designers more flexible revolving and Inflexible revolving and emergent while quantitative research design is structured and predetermined it should be emphasized that the flexible structure of qualitative research

where is the quantitative structure is not less disciplined

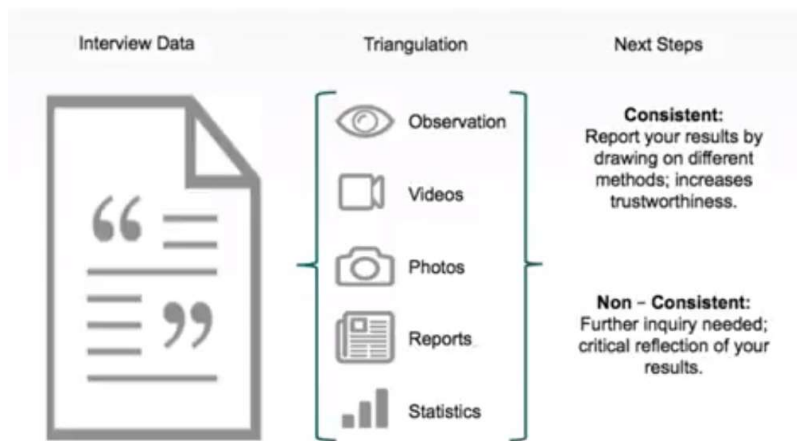
Mixed research:

Both quantitative and qualitative researches are not exclusive. Qualitative research may end in a hypothesis that can be quantitatively tested later. Quantitative research may involve qualitative research elements. Quantitative research may answer questions such as extent and pattern of poverty in India but it may not be efficient in answering questions such as What is the experience if facing poverty, hardships, consequences, and circumstances that lead to poverty. This may be answered by qualitative research. As quantitative research is generally well known, it may be useful to outline when qualitative research is needed.

Triangulation:

There are multiple realities in social research. It is a kin to solving a research problem in multiple ways so as to increase the validity of answer. The triangulation is mostly used in the qualitative research. It entails the use of multiple data sources, multiple investigators, and multiple methods. It also overcomes the problem of subjectivity. It involves the use of multiple data sources, multiple investigators, and multiple methods (such as participant observation, focus groups, case studies and so on) to get complete understanding of the social phenomenon. This provides validity to research process and also overcomes the problem of subjectivity and biasedness to an extent. It is multiple validations of results. The use of results from one set of data to corroborate those from another type of data is also known as triangulation.

What is Method Triangulation in Qualitative Research?



3. Interdisciplinary research

3.1. Conducting interdisciplinary research



❖ Definitions and models of interdisciplinary research

Interdisciplinary research often requires more resources of time, effort, imagination and money than single discipline research (and may also involve higher risks of failure) but the rewards can be substantial, in terms of advancing the knowledge base and helping to solve complex societal problems.

We define interdisciplinary research as occurring where the contributions of the various disciplines are integrated to provide holistic or systemic outcomes.

Interdisciplinary research can be within the social sciences or between the social, natural and life sciences and can be sub-divided into:

- Research which aims to further the expertise and competence of academic disciplines themselves, e.g. through developments in methodology which enable new issues to be addressed or new disciplines or sub-disciplines to be formed
- Research which is problem focused and addresses issues of social, technical and/or policy relevance with less emphasis on discipline-related academic outcomes

These two models of interdisciplinary research are appropriate to different types of research question and will require differing combinations of expertise in researchers. The criteria for the choice of disciplines to be involved in a project will also differ in each case.

Motivations for setting up and funding interdisciplinary research programmes might include:

- the nature of the subject is interdisciplinary (e.g. transport, environment)
- researchers are transferring information from the laboratory to the real world
- the research is user driven (not necessarily commercial)
- the research is particularly relevant to policy making in complex areas
- single discipline research has encountered a bottle-neck and more than one discipline is needed to make a breakthrough

For individuals engaging in interdisciplinary research motivations might include a desire to:

- engage with 'real world' problems
- tackle socially relevant issues
- contribute to the advancement of academic disciplines

❖ Strategies for integrating disciplines

Disciplines have survived for so long in the academic world because they serve the very useful function of constraining what the researcher has to think about. They set a boundary on the parameters of interest (what to include and what to leave out) and dictate the range of methodological approaches that are relevant. They thus provide a clearly defined starting point for a project but they also pre-determine to a large extent what the outcomes of the research will be. If this framework is partially or wholly removed, as is the case in interdisciplinary research, inexperienced researchers can be overwhelmed by the resulting complexity. An active strategy is thus needed to provide for integration among the different disciplines and different models in an interdisciplinary project.

Much more than discipline-based projects, interdisciplinary projects have to undergo a preliminary

research phase that is open-ended. This initial phase involves trying out a range of possible boundaries to the problem to see which gives the best 'fit', allowing the outputs of this analysis to determine the disciplines to be involved. This should be part of the process of developing a research proposal and it should be clear from the proposal what has been done and that the outcome represents a justifiable decision on the project's boundaries.

The outcome of the initial exploratory phase should be:

- a specification of the range of issues that are central to the research problem
- how they interact with one another to create or sustain the problem
- how these interactions can be modified to deliver an implementable, synergistic solution

Interdisciplinary research does not occur automatically by bringing together several disciplines in a research project. Extra effort is needed to promote the formation of a cohesive research team involving researchers from different disciplines, to combine expertise from several knowledge domains and to overcome communication problems among researchers from different disciplines.

Perceived problems in conducting interdisciplinary research include:

- language and communication issues
- institutional structures and procedures
- divergences in worldviews across disciplines

It thus takes longer to bring together an effective interdisciplinary team, the start-up phase of a project will take longer and the demands on the project co-ordinator will be greater.

❖ Skills needed by interdisciplinary researchers

In interdisciplinary research, personality and attitudes of researchers are at least as important for success as discipline base and specialisation. Useful characteristics are:

- flexibility, adaptability, creativity
- curiosity about, and willingness to learn from, other disciplines
- an open mind to ideas coming from other disciplines and experiences
- good communication and listening skills
- an ability to bridge the gap between theory and practice
- a good team worker

A good interdisciplinary researcher will also have a high tolerance for ambiguity. This means not prematurely reducing a problem to a limited set of dimensions, but taking time to explore a range of dimensions, to test several potential boundaries to a problem until the apparently optimum boundary and set of dimensions has been identified. These explorations should be part of the teamwork conducted by the project co-ordinator and the ability of team members to engage productively in this process is very important to the project's success.

Researchers who have skills and knowledge in more than one discipline are particularly valuable members of interdisciplinary teams, but a mono-disciplinary researcher with most of the above attributes should be capable of learning rapidly to operate in an interdisciplinary environment.

Conducting Interdisciplinary Research



"Interdisciplinary research is a mode of research by teams or individuals that integrates **information, data, techniques, tools, perspectives, concepts, and/or theories** from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice."

The following additional qualities are also relevant to good project management:

- understanding (not necessarily in depth) across the project's main discipline domains
- understanding application areas, in industry or the public sphere, for project outcomes
- focus on team work and on practical results, to overcome differences in disciplinary orientation and between, say, participants from public and private sectors
- respect for other disciplines and some understanding of their general principles
- expertise in their own discipline(s), but not necessarily a strong ambition to pursue a career in that discipline which would inhibit their willingness to invest attention elsewhere
- balancing openness to new ideas with maintaining the progress of the project
- skills in building relationships, trusting the judgement of others, good interpersonal and diplomatic skills and a pro-active approach to interaction with partners
- Finally, a clear vision of the project and what it is trying to achieve.

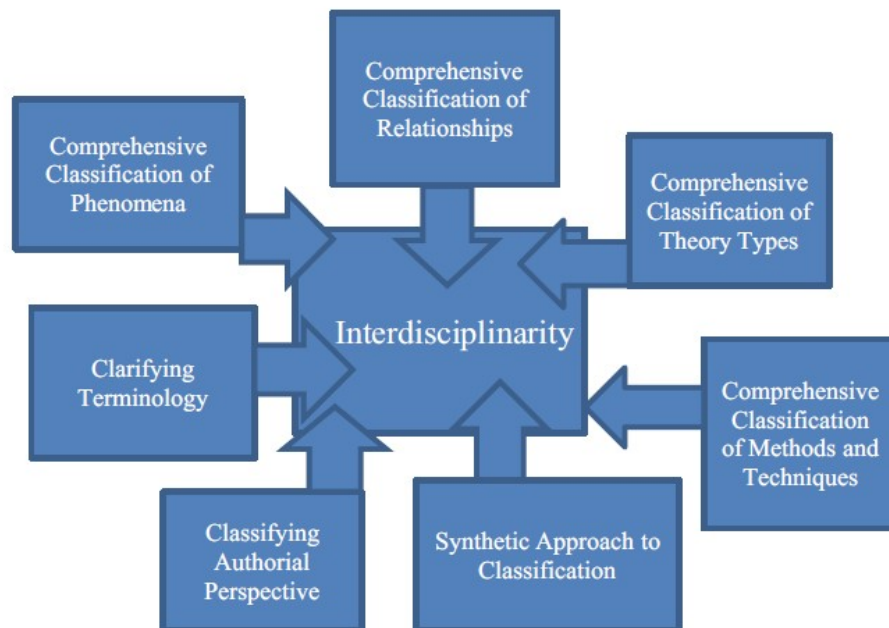
❖ The role of stakeholders and users

Stakeholders can play an important role in interdisciplinary research, focusing attention on the need for relevance to real world problems and encouraging the uptake of research results by industry or other end-users. User engagement is often perceived as a way of reinforcing the interdisciplinary nature of research projects since users' needs are usually not demarcated along disciplinary lines. Strong interdisciplinary proposals are often those that are designed in close collaboration with potential users, not least because this can permit access to research data, research subjects or additional funds.

However, it would be wrong to assume that users will automatically have a better understanding than academics of the 'real world' nature of problems. On the contrary, user communities might not fully understand the nature of their problem and this can compromise the quality of the research and may lead it in unproductive directions. Interactions with stakeholders can also be problematic, for example if key research partners move posts unexpectedly, if commercialisation or other pressures lead to demands for premature delivery of outputs, if delays in delivery of project outputs jeopardise commercial applications or if delays in obtaining research funding cause users to lose interest in the project. A plan for stakeholder and user engagement, with allowances for such contingencies, is needed.

❖ Checklist for a good interdisciplinary research proposal

- Specify clearly why an interdisciplinary approach is needed, which type of interdisciplinary approach is envisaged and which disciplines should be involved. (Where this has been based on a formal analysis of the problem domain, describe the process briefly.)
- Describe how the disciplines involved will be integrated and how this relates to the type of interdisciplinarity involved; demonstrate how the quality of integration will be assured
- Describe the leadership role and management strategy to deliver the desired outcomes
- Summarise the interdisciplinary skills of the researchers involved
- Where relevant, develop a clear plan for the involvement of end users and stakeholders in the project, including contingency plans for recognised pitfalls. Indicate clearly the benefits to stakeholders and the roles of stakeholders in contributing to the project
- Budget for, and justify, the additional resources needed
- Describe how inter disciplinarity will be reflected in the project outputs and outcomes



3.2. Engaging Faculty in Interdisciplinary Research: Challenges and Best Practices from a Career Development Perspective

In recent years, the growth in interdisciplinary research has contributed to significant advancements in science. However, from a career development perspective, faculty perceive a number of impediments to conducting interdisciplinary research. This paper will describe the rise of interdisciplinary research in academia. It will describe faculty's perceived impediments to conducting interdisciplinary research. Next, it will review evidence that women have a stronger propensity to collaborate and to conduct interdisciplinary research than men, thereby suggesting that engaging in interdisciplinary research may have a disproportionately negative effect on women's career development. Finally, given the critical importance of interdisciplinary research to scientific advancement, it will review best practices for supporting interdisciplinary research at the institutional level, provide conclusion, and provide supporting references.

I. The Rise of Interdisciplinary Research in Academia

Many important research questions demand solutions that integrate knowledge from multiple scientific disciplines. Interdisciplinary research has delivered new technologies and discoveries, as well as healthier and more prosperous lives.

Since the mid-1990s, federal funding agencies have increasingly pushed researchers towards conducting interdisciplinary research. A growing proportion of federal Requests for Proposals require an interdisciplinary research approach. The National Science Foundation (NSF) has acknowledged the importance of interdisciplinary, cutting-edge science and technology for the growth and vitality of the economy and society.

II. Impediments to Conducting Interdisciplinary Research from a Career Development Perspective

Despite the tremendous contributions of interdisciplinary research, studies reveal several impediments to engaging in it from a career development perspective. For example, in a survey of researchers participating in interdisciplinary programs funded under the NSF Environmental Research and Education portfolio, Rhoten and Parker (2004) found that approximately 16% of graduate students reported “negative” career effects of the program’s interdisciplinary design. Several graduate students indicated a greater prevalence of interdisciplinary role models among non-tenured staff than among tenured staff.

Rafols and colleagues (2012) found evidence that “excellence-based” journal rankings have a systematic bias against interdisciplinary research. This may create or reinforce disincentives for researchers to engage in interdisciplinary research. When journal rankings are used to help determine the allocation of prestige and resources for faculty, it can hinder interdisciplinary research.

For many faculty, a major impediment to conducting interdisciplinary research is the perception that it will put them at a disadvantage in the review and promotion process. Traditional faculty review and promotion systems tend to favour disciplinary over interdisciplinary research (Pfirman et al., 2011). As Valian (2005) states, faculty working in traditional, disciplinary areas may be unable to evaluate interdisciplinary work, as it will likely be at odds with the approaches and findings with which they are most comfortable. In a study by the National Academies (2005), both individuals and provosts ranked concern about “promotion criteria” as the top impediment to interdisciplinary research at their institutions. In a survey of scientific employees at a large research university, van Rijnsoever and Hessels (2011) found that disciplinary research collaboration was positively related to academic rank, but that interdisciplinary research collaboration was unrelated to academic rank.

• Evidence for Gender Differences in the Propensity to Collaborate and Engage in Interdisciplinary Research

Evidence suggests that women have a greater propensity to collaborate and engage in interdisciplinary research than men (Kuhl & Villeval, 2013; Rhoten & Pfirman, 2007; Van Rijnsoever and Hessels, 2011). Engaging in interdisciplinary research may have a disproportionately negative effect on the career development of women.

Evaluation Associates Ltd (1999) analyzed survey responses from 5,505 researchers in the United Kingdom and found that greater percentages of women than men reported participating in interdisciplinary research at almost every age and in almost every discipline. In a large-scale analysis of publications indexed in the Web of Science, Abramo and colleagues (2013) found that women researchers showed a greater propensity to collaborate within their institutions and outside of their institutions (domestically) than men researchers. Leahey (2006) found evidence that faculty who specialize tend to publish more, and that women tend to specialize less than men.

In a survey of STEM faculty from ten private, mid-sized research universities, Hyland, Krasas, Levine, and Abrantes (2011) found that, compared with men, women expressed more desire to pursue additional opportunities for collaborative and interdisciplinary research. However, women also perceived greater institutional constraints. Women agreed more than men with the statement, “I would like to pursue more interdisciplinary research, but only after I am more established in my career.” Compared with men, women agreed less with the statement, “Participation in collaborative research is viewed

positively during the tenure/promotion review process.”

IV. Best Practices in Promoting Interdisciplinary Research at the Institutional Level

To facilitate interdisciplinary research, Pfirman and colleagues (2011) offer guidelines for individuals and academic administrators in several areas. The areas include structural considerations, position creation and institutional acceptance, search and hiring, early-career scholar development, reviews and tenure, and senior career development. For example, in the review and tenure processes, they recommend developing interdisciplinary criteria and providing special guidance to individuals who will write letters of reference. Further, to support career development, they recommend that merit pay and professional development funds for interdisciplinary activities be made available at the Dean’s level or higher.

In 2008, the NSF Integrative Graduate Education and Research Traineeship (IGERT) Program sponsored a two-day workshop to define the progress of interdisciplinary research and graduate education, as well as their impacts on academic institutions. The working groups provided key recommendations to universities for advancing interdisciplinarity (Van Hartesveldt & Giordan, 2008), including the following:

1. Develop new models of organizational structures and funding to facilitate interdisciplinary research and build incentives for interdisciplinary collaboration among faculty.
2. Establish policies regarding the distribution of overhead funds for interdisciplinary grants. Establish policies regarding credit for multi-authored publications, patents, and grants.
3. Provide clarity and transparency in the valuation of work. This must include both traditional measures and non-traditional measures that capture the breadth of interdisciplinarity.
4. Revise tenure and promotion guidelines, to include recognition and reward for contributions to interdisciplinary research and education.

V. Inference

Despite the significant scientific advancements that interdisciplinary research has created, faculty experience a number of disincentives to conducting interdisciplinary research, from a career development perspective. These impediments may affect women more than men, given the research evidence that women have a stronger propensity to collaborate and to conduct interdisciplinary research than men. It is critical to follow best practices for engaging faculty in interdisciplinary research. This will support equity among faculty who engage in disciplinary and interdisciplinary research, and it will help to fuel the advancement of scientific knowledge.

3.3. The Problems, Pitfalls, and Opportunities in Interdisciplinary Applied Consumer Research

The problems of interdisciplinary research are discussed infrequently in the published literature and few empirical studies have been published on the topic. Thus, few role models exist. One exception is the work being pursued at the University of Washington under a National Science Foundation grant as part of the Research Management Improvement Program (e.g., Birnbaum, 1975; Gillespie, 1976; Mason, 1975).

Further, the concept and practice of interdisciplinary research is fraught with myths and misconceptions. Also, few persons have invested the time and energy necessary to establish truly interdisciplinary research activities. Disagreement even exists on the meaning of the term "interdisciplinary." The terms interdisciplinary, multi-disciplinary, and transdisciplinary are often used interchangeably by colleagues discussing the subject. For the sake of clarity the following definitions are presented.

1. Discipline - A specific body of teachable knowledge with its own background of education, training, procedures, methods, and content areas.

2. Multidisciplinary - Juxtaposition of various disciplines, sometimes with no apparent connection between them. e.g.: music + mathematics + history.
3. Pluridisciplinary - Juxtaposition of disciplines assumed to be more or less related. e.g.: mathematics + physics, or French + Latin + Greek: "classical humanities" in France.
4. Interdisciplinary - An adjective describing the interaction among two or more different disciplines. This interaction may range from simple communication of ideas to the mutual integration of organizing concepts, methodology, procedures, epistemology, terminology, data and organization of research and education in a fairly large field. An interdisciplinary group consists of persons trained in different fields of knowledge (disciplines) with different concepts, methods, and data and terms organized into a common effort on a common problem with continuous intercommunication among the participants from the different disciplines.
5. Transdisciplinary - Establishing a common system of axioms for a set of disciplines, e.g., anthropology considered as "the science of man and his accomplishments." (Centre for Educational Research and Innovation, 1972, pp. 25, 26).

Most persons probably agree that the major problems of contemporary society are increasingly interdisciplinary in nature, but neither interdisciplinary research nor education are simple processes, especially given the discipline-oriented university and the mission oriented society of today. Ideally, interdisciplinary research efforts involve pooling the talents of several faculty members from various disciplines who integrate their knowledge in conducting research on a problem that individual researchers working alone could not effectively resolve. Too often, however, multi-disciplinary research is the end product, not interdisciplinary research. As noted, "multi-disciplinary research... can be performed by experts with interdisciplinary backgrounds, but who work separately, not necessarily in the same environment or within a mutual confrontation, exploring different aspects of a central problem. Results of multi-disciplinary research may be integrated by one of the researchers or by someone else (Nilles, 1976, p. 80; also, Segner, 1973).

The lack of ready acceptance of interdisciplinary research efforts is at least partially due to the nature of the university. Disciplinary structures are the basis of the university and of the professions engaged in teaching and research. The arrangement provides a convenient breakdown of knowledge into readily identifiable parts. However, disciplines as we know them today do not represent a preordained order of knowledge. The dynamics of social phenomena forces interchange between disciplines and even creates new disciplines. "The inter-discipline of today is the 'discipline' of tomorrow" (Centre for Educational Research and Innovation, 1972, p. 9).

Unfortunately, most persons experienced in interdisciplinary research agree with the statement that "a principle feature of interdisciplinary research is not necessarily profound scientific development, but an improvement in human relations to overcome the intolerance, bigotry, and barriers not only among individuals, but within and among disciplines" (Mar, 1976, p. 65; also, Sherif and Sherif, 1969; Piaget, 1970).

The discussion that follows reflects our joint experience in interdisciplinary research, graduate and undergraduate teaching, development of interdisciplinary curricula, and the direction of interdisciplinary masters theses and doctoral dissertations. The thoughts presented also reflect the experiences of colleagues at other institutions with whom we have discussed this area.

Potential Problems in Interdisciplinary Research

Colleague support of interdisciplinary research activities. The quality and worth of much interdisciplinary research is suspect in the eyes of many colleagues. This often occurs because of the blending of concepts from two or more disciplines in an interdisciplinary research activity, but typically

not the use of frontier concepts from either discipline. Thus, the research activity is likely to reflect breadth of knowledge, perhaps more than depth of knowledge. Faculty members are trained in doctoral programs and selected for faculty appointments on the basis of their knowledge of and research skills appropriate to a particular discipline, not because of interdisciplinary skills. Thus, suspicion of the unknown is to be expected.

We have clearly seen the suspicion with which interdisciplinary research is viewed by various professional associations. For example, a session focusing on consumer education at the secondary school level was recently proposed to the program committee of a major national consumer association with an avowed interdisciplinary thrust. The proposed session, including three empirically based papers, was not accepted because the program committee felt that the topic was not appropriate for sponsorship by the organization. Likewise, when two of our marketing colleagues presented a paper at the American Council for Consumer Interests meeting a few years ago and approached the problem from a marketing perspective--development of marketing strategies for reaching consumers--instead of from the home economics perspective--consumer welfare--criticisms of the paper and the approach were both intense and vocal. Much progress in the recognition of the value of interdisciplinary research remains to be accomplished.

Recognition and support by administrators. Faculty members who pursue research activities outside their own primary area of expertise face the possibility that this will be viewed as contrary to the goals of their college and to the goals of the individual faculty member, defined as achieving excellence in a particular discipline. For example, we know of a young home economics colleague who, with the support of the department chairman, began to pursue interdisciplinary research with young faculty members in the marketing department of a college of business. The chairman of the marketing department also supported this effort. The result yielded several quality articles which were published in such journals as the *Journal of Social Psychology*. However, the Dean of the College of Home Economics indicated to the young faculty member that this activity was largely a waste of time as it did not contribute to the visibility of the College of Home Economics or contribute to the conceptual and technical skills of the individual in terms of solving problems unique to home economics. As part of the process of chastisement, support to the individual in the form of research monies and computer time were lessened. Also, it was made clear the research accomplishments in no way contributed to progress toward promotion and tenure.

Finally, one further example illustrates the point. One of the authors recently collaborated with a young faculty member in writing an article from the young person's doctoral dissertation. The logical publication outlet for the article appeared to be the new British journal, the *Journal of Consumer Studies and Home Economics*. However, the young faculty member indicated that he preferred not to have the article published in this journal because the publication would be viewed by his colleagues and his dean as a relatively insignificant contribution which would not be acceptable by a marketing journal. These narrow viewpoints and outright prejudices against interdisciplinary research can be very disheartening.

Interdisciplinary research in a university setting often faces major human relations problems and requires a continuing education of other faculty members and administrators on the value of such activity. In the absence of support by peers and administrators, the path is particularly fraught with difficulties for a young faculty member in a promotion and tenure track. However, the benefits to the individual and society can be tremendous, and these comments are not designed to frighten people away from interdisciplinary research efforts but simply are offered to point out some of the pragmatic realities which often exist today.

3.4. Ways of Generating Interdisciplinary Research

The following discussion reflects on the various activities in which we have engaged over the past ten years and which have been useful in developing and encouraging an interdisciplinary research

environment in our departments. The various approaches are relatively easy to implement and can yield significant benefits.

Strive for better communication. Communication is probably the fundamental problem in interdisciplinary research. The persons involved must understand the different viewpoints focusing upon a central research problem. Without this appreciation, which requires a high level of tolerance and patience, good interdisciplinary research simply cannot occur. Establishing adequate communication is a time consuming process even under the best of circumstances and may well take several years. Otherwise, what happens is a multi-disciplinary effort.

Each discipline has its own sophisticated Jargon which can only be understood over time. To many people, this process of establishing constructive communication may seem scientifically unproductive. We have observed that persons who are strongly committed to a narrow academic specialization have difficulty in participating in interdisciplinary research for this very reason.

Further, it is necessary to recognize that disciplines often have intolerance for other disciplines. Representatives of each discipline are likely to claim superiority or intellectual distinction over the others. For example, we probably all have heard a colleague ask the question, "What can a home economist possibly tell me about consumer behavior?" or "Those faculty members in marketing are simply interested in finding ways to help businesses exploit the consumer; they have no interest in consumer welfare."

How, then, can communication be encouraged?

The following possibilities seem to work fairly well.

1. Cross-listed courses. One of our major breakthroughs occurred when Professor Joseph Uhl, an agricultural economist at Purdue University, taught a graduate consumer behavior course at the University of Alabama which was cross-listed between home economics and marketing. Students from both disciplines enrolled in the course. The resulting dialogue was lively and instructive. At least one doctoral dissertation emerged as a result of the discussions in the course, and a heightened awareness of and interest in interdisciplinary problems emerged on the part of both students and faculty members.
2. Interdisciplinary curricula. In 1970, the consumer sciences curriculum in the College of Home Economics was revised at both the graduate and undergraduate levels to require or encourage consumer science students to take courses outside the College of Home Economics. Even though our joint interests in interdisciplinary activities extend back to 1968, the curriculum revision which occurred accelerated the interest and placed several graduate and undergraduate home economics students in the marketing curricula on a regular basis.
3. Colloquia. Several seminars for graduate students and faculty have been conducted in recent years in which research ideas and research findings have been presented. Also, focuses on common methodological concerns have been a part of these discussions. Lastly, areas of common consumer research interests are likely to emerge.
4. Joint appointments. Joint appointments, if more than simply an arrangement on paper, can be especially useful in encouraging an appreciation of the values of interdisciplinary research. Such arrangements allow badly needed dialogue at faculty meetings, give a measure of credibility to the activities of the faculty member which would otherwise be lacking, and encourage broadened dialogue with graduate students and faculty members who share joint interests in a given area of research.
5. Masters theses and doctoral dissertations. Two interdisciplinary doctoral dissertations have been completed under our joint direction. The focus of one was on evaluating the effectiveness of consumer education at the secondary school level, and the second dealt with consumer cognized distance and the factors which affect distance perception. Five or six

masters theses on diverse aspects of consumer behavior have also been completed under our supervision in recent years.

Students and faculty members have to be selected carefully for participation in this process. For example, students must be capable of tolerating a higher level of ambiguity than is normal because of the complexities of working with faculty members from more than one discipline. Also, we have found that the senior faculty members involved have to be constantly on the alert so that the student is not "used" by a faculty member from one of the disciplines in generating research which is primarily disciplinary in nature, but which is conducted under the guise of interdisciplinary research. Intellectual snobbery often occurs when a young faculty member makes disparaging remarks about the other discipline involved.

6. Interdisciplinary doctoral programs. We have been successful in structuring one doctoral level curriculum and one masters program in the last few years which have been truly interdisciplinary. These were housed in the Graduate School of the University to avoid the problem of departmental barriers. These vehicles are useful in allowing students to select courses from a wide array of disciplines such as marketing, economics, consumer sciences, psychology, geography, sociology, and other areas which are appropriate to a particular area of study. The result is a stronger conceptual and methodological base for conducting research.
7. Interdisciplinary research committees. The two of us have made a continuing effort to serve on committees which are evaluating possible areas for interdisciplinary research. These have included activities related to the Center for the Aging, Center for the Study of Drug and Alcoholism Abuse, the New College of the University, the Health Care Management Advisory Committee and similar programs or institutes. These arrangements provide a unique opportunity for advocating quality interdisciplinary efforts.

3.5. Advantages of Interdisciplinary Research

Development of a broader philosophy. Inevitably, interdisciplinary research activities will lead to a greater understanding and appreciation of the philosophies underlying the respective disciplines of marketing and consumer science. The horizons of the participants are expanded. Problems are more readily viewed from a variety of different perspectives and a greater tolerance for diverse viewpoints occurs. Also, entirely new dimensions of rather conventional research problems emerge. As recently noted, for example, marketers often treat the "consumer not as the subject, but as an object to be affected in order to realize their behavior goals" (Arndt, 1977, p. 13). Interdisciplinary research helps overcome this bias.

Language barriers are overcome. As a result of interdisciplinary efforts, faculty members will benefit by becoming able to read a greater variety of journals. Language barriers are resolved and levels of heightened intellectual awareness and appreciation occur.

Development of new conceptual frameworks. The value of differing conceptual frameworks for focusing on a given problem is quickly realized. Alternative assumptions and viewpoints emerge which make one more sensitive to the nuances of language and of the need for developing shared meanings to permit linking of insights into the disciplines involved. An interdisciplinary focus also fosters the convergence of the two disciplines in developing more comprehensive consumer interest and public policy perspectives and helps conceptualize public policy on matters of broad social concern.

Current Research Activities

However, a brief discussion of how the research originated and its focus will help to reveal some of the everyday realities of interdisciplinary research. The focus of our current research effort is the senior citizen and the marketplace. Funding was provided by the Center for Aging on the University of Alabama campus. It quickly became apparent to us that an interdisciplinary focus on senior citizens

shopping behaviour was badly needed. Thus, the specific areas of focus of the research include the shopping behaviour of the senior citizen, information seeking activities, food consumption patterns, and satisfaction and dissatisfaction with various products or services and complaint behavior, nutritional adequacy of diets, and the adequacy of physical facilities within the senior citizen household.

Logical Areas for Interdisciplinary Research

Numerous opportunities exist for meaningful interdisciplinary research between the Colleges of Business and Colleges of Home Economics. A few areas quickly come to mind and include various dimensions of public policy, metrication, consumer education, quality of life, the handicapped, use of leisure time, improving consumer competence, and family resource use. For example, a recent conference at the University of Nevada identified the following areas of research in the generally defined area of "improving consumer competence in family resource use".

4. RESEARCH PROPOSAL

Most students and beginning researchers do not fully understand what a research proposal means, nor do they understand its importance. To put it bluntly, one's research is only as good as one's proposal. An ill-conceived proposal dooms the project even if it somehow gets through the Thesis Supervisory Committee. A high quality proposal, on the other hand, not only promises success for the project, but also impresses your Thesis Committee about your potential as a researcher.

A research proposal is intended to convince others that you have a worthwhile research project and that you have the competence and the work-plan to complete it. Generally, a research proposal should contain all the key elements involved in the research process and include sufficient information for the readers to evaluate the proposed study.

When you submit your manuscript, number the pages consecutively starting with the title page and organize them in this order:

- ◆ Page 1 — Title
- ◆ Page 2 — Abstract
- ◆ Page 3 — Beginning of Text (Body)
- ◆ References begin on a new page after the last page of text.
- ◆ Each table begins on a new page after the References.
- ◆ Each appendix begins on a new page after the references.

Regardless of your research area and the methodology you choose, all research proposals must address the following questions:

1. What you plan to accomplish?
2. Why you want to do it? and
3. How you are going to do it.

The proposal should have sufficient information to convince your readers that you have an important research idea, that you have a good grasp of the relevant literature and the major issues, and that your methodology is sound.

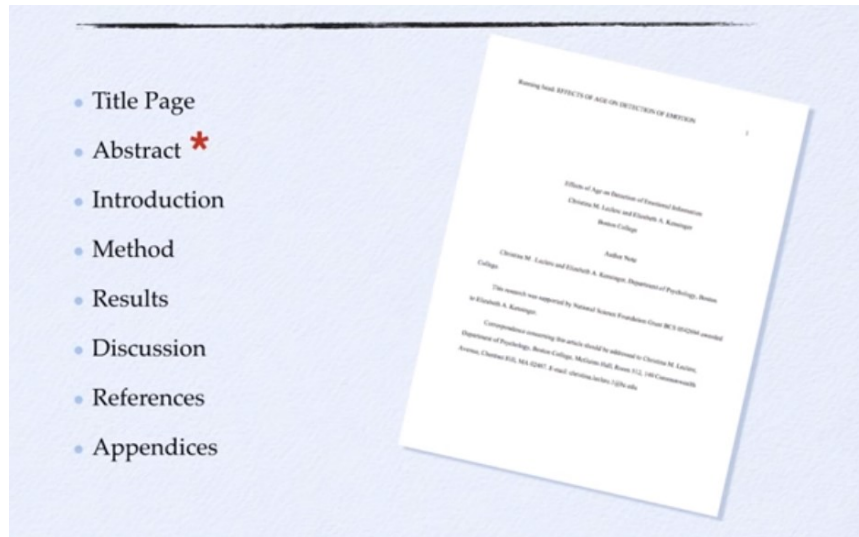
The quality of your research proposal depends not only on the quality of your proposed project, but also on the quality of your proposal writing. A good research project may run the risk of rejection simply because the proposal is poorly written. Therefore, it pays if your writing is coherent, clear and compelling.

What is your research proposal used for and why is it important?

1. It is used to establish whether there is expertise to support your proposed area of research
2. It forms part of the assessment of your application
3. The research proposal you submit as part of your application is just the starting point, as your ideas evolve your proposed research is likely to change.

How long should my research proposal be?

- ❖ It should be 2,000–3,500 words (4-7 pages) long.



4.1. Proposal writing

This chapter focuses on proposal writing rather than on the development of research ideas.

1. Title:

It should be concise and descriptive. For example, the phrase, "An investigation of . . ." could be omitted. Often titles are stated in terms of a functional relationship, because such titles clearly indicate the independent and dependent variables. However, if possible, think of an informative but catchy title. An effective title not only pricks the reader's interest, but also predisposes him/her favourably towards the proposal.

2. Abstract:

It is a brief summary of approximately 300 words. It should include the research question, the rationale for the study, the hypothesis (if any), the method and the main findings. Descriptions of the method may include the design, procedures, the sample and any instruments that will be used.

3. Introduction:


The main purpose of the introduction is to provide the necessary background or context for your research problem. How to frame the research problem is perhaps the biggest problem in proposal writing.

If the research problem is framed in the context of a general, rambling literature review, then the research question may appear trivial and uninteresting. However, if the same question is placed in the context of a very focused and current research area, its significance will become evident.

Unfortunately, there are no hard and fast rules on how to frame your research question just as there is no prescription on how to write an interesting and informative opening paragraph. A lot depends on your creativity, your ability to think clearly and the depth of your understanding of problem areas.

However, try to place your research question in the context of either a current "hot" area, or an older

area that remains viable. Secondly, you need to provide a brief but appropriate historical backdrop. Thirdly, provide the contemporary context in which your proposed research question occupies the central stage. Finally, identify "key players" and refer to the most relevant and representative publications. In short, try to paint your research question in broad brushes and at the same time bring out its significance.



Introduction*

- * Clear statement of the problem
- * Purpose of the Study
- * Significance of the Study
- * Literature Review
- * Theoretical Framework
- * Research Question(s)/Hypothesis

The introduction typically begins with a general statement of the problem area, with a focus on a specific research problem, to be followed by the rationale or justification for the proposed study. The introduction generally covers the following elements:

- State the research problem, which is often referred to as the purpose of the study.
- Provide the context and set the stage for your research question in such a way as to show its necessity and importance.
- Present the rationale of your proposed study and clearly indicate why it is worth doing.
- Briefly describe the major issues and sub-problems to be addressed by your research.
- Identify the key independent and dependent variables of your experiment. Alternatively, specify the phenomenon you want to study.
- State your hypothesis or theory, if any. For exploratory or phenomenological research, you may not have any hypotheses. (Please do not confuse the hypothesis with the statistical null hypothesis.)
- Set the delimitation or boundaries of your proposed research in order to provide a clear focus.
- Provide definitions of key concepts. (This is optional.)

4. Literature Review:

Sometimes the literature review is incorporated into the introduction section. However, most professors prefer a separate section, which allows a more thorough review of the literature.

The literature review serves several important functions:

1. Ensures that you are not "reinventing the wheel".
2. Gives credits to those who have laid the groundwork for your research.
3. Demonstrates your knowledge of the research problem.
4. Demonstrates your understanding of the theoretical and research issues related to your research question.
5. Shows your ability to critically evaluate relevant literature information.
6. Indicates your ability to integrate and synthesize the existing literature.
7. Provides new theoretical insights or develops a new model as the conceptual framework for your research.

8. Convinces your reader that your proposed research will make a significant and substantial contribution to the literature (i.e., resolving an important theoretical issue or filling a major gap in the literature).

Most students' literature reviews suffer from the following problems:


1. Lacking organization and structure
2. Lacking focus, unity and coherence
3. Being repetitive and verbose
4. Failing to cite influential papers
5. Failing to keep up with recent developments
6. Failing to critically evaluate cited papers
7. Citing irrelevant or trivial references
8. Depending too much on secondary sources
9. Your scholarship and research competence will be questioned if any of the above applies to your proposal.

There are different ways to organize your literature review. Make use of subheadings to bring order and coherence to your review. For example, having established the importance of your research area and its current state of development, you may devote several subsections on related issues as: theoretical models, measuring instruments, cross-cultural and gender differences, etc.

It is also helpful to keep in mind that you are telling a story to an audience. Try to tell it in a stimulating and engaging manner. Do not bore them, because it may lead to rejection of your worthy proposal.

5. Methods:

The Method section is very important because it tells your Research Committee how you plan to tackle your research problem. It will provide your work plan and describe the activities necessary for the completion of your project.

 <p><u>Method</u></p> <ul style="list-style-type: none"> * Procedures <ul style="list-style-type: none"> —Participants (characteristics, sampling method, etc.) —Instruments (surveys, tests, etc.) —Variables * Research Design (qualitative, quantitative, etc.) * Projected Material Needs (equipment, personnel, etc.) 	 <p><u>Method</u></p> <ul style="list-style-type: none"> * Data Collection <ul style="list-style-type: none"> —How will you collect the data? —How will you evaluate the data? * Reliability/Validity * Timetable
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The guiding principle for writing the Method section is that it should contain sufficient information for the reader to determine whether methodology is sound. Some even argue that a good proposal should contain sufficient details for another qualified researcher to implement the study.

You need to demonstrate your knowledge of alternative methods and make the case that your approach is the most appropriate and most valid way to address your research question.

Please note that your research question may be best answered by qualitative research. However, since most mainstream psychologists are still biased against qualitative research, especially the phenomenological variety, you may need to justify your qualitative method.

Furthermore, since there are no well-established and widely accepted canons in qualitative analysis, your method section needs to be more elaborate than what is required for traditional quantitative research. More importantly, the data collection process in qualitative research has a far greater impact on the results as compared to quantitative research. That is another reason for greater care in describing how you will collect and analyze your data. (How to write the Method section for

qualitative research is a topic for another paper.)

For quantitative studies, the method section typically consists of the following sections:

1. Design -Is it a questionnaire study or a laboratory experiment? What kind of design do you choose?
2. Subjects or participants - Who will take part in your study ? What kind of sampling procedure do you use?
3. Instruments - What kind of measuring instruments or questionnaires do you use? Why do you choose them? Are they valid and reliable?
4. Procedure - How do you plan to carry out your study? What activities are involved? How long does it take?

6. Results:

Obviously you do not have results at the proposal stage. However, you need to have some idea about what kind of data you will be collecting, and what statistical procedures will be used in order to answer your research question or test you hypothesis.

7. Discussion:

It is important to convince your reader of the potential impact of your proposed research. You need to communicate a sense of enthusiasm and confidence without exaggerating the merits of your proposal. That is why you also need to mention the limitations and weaknesses of the proposed research, which may be justified by time and financial constraints as well as by the early developmental stage of your research area.

Common Mistakes in Proposal Writing

- Failure to provide the proper context to frame the research question.
- Failure to delimit the boundary conditions for your research.
- Failure to cite landmark studies.
- Failure to accurately present the theoretical and empirical contributions by other researchers.
- Failure to stay focused on the research question.
- Failure to develop a coherent and persuasive argument for the proposed research.
- Too much detail on minor issues, but not enough detail on major issues.
- Too much rambling -- going "all over the map" without a clear sense of direction. (The best proposals move forward with ease and grace like a seamless river.)
- Too many citation lapses and incorrect references.
- Too long or too short.
- Failing to follow the APA style.
- Slopping writing.

The demand for higher education and the magnitude of planned reforms over the next ten years in India will provide the largest opportunity in the worldfor international higher education institutions and education businesses.

4.2. SAMPLE: RESEARCH PROPOSAL

Title of research:

Research Capacity in Health Librarianship: The ReCAP Project

Objectives:

- To identify key priorities and barriers for research development in health librarianship
- To gain consensus on key questions to be included in a national survey for research development in health librarianship

Please give a brief justification of your proposed research project:

The aim of this focus group study is to identify key issues relating to the engagement with research of health librarians with research and in particular, their consideration of research development in the contexts of their professional practice.

The existing healthcare system is based on accountability, cost containment, and quality of care; fundamental to the achievement of these is the integration and application of the results of sound, reliable research and therefore the practice and delivery of evidence based patient care. The latest Government documents which consider the future of the NHS confirms the continued Government prioritisation of this in highlighting the need to develop a strategy for leadership in health related research. The development of research capacity goes hand in hand with research and development activities and the Department of Health proposes that building research capacity will be achieved primarily through the application of collaborative practice models.

Librarians are fundamentally associated with research; their work involves the organisation and management of the knowledge that is generated from research. The recent review of NHS library services identifies research as one of the four key areas where librarians have an essential role and recommends that the Department of Health issues formal guidance indicating this. Given this recommendation health librarians will in the future increasingly need to become more engaged with research. Furthermore, as research capacity building is becoming increasingly significant within the current climate of research and development in health, it is necessary to consider the role of health librarianship in this context. This is particularly pertinent in light of the recent Hill Report⁹ which specifically recommends that “research to measure the impact of the application of best available evidence in decision making should continue to be pursued vigorously and routinely by health librarians, in partnership with researchers”.

It is hoped that the end result of this focus group study will be a clearer identification of the priorities and barriers in relation to research development in health librarianship and to reach a consensus agreement which will inform the development of a national questionnaire survey which will explore these issues in greater depth.

4.3. Outline sample

Please outline the proposed sample group, including any specific criteria:

The sample group will include a single representative for seven identified areas of health librarianship:

- Academic health librarians
- Clinical librarians
- NHS library service managers
- Other health librarians (non-NHS)
- Research librarians (in health)
- Senior information strategy managers
- Senior strategy group members

Describe how the proposed sample group will be formulated:

A call for representatives will be sent out to targeted groups and communities in the areas of representation identified, and through the use of cascading methods. This will include JISCMail groups, special interest and professional groups, and cascades through senior strategic managers and group Chairs.

Indicate clearly what the involvement of the sample group will be in the research process:

The main purpose of the focus group is to reach a consensus agreement which will inform the development of a national questionnaire survey. The results of the focus group will be used to develop the survey which will then be sent out to a large representative sample group of health librarians

working in the seven different contexts of health librarianship identified.

Specify how the consent of participants will be obtained. Please include within this a description of any information with which you intend to provide the subjects:

Participants will be sent an information sheet and consent form giving full details of the study (see attached). Participants will be sent this information by email and asked to bring a signed copy on the day the focus group runs.

Indicate any potential risks to subjects and how you propose to minimise these:

Participation in this focus group presents no potential risks to the participants. Participants and their organisations will not be named in subsequent write ups and material submitted for publication.

Describe the procedures you intend to follow in order to maintain the anonymity and confidentiality of the subjects:

Participants and their organisations will not be named in subsequent write ups and material submitted for publication.

4.4. RESEARCH CONSENT FORM

Title of study

Research Capacity in Health Librarianship: The ReCAP Project

Please read and complete this form carefully. If you are willing to participate in this study, ring the appropriate responses and sign and date the declaration at the end. If you do not understand anything and would like more information, please ask.

I have had the research satisfactorily explained to me in written form by the researcher. **YES / NO**

I understand that the research will involve:

- A half day focus group event in which I will be representing one of the seven areas of librarianship
- Discussions with the other focus group members on the topic of research development in health librarianship and to identify key issues
- Identifying key questions which will be used to develop a national survey on the topic of research development in health librarianship

I understand that I may withdraw from this study at any time without having to give an explanation. **YES / NO**

I understand that all information about me will be treated in strict confidence and that I will not be named in any written work arising from this study. **YES / NO**

I understand that any data collected will be used solely for research purposes and will be erased on completion of the research. **YES / NO**

I understand that the data will only be discussed within the research team. **YES / NO**

I understand that study participants and their respective organisations will not be named in subsequent write ups and material submitted for publication. **YES / NO**

I freely give my consent to participate in this research study and have been given a copy of this form for my own information. **YES / NO**

Signature:

Name (capital letters).....

Date:

Contact details: (include address, email and telephone number)

.....
.....
.....

4.5. Writing a research report

Structure

Divisions and sections of a report

Broad Divisions	Individual Sections
(1) Preliminary material	Title of Report
	Table of Contents (not always required)
	Abstract/Synopsis
(2) Body of report	Introduction
	Literature Review (sometimes included in the Introduction)
	Methodology
	Results
	Discussion
	Conclusion
	Recommendations (sometimes included in the Conclusion)
(3) Supplementary material	References or Bibliography
	Appendices

The researcher must carefully read the course information details to ensure that you comply with what the lecturer/tutor stipulates.

A report is typically made up of three main divisions:

- (1) preliminary material,
- (2) body and
- (3) supplementary material.

Each of the sections contains a different kind of content.

Refer to the tables above.

Content of individual sections

Individual Sections	Content of Each Section
Title of Report	Concise heading indicating what the report is about
Table of Contents (not always required)	List of major sections and headings with page numbers
Abstract/Synopsis	Concise summary of main findings
Introduction	What you researched and why
Literature Review (sometimes included in the Introduction)	Other relevant research in this area
Methodology	What you did and how you did it
Results	What you found
Discussion	Relevance of your results, how it fits with other research in the area
Conclusion	Summary of results/findings
Recommendations (sometimes included in the Conclusion)	What needs to be done as a result of your findings
References or Bibliography	All references used in your report or referred to for background information
Appendices	Any additional material which will add to your report

STEP 1

Analyse the Task

As with any assignment task, you must first analyse what is expected of you. This involves careful reading of the assignment task as outlined in your course information book. You may find the following questions useful when analysing the task:

1. What is the purpose of the report?
(It could be analysing, persuading or reporting on an investigation.)
2. Who is the audience for the report?
3. What is the word limit?
(Many times the word limit only includes the body of the report.)
4. What is the topic of the report?
(The topic may be specified by the lecturer, but other times you will have a choice.)
5. What is the expected format of the report?

STEP 2

Develop a Rough Plan

Use the section headings (outlined above) to assist with your rough plan. Write a thesis statement that clarifies the overall purpose of your report. Jot down anything you already know about the topic in the relevant sections.

STEP 3

Do the Research

Steps 1 and 2 will guide your research for this report. You may need to report on other research on a particular topic or do some research of your own. Keep referring to your analysis and rough plan while you are doing your research to ensure that you remain on track.

Give yourself plenty of time for this step, as the research phase of your work will usually take the most time of any step in producing your report. Also, ensure you keep correct bibliographic details for all of the material you may later use in your report.

STEP 4

Draft the Body of Your Report

Introduction - The purpose of your report. The thesis statement will be useful here. Background information may include a brief review of the literature already available on the topic so that you are able to 'place' your research in the field. Some brief details of your methods and an outline of the structure of the report.

Literature Review - If asked to do a separate literature review, you must carefully structure your findings. It may be useful to do a chronological format where you discuss from the earliest to the latest research, placing your research appropriately in the chronology. Alternately, you could write in a thematic way, outlining the various themes that you discovered in the research regarding the topic. Again, you will need to state where *your* research fits.

Methodology - Here you clearly outline what methodology you used in your research i.e. what you did and how you did it. It must be clearly written so that it would be easy for another researcher to duplicate your research if they wished to.

It is usually written in a 'passive' voice rather than an 'active' voice.

Clearly reference any material you have used from other sources. Clearly label and number any diagrams, charts, and graphs. Ensure that they are relevant to the research and add substance to the text rather than just duplicating what you have said. You do not include or discuss the results here.

Results - This is where you indicate what you found in your research. You give the results of your research, but do not interpret them.

Discussion - This is where you discuss the relevance of your results and how your findings fit with other research in the area. It will relate back to your literature review and your introductory thesis statement.

Conclusion - This is a summary of the most significant results/findings. You should not include any new material in this section. Sometimes you could indicate some areas where your research has limits or where further research would be useful.

Recommendations - This includes suggestions for what needs to be done as a result of your findings. Recommendations are usually listed in order of priority.

Title
Acknowledgements
Table of contents
List of Tables
List of Figures
Abbreviations
Abstract
Introduction
Literature
Research Design
Results and Findings
Summary and Conclusion
Bibliography , Appendices

The above is the format for a report.

Below are the list of research funding agencies:

- All India Council for Technical Education (AICTE)
- Council of Scientific and Industrial Research (CSIR)
- Defence Research and Development Organisation (DRDO)
- Department of Atomic Energy (DAE)
- Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH)
- Department of Biotechnology (DBT)
- Ministry of Coal (MOC)
- Ministry of Earth Sciences (MoES)
- Department of Scientific and Industrial Research (DSIR)
- Indian Council of Medical Research (ICMR)
- India Meteorological Department (IMD)
- Indian Space Research Organisation (ISRO)
- Department of Electronics & Information Technology (DeitY)
- Ministry of Environment, Forest and Climate Change
- Ministry of New and Renewable Energy
- Ministry of Power
- Ministry of Social Justice & Empowerment (MOSJE)
- Ministry of Water Resources, River Development & Ganga Rejuvenation
- Ministry of Petroleum & Natural Gas
- University Grants Commission (UGC)

Government Initiatives

Some of the major initiatives taken by the Government of India to promote R&D sector are:

- The Government of India aims to develop India into a global innovation hub by 2020 on the back of effective government measures taken to provide an enabling environment for growing research and development in India, says Mr Y. S. Chowdary, Minister of State for Science and Technology & Earth Sciences, Government of India.

- India and Israel have agreed to enhance the bilateral cooperation in science and technology in the next two years by providing US\$ 1 million from each side to support new research and development (R&D) projects in the areas of big data analytics in healthcare and cyber security.

Road Ahead

With the government's support, the R&D sector in India is all set to witness some robust growth in the coming years. According to a study by management consulting firm Zinnov, engineering R&D market in India is estimated to grow at a CAGR of 14 per cent to reach US\$ 42 billion by 2020.

India is also expected to witness strong growth in its agriculture and pharmaceutical sectors as the government is investing large sums to set up dedicated research centres for R&D in these sectors. The Indian IT industry is also expected to add to the development of the R&D sector.

5. Integration Research with Pedagogy

The ways of researching the pedagogy involved in building research methods competencies in the social sciences. The lack of explicit and shared pedagogy in this area make it particularly important that research is conducted to stimulate pedagogic culture, dialogue and development. The authors discuss the range of methods used in one study with the aim of teasing out pedagogical content knowledge, making implicit pedagogic knowledge more explicit and thereby malleable. The research design and methods deliberately foster dialogue with, rather than cast a judgmental gaze upon, teachers and learners of research methods. Rejecting observational methods on this basis, and declining action research because of the level of participant pedagogic knowledge and commitment required, the authors examine a combination of expert panel, video stimulated dialogue and diary methods for building pedagogic knowledge and culture. These 'methods that teach' are argued to offer value for other researchers working in new and emerging teaching fields, where pedagogy is particularly 'hard to know' and pedagogic content knowledge and pedagogic culture are underexplored or underdeveloped.

5.1 The importance of researching research methods pedagogy

Given scholarly debates over the relationship between research and teaching in higher education –

1. the 'research-teaching nexus' (see Colbeck [1998](#)Colbeck, C. L. 1998.
2. "Merging in a Seamless Blend: How Faculty Integrate Teaching and Research."
3. *The Journal of Higher Education* 69: 647–671. [[Taylor & Francis Online](#)], [[Web of Science](#)®], , [[Google Scholar](#)]; Robertson [2007](#)Robertson, J. 2007.
4. "Beyond the 'Research/Teaching Nexus': Exploring the Complexity of Academic Experience." *Studies in Higher Education* 32 (5): 541–556. doi: 10.1080/03075070701476043 [[Taylor & Francis Online](#)], [[Web of Science](#)®], , [[Google Scholar](#)]; Brew [2010](#)Brew, A. 2010.
5. "Imperatives and Challenges in Integrating Teaching and Research." *Higher Education Research and Development* 29 (2): 139–150. doi: 10.1080/07294360903552451 [[Taylor & Francis Online](#)], [[Web of Science](#)®], , [[Google Scholar](#)]

It is perhaps surprising that more attention has not been given to the ways in which research and teaching and learning combine in pedagogic research pertaining to developing research methods competences. Pedagogies often become the subject of research when there are particular challenges in the pedagogic context:

- Inclusive pedagogy (e.g. Florian and Black-Hawkins [2011](#)Florian, L., and K. Black-Hawkins. 2011.
- "Exploring Inclusive Pedagogy." *British Educational Research Journal* 37: 813–828. doi: 10.1080/01411926.2010.501096 [[Taylor & Francis Online](#)], [[Web of Science](#)®], , [[Google Scholar](#)]; Swann et al. [2012](#)Swann, M., A. Peacock, S. Hart, and M. Drummond. 2012.

- *Creating Learning without Limits*. Maidenhead: Open University Press. [\[Google Scholar\]](#)), arts pedagogy (e.g. Gadsden [2008](#)Gadsden, V. L. 2008).
- “The Arts and Education: Knowledge Generation, Pedagogy, and the Discourse of Learning.”
- *Review of Research in Education* 32 (1): 29–61. doi: 10.3102/0091732X07309691[\[Crossref\]](#), [\[Web of Science®\]](#), [\[Google Scholar\]](#)) and early childhood pedagogy (e.g. Siraj-Blatchford and Sylva [2004](#)Siraj-Blatchford, I., and K. Sylva. 2004).
- “Researching Pedagogy in English Pre-Schools.” *British Educational Research Journal* 30 (5): 713–730. doi: 10.1080/0141192042000234665[\[Taylor & Francis Online\]](#), [\[Web of Science®\]](#), [\[Google Scholar\]](#)) spring to mind.

In higher education, pedagogic research has focused on lecturers’ responses to challenges arising from policy drivers, adjusting to widening participation, for example, or making use of new technologies

- (Rienties, Brouwer, and Lygo-Baker [2013](#)Rienties, B., N. Brouwer, and S. Lygo-Baker. 2013).
- “The Effects of Online Professional Development on Higher Education Teachers’ Beliefs and Intentions Towards Learning Facilitation and Technology.”
- *Teaching and Teacher Education* 29: 122–131. doi: 10.1016/j.tate.2012.09.002[\[Crossref\]](#), [\[Web of Science®\]](#), [\[Google Scholar\]](#)).

However, despite the inherent challenges, historically the teaching of research methods has received little pedagogic attention. In this paper we explain this situation further, discuss the research approaches and methods suited to this area of pedagogic research, and outline our own response to it in the Pedagogy of Methodological Learning study. Wanting the research to be educative, with researchers, teachers and learners developing understanding alongside each other, our methodological approach takes dialogue as a founding principle. We thereby argue that the expert panel methods, video stimulated dialogue and group diary methods are methods that teach. Moreover, we align this with a sociocultural principle to recognize both the richness of context and importance of negotiated knowledge that is transformative for those engaged in methods education: teachers, learners and ourselves as researchers.

What is pedagogic research?

Pedagogic research is research into the processes and practices of learning, teaching and assessment, which may involve systematic empirical research as well contributions to pedagogic theory. There are overlaps with other forms of scholarship and research: for example, it can be seen in the wider context of educational research, and where it feeds into decision-making and planning there are links to institutional research. Pedagogic research contributes to the Scholarship of Teaching and Learning (SoTL) and of course has strong links to reflection on practice, as well as activities like peer-review of teaching and engaging with student feedback. In fact, Felten’s (2013) five principles for good practice in SoTL work (as shown), could easily apply to pedagogic research.

Good practice principles for SoTL (Felten, 2013)



In practice, much pedagogic research is practitioner-led and localised in focus. Often researchers are looking into their own (or peers) teaching and assessment, and the learning experiences of their own students. As such, pedagogic research can also be ‘insider research’ (Trowler, 2014). This means it may be easier to recruit research participants, and the researcher often has a deep understanding of the context and culture in which the research is conducted. However, there are also potential tensions between the practitioner’s professional role (e.g. as a lecturer) and their role as ‘insider researcher’. Clearly, we need to attend to power differentials in our consideration of the ethics of insider research. Pedagogic research often has multiple aims. It’s not just about contributing to the body of knowledge about a specific pedagogic approach, or the impact this has on student learning. It is often intended to be applied to directly inform the development of policy and practice within the institution (and beyond). For many HE teachers, the focus and aims of pedagogic research may be different to their disciplinary/subject-based research. It may require developing new research skills, and using new methodologies. Social science research methodologies have dominated pedagogic research, but there is growing interest in learning from other disciplinary approaches to research and how these could be applied. There is huge scope for us to learn from one another, and to explore how approaches could be transferred across contexts and disciplines.

5.2. Pedagogical research and its offers to the sector

As pedagogic research explores the nature of teaching and student learning, it is intertwined with developments in the practice and policy of teaching and learning locally and (inter)nationally. Pedagogic research can help us understand these developments more deeply, reflect on their potential, and anticipate future impact. There is considerable change across the HE sector at the moment, and pedagogic research is crucial to helping us navigate that change in a scholarly way. It may also help us focus attention on areas where there may be challenges. This is not to suggest these are insurmountable barriers, but areas where considered and critical reflection (and further research!) will help us realise new potential futures for learning and teaching.

With this in mind, the following are proposed as issues for discussion and potential levers for change.

- How can we better articulate the benefits and impact of pedagogic research, both to raise its profile, and to enable it to inform future policy and practice development? Recent research commissioned by the HEA explored how pedagogic research and its impact were framed within the context of the 2014 Research Excellence Framework (Kneale et al, 2016)
- How might we draw together insights and findings from locally conducted pedagogic research to develop greater collective understanding of key learning and teaching challenges?

- How can we encourage the use of a wider range of research methodologies that recognise the contribution of diverse disciplinary approaches, and the potential of new/social media? For example, how might discussions on the **New Social Media, New Social Science blog spot** relate to pedagogic research?

5.3. What is History at the Higher Education Academy's Role in developing Pedagogy?

Pedagogical research involves reflecting on and disseminating your own practice. It may showcase particular teaching developments or demonstrate how particular methods might be adapted to others' use. It is important to set this in the context of the wider literature on the the scholarship of teaching and learning (SOTL). History in the HEA regularly publish Briefing Papers and Case Studies on aspects of pedagogical research.

What is the current state of the art in understandings of learning and teaching processes?

- The current state of the art is 'eclectic': understandings of pedagogy - and the methods and practices commonly adopted - vary from sector to sector. Moreover, most of the debates are normative and value-laden: they arguing for the primacy of one approach over another rather than the appropriateness of different practices to different settings and purposes.
- A 'new pedagogy' is emerging, drawing on constructivist theory and practice as its main source of understanding. Within this, four main types of 'pedagogic method' can be identified: expository methods; interactive methods; conversational methods and experiential methods. But the most important feature of the 'new pedagogy' is the altered configuration of the whole educational research enterprise.
- In the 'post-modern' educational enterprise, the very nature of knowledge is perceived differently. The curriculum, in terms of both content and process, reflects this through a move away from propositional knowledge to knowledge seen as contextualised and contingent, as well as, often, more immediately applicable.
- The core issues and propositions about learners, learning and teaching have not altered; rather, the societal context in which these questions are now posed has changed. Within an operational agenda that addresses how to teach and how to support learning, the questions take a different specific form and lead to different issues. However, it is not clear whether 'fundamental' understandings about how people learn and how learning is best supported have changed in any 'absolute' sense; or whether we have merely become more adept at making the connection between pedagogic inquiry and 'classroom' practice in ways which generate higher levels of 'output' success.

How do learning and instructional processes affect learner attainment and pedagogic effectiveness?

- A more pertinent question could be: "How do conceptions of learner attainment affect learning and instructional processes?" Some writers argue that the emphasis on attainment effectively reinforces a separation of learning from assessment and neglects the significance of 'process' as opposed to 'outcomes'.
- Notions of 'performativity' are beginning to dominate pedagogic debates in post-modern western society - particularly in the Higher Education sector. This is creating tensions between the social and the highly individualistic consumer ethic identified as the key to post-modernity, and between the rediscovery of learning as a social activity and the rise of self-directed and virtual (web-based) pedagogies.

- Too little is known about the relationship between pedagogic arrangements and learning outcomes to meaningfully compare competing models.
- Pedagogic effectiveness is highly dependent on context and the measurement of this effectiveness is itself context-dependent. A major problem identified by the Review is that the measurement of pedagogic effectiveness tends to be limited to the immediate confines of the 'theatre of instruction'. Unless pedagogic models and approaches incorporate understandings of the 'life world' outside the learning setting itself, they cannot be entirely effective.
-

How are learning and teaching arrangements and configurations informed by current understandings of teaching and learning?

- It has not been possible in the course of this Review to uncover with any confidence what research findings the different communities of practitioners do in fact use and to what effect. Additionally, the communities of research and discourse across the sectors of post-secondary education are often quite closed, self-referencing, with poor transfer and transition across boundaries either of research or of knowledge and its application.
- Rather little is known about the processes of knowledge management, production and diffusion and about how to manage knowledge flows from research into practice (as also into the areas of policy-making and funding). What does seem to be the case is that knowledge production is lagging behind the evolving 'new pedagogy'.
- Against this broader background, the Review did uncover a number of examples of innovative teaching and learning arrangements. There is a need, however, for systematic review of the relevance and effectiveness of these innovations.

5.4. What are the factors that appear to shape pedagogic understandings and assumptions within and across the main sectors identified?

- The key driver in the 'new pedagogy' is recent government policy, within which learning has been explicitly identified as the main catalyst for economic competitiveness and growth. This also situates learning within a broader arena, justified by concerns for 'citizenship', social integration and equity.
- There has been a marked degree of 'mixing' of methods and practices across different settings and sectors. For example, previously 'discipline-specific' instructional methods have migrated across disciplinary boundaries - particularly the infiltration into mainstream teaching of formerly marginalised approaches from adult and community-based education.
- The re-configuration of the 'learning setting' in response to these drivers has meant that pedagogic understandings are much more concerned with: the de-centering of knowledge; the valorisation of other forms of knowledge and ways of knowing; supporting the learner as consumer; working with knowledge as 'social', distributed rather than individualised; learning rather than education.
- With one or two exceptions (for example, medical training) there is little established 'evidence base culture' in teaching and learning. Furthermore, as discussed above, pedagogic understandings are, firstly, shaped by different - and sometimes conflicting - patrimonies across each sector, but, secondly, there has been a significant - and complex - degree of 'inter-breeding' between the sectors.
- We do not know enough about the 'goodness of fit' between the prescribed, subscribed and ascribed roles of the 'new pedagogy', and the needs of the different stakeholders involved.

What is known about what does and does not work in different sectors and contexts?

- Old issues and discourses are constantly reinvented but still remarkably little is known about what really works. One key emergent issue that appears quite pivotal in terms of the new proximal forces (knowledge workers and society) and the new discourse is - how do we create/know we have created - independent learners? It implies high priority for research on congruence between new intended outcomes and assessment methods.
- The Review has identified a host of examples of 'good practices' that are either grounded in the day to day minutiae of 'chalkface' learning delivery (and hence ungrounded in theory) or, conversely, are tied to a particular 'grand learning theory' and are unsubstantiated in practice. A key task for TLRP is therefore to conduct systematic reviews and meta-analysis of 'what works'.
- Without these systematic reviews, we cannot say anything concrete about 'what works' over and above the relatively banal. A summary of the evidence on 'what works' for each of the sectors addressed in the Review is provided in the 'Sectoral Reports: Annex I' appended to this Report. In summary, the evidence suggests that what works is dependent on factors like:
 - whether the pedagogic approach and learning arrangements adopted are consistent with the socio-cultural context in which learning takes place;
 - the motivation of the learners (although motivation, and in particular its relationship to 'learner-empowerment' remains a contested issue in the literature);
 - the competencies of 'teachers' and 'mentors' in the new roles required by the 'new pedagogy';
 - the extent to which the expectations raised by learning can be met outside the immediate learning environment (and particularly in relation to delivering on 'life chances' like job opportunities);
 - the extent to which the teaching and learning process is geared towards the 'pace' of the learner;
 - the extent to which learning arrangements address the particular socio-cultural characteristics and 'life world' of excluded groups;
 - the goodness of fit between learning arrangements (and learning content) and the purposes of learning (for fun; to enhance self-esteem; to enhance the career).

In what ways do 'proximal forces' affect pedagogic approaches and practices?

- This is a key element in the puzzle of understanding 'what is done in the name of pedagogy' and understanding 'what works'. It remains a puzzle for three main reasons. Firstly, the definition and concepts underlying the use of the term 'proximal' in education and training are confused and contested. Secondly, understandings of proximal forces are inextricably linked to particular pedagogic paradigms, and their associated theories of human development. Thirdly, proximal forces themselves appear to be context-dependent, and will vary in relation to particular 'learning scenarios'.
- The terms 'proximal' and 'distal' themselves need to be unpacked. 'Proximal' is used in the education and training literature to denote, inter alia: the categories of knowledge or 'building blocks' of learning; the factors affecting the process of learning and the outcomes of that process.
- It is probably more useful to consider the interface between proximal and distal forces in shaping learning outcomes rather than to distinguish between the two as separate conceptual or categorical frames. A more useful frame of reference might be Polanyi's (1968) notion of a

'heuristic field' or 'field of discovery', where learning is mediated through what Polanyi terms a 'from-to' or 'proximal-distal dimension'.

- Moreover, the interplay between proximal and distal forces, and particular configurations of proximal factors that affect learning outcomes, will be significantly shaped by particular 'learning scenarios'.
- More theoretical and conceptual work is needed on the proximal-distal relationship in learning. There is a particular confusion in the literature between the diachronic and synchronic dimensions that shape 'proximal' and 'distal' structures. Effort is needed to define more sharply the definitions underpinning notions of proximal and distal forces, and how these definitions relate to particular pedagogic paradigms. In turn, more work needs to be done on identifying those proximal elements that are associated with the adoption of particular pedagogic models in particular learning scenarios (for example, the use of a constructivist learning model in a virtual campus).

What appear to be the main gaps and challenges in current knowledge and understandings of effective teaching and learning practice?

- There are extensive gaps in current knowledge and understandings of effective teaching and learning practices. Across teaching and learning as a whole, the main gaps are associated with:
 - The nature and effects of post-modern 'distal-proximal interactions' on pedagogic theory and practice (for example the drive towards the 'de-centering' of knowledge; the focus on assessment and performativity; the demand for 'just-in-time' skills; the re-invention of lifelong learning).
 - The effects of the introduction of Virtual Learning Environments and information and communication technologies (for example whether they are really new forms of learning, or old, re-packaged pedagogies; whether they imply new learning and teaching roles for all stakeholders; how to assess their effectiveness).
 - The nature, and implications of, the re-configuration of the education and training infrastructure in the new post-modern climate.
 - How the knowledge-production process operates, particularly at the interface between 'theory' and 'practice'.
 - What works, for whom and under what circumstances.
 - How do we know we are properly measuring what works.
- Against these over-arching questions, there are a number of 'gaps and challenges' that have been identified within the context of the particular 'sectoral reviews' of post-compulsory education carried out as part of the overall Review. These are discussed in detail in Section 2 below, and in the 'Sectoral Reports: Annex I' appended to this Report. In summary, they highlight the following.

Key conclusions and recommendations

- Two sets of priorities for research in Phase III of TLRP have been identified by the results of the Review. A first set of 'over-arching' priorities are as follows.
- There is a need for analysis of the structural basis of post-compulsory education - what are the sectoral overlaps? What are the inter-relationships between Higher education, Adult learning and lifelong learning? What 'cultural logics' shape understandings of these sectors?

- A key theme for Phase III should be the relationships between 'meta-theories' of psychology, political economy, grand theories of learning; middle theories of learning and practice, and how these affect outcomes.
- A key conclusion of the Review was that very little is known about 'what works'. Priority should therefore be given to meta-analyses and reviews of reviews in order to lay the foundations for an evolving evidence base.
- 'Performativity' and an 'assessment culture' are driving understandings of pedagogy. This suggests a requirement for research on innovative evaluation methodologies and critical reviews of assessment paradigms. Part of this research effort should focus on 'attainment and context' - the relationship between learning outcomes and the application of these outcomes in 'real life'.
- There is a need for research that concomitantly recognises the micro-level contextualised nature of pedagogic practice and the need for more comparative understandings. This directs attention to research that explicitly contributes to developing frameworks, typologies and analytic tools that could allow for comparisons across different pedagogic configurations.
- Priority should be given in Phase III of TLRP to understanding the knowledge production and dissemination process. Moreover, the Programme should devote resources to actively supporting more effective knowledge diffusion through 'support measures' that promote the engagement of the different stakeholders involved.
- The utilisation of Virtual Learning Environments and ICTs in teaching and learning is increasingly pervading pedagogic theory and practice. Priority should therefore be given to: understanding and unpacking the pedagogic models underpinning the design of learning VLEs; unpacking the 'grand visions' and 'cultural logics' that shape design; identifying what works in what contexts; developing innovative assessment and evaluation methodologies.

5.5. 'What is being done in the name of pedagogy?' A bibliographic database review of post-compulsory education pedagogic research and practice

In order to look in a more structured way at what has been done 'in the name of pedagogy' in post-compulsory education and lifelong learning, and to help provide an overview of the knowledge base in the domain, we looked at two main English language bibliographic databases:

- ERIC - Educational Resources Information Centre in the U.S.A., and
- BEI - British Educational Index in the U.K.

Both of these cover the range of peer reviewed journal literature as well as a wide range of grey literature fairly comprehensively. (On the searches we performed on ERIC, slightly less than a quarter of the returned records were journal articles, the rest being books [approximately 10%], conference proceedings, monographs and other grey literature.) ERIC contains in excess of one million current records. BEI contains in excess of one hundred thousand current records.

Both ERIC and BEI can be searched in a structured (Boolean) fashion through the commercial Dialog search engine (among others). Both can also be searched directly through their own websites.

In organising this Review we were grateful for the advice of Alan Gomersall, associate director information and dissemination at the ESRC UK Centre for Evidence Based Policy and Practice at Queen Mary, University of London, and to David Cooper Orton, information officer at STM Search at the British Library who, together with a Tavistock Researcher, undertook the actual Dialog searches.

Database Structures

Both ERIC and BEI use carefully selected thesauri of descriptors to construct their bibliographic records. These descriptors are applied in a consistent fashion, as much as possible, by the database cataloguers. Thus the descriptor-based structure of these databases are in themselves an important artefact of the current state of research in our area.

ERIC

In ERIC 'pedagogy' is considered to be a synonym for 'instruction' and this in turn is related to 'teaching methods' and 'teaching styles'. ERIC contains a large literature on instruction, mainly organised on a subject basis, and virtually all addressing compulsory, basic or remedial education.

Where pedagogy is considered in post-compulsory settings, the discourse would appear to be more about what we might call 'anti-instructionism' as about instruction *per se*. For example, when we looked at a random sample of 10 (out of 654) 'pedagogy' AND 'higher education' returns (on a search of titles and descriptors) all 10 addressed critical, constructivist, historical or "revolutionary" approaches.

ERIC distinguishes 'andragogy' as a descriptor clearly from 'instruction'/'pedagogy'. 'Andragogy' is defined in ERIC as:

The art and science of the facilitation of adult learning, distinguished from child-oriented "pedagogy" in terms of learner self-direction, application of knowledge and experience, learning readiness, orientation to the present, and problem-centredness.

Since 1997 ERIC has also included the descriptor 'popular education' (this is frequently associated with Paulo Freire's critical pedagogy) and since 2000 'transformative learning'. However, as will be seen below, the actual extent of material to be found on ERIC relating to andragogy, popular education or transformative learning for post-compulsory education and lifelong is quite limited (less than a thousand records on post-compulsory education). This suggests a narrow current evidence base.

With regards to post-compulsory education, ERIC uses the descriptors 'adult education', 'higher education', 'college instruction' (which covers just that - college *instruction*), 'continuing education', 'community education', 'lifelong learning' and 'professional continuing education'. ERIC does not use a descriptor such as workbased or workplace learning but does have various work-related descriptors such as 'work environment' and 'job skills'.

BEI

In BEI 'instruction', 'pedagogy' and 'teaching' are subsumed within the descriptor 'teaching process'. As with ERIC, records in BEI with the descriptor 'teaching process' are largely concerned with compulsory, basic or remedial education. BEI also uses 'andragogy' as a descriptor and in the British Educational Thesaurus 'andragogy' is related to, among other things, 'adult education', 'adult learning', 'adult students', 'learner centred methods' and 'learning strategies'.

As regards post-compulsory education, BEI uses the descriptors 'adult education', 'community education', 'continuing education', 'lifelong learning', 'further education', 'professional continuing

education'. While BEI has many work-related terms in its thesaurus, it does not use a descriptor or a synonym descriptor for 'workbased' or 'workplace' learning other than the general term 'work'.

Search strategy

We tried a number of broad search strategies - searching on several bibliographic fields or performing a full text search for the association of pedagogic concepts with post-compulsory education and lifelong learning. This created a huge amount of search 'noise': a large number of returned records that proved to only have the most tenuous link to the matter in hand.

Therefore we restricted our searches to combinations of relevant descriptors (using Boolean 'AND' searches). This involved finding records with *substantial content*, in the view of the cataloguers, relating to *both* pedagogy (in our definition, i.e. 'andragogy' in ERIC's definition or 'teaching process' in BEI's definition) *and* post-compulsory education and lifelong learning.

The quantitative results of these searches are tabulated in the following tables:

ERIC

First term	Operator	Second term	No. of records returned
Andragogy	AND	Higher Education	132
		Adult Education	305
		Continuing Education	38
		Continuing Professional Education	14
		Community Education	8
		Lifelong learning	47
		Work	17
Popular Education	AND	Higher Education	13
		Adult Education	36
		Continuing Education	3
		Continuing	0

		Professional Education	
		Community Education	3
		Lifelong learning	8
		Work	5
Transformative Learning	AND	Higher Education	11
		Adult Education	37
		Continuing Education	6
		Continuing Professional Education	0
		Community Education	3
		Lifelong learning	10
		Work	5
			Total = 701
Pedagogy	AND	Evidence	(all fields) 117
		Effectiveness	(all fields) 43
		Higher Education	(title+descrip)654

BEI

First term	Operator	Second term	No. of records returned
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Teaching Process	AND	Higher Education	103
		Adult Education	9
		Continuing Education	0
		Professional Continuing Education	0
		Community Education	0
		Lifelong learning	0
		Further Education	2
		Work	23
Andrag*			(Full text) 24
Andragogy		Work	3
			Total = 161

Given the very low returns on our preferred descriptors on BEI for everything other than 'higher education', we tried an additional variety of related terms - including 'educational environment', 'instructional design', 'teaching methods', 'teaching styles' and 'learning strategies'. These, with two exceptions, only produced a handful of returns when combined with 'higher education', 'adult education', 'continuing education', 'community education', 'further education' and 'lifelong learning'. While the descriptor 'teaching methods' did produce 70 returns when combined with 'higher education' and 68 when combined with 'further education' most of the latter on inspection appeared to deal with methods of instruction.

Authors

After receiving each of the search results tabulated above we asked Dialog to rank authors by their number of publications on the topic - nothing significant was revealed by this analysis, with authorship being extremely widely spread.

Looking for 'evidence'

The above tables show that the total quantity of literature that deals with substantial issues of pedagogy *and* post-compulsory education catalogued on ERIC and BEI is not enormous(1).

Therefore we examined, by means of a basic content analysis, how much of this literature appeared to

relate to *evidence* of (original research on) pedagogic effectiveness as opposed to conceptual work based on extending *existing* bodies of theory and empirical research or simple descriptions of practice. We searched for records of literature that appeared to document empirically grounded theories, i.e. more than working hypotheses based on one or two cases and models based on several cases. We sought pedagogic models that had received wide empirical confirmation in a variety of settings.

We conducted this analysis on ERIC records only (there were too few relevant BEI records to analyse meaningfully). We selected 10% (70) of the 701 records returned by our searches. The selection was of every 10 records as returned. Where the record was not sufficiently informative we selected the next in sequence. Where texts did not report on original research they are classified as 'conceptual only' or 'descriptive only' depending on the preponderance of their content (most of these texts contained a combination of conceptual and descriptive material). Where texts report on original research the significance of this research is classified as 'contains working hypotheses', 'contains model with limited empirical support', or 'contains model with wide empirical support'.

Content analysis of 10% (70) of returned ERIC records

Conceptual only	Descriptive only	Contains working hypotheses	Contains model with limited empirical support	Contains model with wide empirical support
35	15	12	5	3

n = 70

The above table shows (as does the literature and our expert interviews) hard empirical evidence (whatever its epistemological status) seems to be thin on the ground. While less than one in twenty items in ERIC appeared to contain models with wide empirical support, meta-analysis of the more limited original research might well provide such in the future.

Much of the conceptual literature in this field (particularly the grey literature) appears to be practice-based (or 'grounded') theory. Indeed it was noticeable that much of the conceptual literature has been produced by authors who are both educational researchers and practitioners and who are no doubt writing against the backdrop of extensive personal case-based experience. It should also be noted that a significant amount of what was classified as 'conceptual' was educational or advocacy in its intent ('educating the educators').

Following from this bibliographic review we might conclude that, on the face of it:

- 1) Pedagogic practice in post-compulsory education and lifelong learning appears to break down into three main categories:

1. Education explicitly organised on didactic (instructional) principles (including a great deal of further/college-based education as well as basic and remedial education),
2. Education explicitly organised on andragogic (learner directed, learner centred, problem based, experience based, situated) principles (including a sizeable amount of continuing professional development, community education, workbased education).
3. Education organised on some combination of didactic and andragogic principles (instruction 'wrapped around' some element of learner centering). (The degree of the combination is not likely to be clear either to researchers or indeed to those actually teaching. This probably includes a good deal of current pedagogy in higher education.)

2) There is a pressing need for more meta-analysis that draws together diverse empirical reports on experiences of using particular pedagogic/andragogic models.

3) There is space for a great deal more original research which classifies and evaluates the effectiveness of specific pedagogic/andragogic models in use in post-compulsory education.

4) There is a need to build a better understanding of the empirical basis underlying much of the conceptual/educational/advocacy literature produced by researcher-practitioners (perhaps by extensive interviewing and/or detailed content analysis of texts).

Using the research examples derived from the above bibliographic searches, supported by material drawn from other sources (expert interviews; our own databases), we present below a more detailed review of 'what is being done in the name of pedagogy' in each of the post-compulsory education sectors identified by the research brief.

Policy environment and other forces affecting practice

ACE reflects some influences (proximal forces) common to all sectors. In the Thatcher era, the 'great tradition' at the heart of adult education, the WEA and university extramural courses, was driven to meet assessable criteria and to deliver outcomes within Conservative policy. The long-term adult residential colleges came under similar pressure and were similarly transformed, while seeking to adhere to their access and equity mission. In recent years, the emphasis on lifelong learning and social inclusion are supporting a revival of adult education and training in targeted area improvement type schemes seen to have a place in the public political spectrum.

Meanwhile the informal and incidental areas of adult learning remained problematic within and on the fringe of the ACE 'sector' or community, as well as problematic to government. They are hard to define and support. Yet they remain valued and protected on principle if not in resource terms within the loosely bounded 'sector' approximately represented by NIACE.

A new feature of the drive to create a knowledge nation or learning society with a knowledge economy as its practical heartland is the wish of the Blair Administrations. This feature is to understand and take advantage of informal if not incidental learning, and to use its potential to enlist more adults excluded from formal education into the numbers required to reach ambitious participation and qualifications

targets. This offers a central opportunity and threat for the 'sector' with its distinct ideals-based 'patrimony' of access, equity, citizenship and education.

The key pedagogic practices shaping teaching and learning activities

The heritage of adult education is strongly dominated by the liberal tradition of education for purposeful self-development, often therefore for citizenship if not political action. Civic participation represents an abiding strand.

Personal development or self-development is sometimes aligned with this purpose, sometimes largely detached as its own end. Therefore intellectual and recreational courses are given similar merit as part of the rights and accoutrements of a prosperous and open society, whether subsidised or on a full self-financing or for-profit basis. Part of this strand involves developmental therapeutic and counselling work, mostly on a peer support basis, and part involves essentially cultural, intellectual and recreational activity where the social and civic aims are absent or, often, covertly subscribed in an ill-substantiated way.

Evidence available about what works

The amount of 'scientifically known' knowledge in the sector is modest. There is a strong tendency towards ambivalence apropos quantitative research. There are some areas of sustained inquiry and evidence-based practice, mainly to do with participation. There is less of a synthesis or consensus about pedagogy as applied to the different zones of practice, despite a wealth of often small-scale, mainly descriptive or modestly analytical studies and accounts of 'classroom' practice. By virtue of its scattered, piecemeal, grounded and small-scale character, much has a folksy quasi-anecdotal character. The field of ACE is so vast that more comprehensive studies (larger in either breadth, depth or timescale) are daunting, and would be costly. They may be of limited value unless the purpose and potential utility are clearly defined.

The diversity of adult learners (as types, individuals, communities, characterised across plural dimensions including age, gender, SES, ethnicity, disability or need, and learning intention) bewilders. It challenges efforts to undertake generalisable study of an empirical and pedagogic nature. Little is known that has strong scientific validity about the results of different teaching methods for different students groups with different purposes. The terrain is rich in heart-warming examples of triumph over adversity, including paucity of resources, richer in myth than in unassailable evidence.

Central propositions about 'what works' that still command a following and are now more widely adopted include:

- Adults bring experience to a course that it is important to recognise, value and engage with. They contribute and add to knowledge by bringing this experience into engagement with 'validated' disciplinary knowledge. Both the subject and the teacher can gain.
- The teacher is above all a facilitator and a mentor, as well as a source of information.

- The adult class is a community of learners providing important mutual support. Tapping this energy and creating a learning environment in which students feel confident to speak and learn freely is part of the skill of the adult educator.
- More generally, the context and environment - social, informational and physical - of learning is crucially important.
- It is important to start where people are at and where their interests are, rather than impose an alien framework upon them. At the same time the teacher takes them forward, and does not simply stay where they are. There is an element of negotiation and leadership as well as the essential 'student-centredness'.
- Students vote with their feet. They will stay away if they are not motivated and involved. Participation is essential. Active learning which is seen as 'relevant' is a means to this.

Gaps in state of the art knowledge

The problem is not principally one of what we know or where our pedagogic evidence falls short, but whether more systematic research attention is likely to be welcome, benign or fruitful. The subject for inquiry should be the effect on incidental learning of its systematic attention by the 'educative society' as a pedagogic form.

What we do know about the sector is that a number of long-term propositions about how adults learn remain live and strongly owned within and now beyond the ACE community; this constitutes an important set of factors in asking whether there is a significant and fruitful research agenda for ESRC support. This migration of influences and ideas is a subject worthy of scrutiny both for its intrinsic interest to social science and for its possible utility for programmes of social and pedagogic amelioration.

Much of the history of ACE has been dominated by certain philosophical frames of reference and forms of discourse, whether or not explicitly acknowledged. It has tended towards the dichotomous, good struggling with less good, partly within the sector and tradition, but more often as reinforcement for a set of uniting values in a world seen as shallow, self-seeking or philistine.

Within the 'sector' there is an old and long-standing debate over standards or quality. This tends to anchor in disciplinary authority - teach (and learn) the subject and its discipline rather than teach the student. In this regard, little is known about adult 'empowerment' and 'classroom resistance'.

There was a related conflict over the value of different discipline fields, less as a hierarchy of pure and applied, or disciplinary versus problem-oriented as in the HE patrimony, than in terms of social value and relevance (politics and economics ahead of fine art, let alone macramé). This connects to a not always openly articulated belief in ACE as a means to civic and political ends - active citizenship - rather than self-fulfilment through the arts.

There is a pragmatic issue and one of principle about *informal* shading into *incidental* learning. Many ACE professionals operating in or close to these areas find the very notion of pedagogy irrelevant if not offensive. The process of practice-oriented research for enhanced quality of learning (outcomes) such as the ESRC project represents, is fundamentally problematic in that it operates from within a deeply entrenched 'patrimony of education and teaching'. This cannot actually conceive of or value learning as its own process and end outside the education domain. Even key ACE bodies such as NIACE drift into this

mode. The danger is of devaluing and further marginalising socially important learning activities, simply because they cannot thus be comprehended and corralled. The very process of definition as a subject for pedagogical research may be seen as more destructive than is justified by any knowledge and understanding which the research might produce.

Another research agenda relates to how pedagogic practice is influenced and enhanced. It requires looking explicitly at the flows of influence from values, ideas and ideals which reside in the ACE tradition, and which have survived the changes especially of the eighties to grow again in different settings, sometimes with new terms and in hybrid forms. A better understanding of these processes would tell us something about how ideas move and influence pedagogy - 'classroom practice' - across sectors, throwing light on dissemination and innovation processes.

It is possible that more familiar evaluative research on the relationship between pedagogic strategies and learning outcomes could increase understanding about how different kinds of adults learn different things in different ways with more or less success. This would have to be approached with an awareness of the need for significant funding, and patience, for modest empirical gain. There may be merit in considering a grounded study of unpublished and grey studies of adult learning strategies and outcomes in different arenas. This might systematise and build on this knowledge, perhaps reactivating and extending some of the more promising.

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