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Module name/ title: Experimental Method

Paper: Communications Research

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Component II: Description of the Module

Items	Description of Module
Subject Name	Communication Studies
Paper Name	Communications Research
Module Name/Title	Experimental Method
Module ID	P2M28
Pre-requisites	
Objectives	
Keywords	Experiments

Module 28: Experiments

1. Learning Outcome

The module aims to elucidate the concept of experimental research. Being a key method in the field of natural and social sciences, over the period of time, experiments are a key method in communication and media research.

The paper has been designed to understand the relevance of experiments in the field of communication and media research. This scientific method of testing the hypothesis is crucial in determining the cause-effect relationship.

The module outlines two main methods of experimentation known as laboratory and field experiments. In addition to that, the chapter also discusses various experimental designs and delineates the advantages and disadvantages of experiments research at large.

2. Introduction

Experimental research has a wide range of scope in the field of communication and media. Experiment, a primary method of investigation in science, is a method of testing a hypothesis scientifically. Communications research can be quantitative or qualitative. The experimental method is a quantitative research method where the researcher manipulates an independent variable (while controlling extraneous variables) to analyse its effect on the dependent variable. In simple words, we can say that it is a cause-effect relationship between the variables. A randomly assigned treatment and control group are cardinal to an experimental study. In this method, the dependent variable (effect) is measured after manipulating an independent variable (the cause) and controlling the extraneous variables. In the experimental method, the researcher is able to manipulate the conditions of the experiment and control the irrelevant factors. According to Fisher (1936) the three basic principles of the experimental method are "randomisation, replication and local control."

For example: Suppose, there are two sections of a classroom. In order to examine the effect of competition on the performance of the students, principal of the school asks all the students of section A to write an essay in one hour. The students of the other section suppose B are also told to write an essay in the same way but they are being informed that they are competing with the students of section A as they are also writing the same essay.

Note: In this case, section A becomes the control group and section B is an experimental or treatment group which is being administered the additional information about the competition.

As witnessed above example, the respondents are either allocated to a control group or experimental group in an experimental research method. Even though the researcher only tests one effect at a time, the respondents are randomly assigned between the groups.

3. Experiments in Communication and Media Research

In the field of media and communication research, experiments have been used since more than some seven decades now. According to Hovland et al. (1953), experimental methods have been used during the wartime in the 1940s and 1950s to study the impact of media messages on people's opinion about the enemy. Experiment research in this field mainly deals with the quantification of the media effects upon their audiences. Available literature in the field of communication psychology and media effects theories reveals that people's behaviour in using media has been investigated through experimental methods. The majority of the media theories came into being through experiment research. For example Albert Bandura's Bobo Doll Experiment, which gave birth to Social Learning Theory, is considered a landmark experiment relevant to this field.

The respondents in experiment methodology are usually small in number as compared to other methods.

To understand the role of a particular media on the knowledge gap between educated and less-educated media users, Grabe et al. (2009) conducted an experiment in a lab and exposed the respondents to news stories through different media like TV, newspaper and internet. Like the educated respondents, it was found that less-educated respondents had a high recall rate for the context viewed on TV.

4. Experimental designs

According to Singh (2006), following are the features of a good experimental design:

- It will ensure that the observed treatment effects are unbiased.
- It will permit a quantitative description of the observed treatment.
- It will make possible an objective test of a specified hypothesis.
- It is economical.

Experimental designs differ from each other on certain criteria like the time of treatment (pre-test or post-test), the number of participant groups etc. In this chapter, an attempt has been made to explain this feature of experimental design. Below are some of the basic experimental research designs:

- Pre-Experimental Design

- True Experiments Design
- Quasi-Experiments Design
- Classic Experimental Design
- Factorial Design
- Time Series Experiments Design
- Repeated Measure Design (also called Cross-Over Design)

4.1 Pre-Experimental Design: After some treatment with an assumption that a change will occur, we either observe only one group or multiple groups in pre-experimental design. They are considered simplest form of research designs, as they follow the basic experimental steps. There is no control group in this type of research design. One of the major shortcomings of this design is that they are subject to numerous threats to their validity.

Further, there are three types of pre-experimental design:

4.1.1. One-shot case study: A single group after some treatment with an assumption that a change will occur, is studied at only one point in time. In this case, it is assumed that the change has been occurred due to intervention.

The “One-Shot Case Study” is an example of pre-experimental design. In this case, the subjects are made to undergo an experience like some internship programme for college students at the end of a semester. After that, their college grades and assignments are evaluated for the outcome measure. If there is no comparison group, it would not be possible to assess whether the treatment in the form of ‘internship’ had any effect on the college grades. Also, if there are no pre-tests, the changes, if any, could not be determined within the group.

4.1.2. One group pre-test-post-test design: In this type of research design, a single case is studied twice; before the treatment and after the treatment. The post-test change in the subject is assumed to the result of the treatment.

4.1.3. Static-group comparison: A group after receiving some treatment is compared with a group with no treatment at all. The difference between these two groups observed after the comparison is considered to be the result of the treatment.

4.2. True Experiments Design: This design is an ideal research design. It is a type of design in which all the important elements which may cause an effect on the outcome

of an intervention are completely controlled. In true experiment design, participants are randomly allocated to either a treatment group or a control group.

Apart from control over all the extraneous variables, an experiment may be termed to be well-designed if the researcher undoubtedly predicts that no other factor but only the manipulation of an independent variable is responsible for the change observed in the dependent variable. Practically, it is not possible to control all the key factors in the majority of the cases. So, such constraints expand the way for a quasi-experimental research design.

For Example: If we have to see the effect of temperature on task performance, noise and pollution may act as the extraneous variables in case. We will have to control the noise and pollution if we want to quantify the effect of temperature on task performance.

4.3. Quasi-Experimental Design: This design controls some of the extraneous variables. The participants in this type of research design are not randomly assigned. Besides different treatments, both the control and treatment groups differ from each other in a number of unknown ways. Due to non-randomized selection process, the method lacks external validity.

4.4. Classic Experimental Design: Also known as pre-test-post-test with control group design. There are at least two groups in this type of research design. One among the two groups serves as a control group. Referring to the above example of classroom performance, section A is the control group.

4.5. Factorial Designs: In this method, the outcome is measured after the manipulation of two or more than two independent variables or factors. In some cases, the independent variable fails to affect a dependent variable unless manipulated in the presence of another independent variable.

4.6. Time Series Experiments Design: In a time series research design, measurements from each member in the sample are taken multiple times. The data from the different points of time are compared amongst each other. It is a type of quasi-experimental design in which there are two groups of test units. One is experimental group, and the other is the control group. The experimental group is subjected to a treatment, and then another series of periodic measurements is taken from both groups.

4.7. Repeated Measure Design: Repeated Measure Design is also called Cross-Over Design. In this design, the subjects with every branch of research remain the same, for both the experimental group as well as the control group. This needs a smaller number of participants and lesser resources. Moreover, the influence of natural differences between individuals on the results is also minimized. Such designs are commonly

used in longitudinal research studies, which are spread over a long time period. They are also used in educational tests, where lesser variation is required in the sample.

These designs do carry certain disadvantages. The long term plan can lead to boredom and fatigue. Also, there remains a risk of some participants withdrawing themselves from the research, before the completion of second or subsequent part.

5. Experimental Errors

According to Singh (2006), there may be generally two kinds of error in case of an experimental study:

- Chance Error
- Systematic Error

5.1. Chance Error: This error may occur due to the individual differences. According to the sources of error, there may be two categories in this type of experimental error.

- a) Sampling Error
- b) Measurement Error

5.1.1. Sampling Error: The error simply occurs due to the differences in the items in the sample that are chosen for study.

5.1.2. Measurement Error: The error occurs because accurate results cannot be obtained due to the ineffectiveness of the measuring instruments.

5.2. Systematic Error: Despite taking preventive measures, some other external factors with no direct connection with the study may also affect the experiment. This affects the result. This type of error may be surprising for the researcher. All experimenters try to control these errors. Kerlinger (1964) has pointed out that a researcher attempts to control error variance in three ways as follows:

- Maximizing the variance of desired variables
- Controlling the variance of extraneous variables and
- Minimizing the error or random variance

6. Types of Experiments

Experiments can be divided into two types:

- Laboratory Experiment

- Field Experiment

6.1. Laboratory Experiment: Laboratory experiments are conducted in a maximum controlled environment. The outcome is measured after manipulating an independent variable in a controlled setting. The extraneous variables can be controlled to limit their effect on the dependent variable.

These conditions are favorable in a way that they enable a researcher to control the behaviour of the respondents and other extraneous variables which might impact the study in an uncontrolled condition. This experimental method is used to gauge a cause-effect relationship between the variables. According to Card et al (2011), from the theory point of view, laboratory experiments are more valued than field experiments. However, this experimental method is criticized for being conducted in an artificial setting which is altogether different from real-life or natural setting.

Advantages of Laboratory Experiments:

- A laboratory experiment is conducted in a fully controlled environment. The researcher has maximum control over variables.
- Laboratory experiment allows the researcher to completely isolate variables. The effect of the extraneous variable can be completely eliminated.
- Accuracy and precision: Laboratory experiments are considered strong in determining causality. In such experiments, the accurate effect of an independent variable on the dependent variable is measured.
- This experimenting method is considered to have been having a high reliability as it is quite easy to replicate the original conditions of an experiment.

Disadvantages

- Artificial setting: The conditions of a laboratory are totally different from real-life settings.
- Lack of generalizability (external validity).
- Small scale setting: A laboratory experiment can't involve a large group of people and in no way can be conducted in a relatively large setting.
- This method is a time taking process as in most of the cases a single subject may be studied at one point in time.

6.2. Field Experiment: Unlike as in laboratory experiment, this type of experiment are conducted in real-life setting. The researcher in the field experiment applies the

scientific method to experimentally measure the outcome of a treatment or some agent in the real world. List (2007) argues that field experiments lie on the spectrum between lab experiments and empirical studies that use naturally-occurring data."

As per Harrison and List (2004), field experiments can be of two kinds:

- Natural Field Experiment
- Framed Field Experiment

6.2.1. Natural Field Experiment: Is a kind of field experiment in which the respondents remain unaware of their involvement in an experiment. In this regard, the natural field experiment is proved to be instrumental in eliminating the effects of extraneous variables. Without any informed consent, the practice poses a direct threat to the ethical concerns of research.

6.2.2. Framed Field Experiment: The respondents in this kind of field experiment know that they are participating in an experiment. The respondents here may not act normally or naturally.

Advantages of Field Experiments:

- Field experiments are conducted in real-life settings.
- Field experiments have high external validity as compared to laboratory experiments as the former takes place in a real social setting.
- Large scale setting: A field experiment can be conducted in a relatively large social setting like schools, colleges etc. and can involve a large number of participants which is in no way possible in a laboratory experiment.

Disadvantages

- In a field experiment, the researcher has a limited control over variables.
- The researcher can't control extraneous variable in such cases. These variables may affect the causality in the real sense.
- Mostly, respondents in a field experiments are observed without seeking any informed consent from them. Otherwise, they won't act normally.
- There are ethical concerns in this experimenting method as most of the times respondents don't even have iota of an idea that they are being observed.

7. Advantages of Experiments

- It is a precise, systematic, objective and valid method of scientifically testing a hypothesis.
- The experimenter has an upper hand in controlling and creating conditions herself.
- The researchers have a control over the variables.
- Experiment method enables the researcher to eliminate and limit the effects of all the extraneous variables.
- A scientifically tested direct cause-effect relationship between the variables can be measured.
- In experiments dealing with the effect of media on audiences, the researchers have a total control over the selection of media content. It is the researcher who determines the factors and procedures for the exposure and decides methods through which audiences may respond.
- Apart from the single test, the researcher can test the variables at certain points in time.
- Results obtained through experiments method are highly replicable.
- The reliability and internal validity of experiment research is high.
- Experimental method minimizes the error or random variance.

9. Weakness

- Artificial settings.
- In research on behavioural effects, for example, researchers have frequently created artificial measures of behaviour, especially when studying the effects of media violence on audience aggression (Berkowitz 1964; Berkowitz and Geen 1966; Donnerstein and Berkowitz 1981).
- Experimenter's bias may take place.
- In the case of a laboratory experiment, there is lack of external validity. The results can't be generalized beyond the lab.
- This an expensive, lengthy and time-consuming method.
- Every phenomenon can't be studied in the lab.

- Co-operation of the subject remains to be an issue
- An experiment can't be conducted everywhere, in all the settings, at all the points in time.

Summary

In this chapter, we have learned the importance of experiments. We have discussed the role played by experiments in the field of communication and media research. Besides discussing the types of experimental errors, we also learned various types of research designs. The module describes the types of experiments and also throws some light on the advantages of field and laboratory experiments. Finally, the module spells out various advantages and disadvantages of an experimental research.

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