

# Research Experiment

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## 1 Introduction

The experiment serves an important role in research. During the research, researchers use experiments for different purposes. These purpose includes getting data for analysis, testing a new solution to a problem, testing a new hypothesis and etc. There are multiple aspects need to be considered for a research experiment and these aspects are extremely important for the safety, efficiency, and credibility of the research.

These aspects will be research ethics in Experiment, the methodology of the experiment, data collection of the experiment.

## 2 Research Ethics in Experiment

Research Ethics is super important to consider when conducting experiments. Ethical issue within an experiment will be a potential risk which can cause the failure of the experiment. These issues can include, but not limited to, plagiarism, data falsification and excessive risk in research.

### 2.1 Plagiarism

Briefly, plagiarism generally is the using content and idea of other works without citations. When defining a problem for a research experiment, plagiarism may happen by proposing a problem or idea which is already published by other people without proper citation. In order to avoid this problem, one solution will be researching the defined problem to check whether the problem is already published by other authors, and another solution can be a proper citation for the problem already defined by other people.

### 2.2 Data falsification

Data falsification is the modification of experimental data for the desired experiment result. The intentional modification of experiment data is highly risky for the researchers and the research project. Data falsification is serious enough for researchers to be considered academically dishonest that can be a huge barrier for their academic career.

## **2.3 Excessive Risk**

The excessive risk may happen in a research experiment. The excessive risk can cause different forms of harm, mental harm, physical harm, financial harm, and political harm. From the Belmont Report, the assessment of risk and benefit of the research is required. Beneficence is clearly stated in the report that researchers should minimize the risk and maximize the benefit within a research [2]. These rules should be strictly applied when conducting experimental research.

# **3 Methodology of Experiment**

Methodology in an experiment is utterly important and it may decide the success or the failure of the experiment. When doing a research experiment, the first point needs to be considered is defining the problem. And during the experiment phase, a controlled environment for the experiment needs to be considered, the way of conducting research needs to consider, and the desired outcome of an experiment also needs to be considered.

## **3.1 Defining the Problem**

Before conducting a research experiment, researchers need to define the problem or idea in order to conducting the research. The reason is quite simple as we need to know what we want to solve when we decide to do something. Defining the problem before conducting the research experiment will be vitally important because it will be the first step in guaranteeing a successful and efficient experiment. Conducting research experiments will be costly in time, energy and finance.

## **3.2 Controlled Environment**

In a research experiment, in order to analyze the property or relationship within variables or components of an experiment, the controlled environment is required. The controlled environment in an experiment means the control over one or multiple parameters (such as pressure, temperature, size, weight, speed, size of data and etc). It is essential for reducing the amount of uncertain information to get a useful relationship for further analysis.

# **4 Data Collection of Experiment**

During an experiment in the research, the method of recording the data and collecting the data is vital for future analysis. Generally, researchers need to record the data for future use. In research, data can be collected in different ways. Data can be collected through the interview with participants, the questionnaire distributed to participants, the direct observation of the experiment

and etc. There a variety of forms that data can be recorded and stored. There are mainly two types of data from an experiment. One is quantitative and another one is qualitative [1].

## 4.1 Quantitative Data

Quantitative data is usually numerical. This type is generally used to represent the quantity of length, temperature, volume, size, time duration and etc. Quantitative data can be easily used by researchers to create a table, graphs/plots, CSV file and this type of data also can be used to analytical work [1]. For example, the numerical data can be used to analyzed via statistical regression, and it even can be used for prediction via the statistical method, machine learning and etc. Quantitative data can be collected from the observation or questionnaire and etc.

## 4.2 Qualitative Data

Instead of being expressed in numeric, the qualitative data is recorded and represented in forms of description. Generally, this type of data can be reviews, answers of questionnaires, descriptive recording of an experiment. This type of data is not as easy as quantitative data to analyze and organize [1]. In some cases, qualitative data can be converted to quantitative data for easier organizing and analysis. For example, researchers can use map reviews of participants into scales as numeric.

# 5 Conclusion

As a vital component in research, the experiment serves an irreplaceable role in the research. Conducting a research experiment requires great consideration of research ethics, appropriate methodology, and the data collection of the experiment. The failure of each of three aspects will render the experiment being inefficient, have excessive risk and is not trustful. Each aspect also affects other aspects of a research experiment. Failure in research ethics will cause the failure of the whole experiment. Deficit inappropriate methodology of an experiment will consequently cause the data collection of experiment unsuccessful.

# References

- [1] Nemanja Jovancic. 5 data collection methods for obtaining quantitative and qualitative data, 2019.
- [2] National Commission for the Protection of Human Subjects of Biomedical United States and Behavioral Research. The belmont report, 1979.