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**Introduction**

Search for knowledge is the aim of research and it has to be scientific and systematic search for pertinent information on a specific area. In fact, research is an art of scientific investigation.

Research is an academic activity and as such the term should be used in a technical sense. This comprises defining and redefining problems, formulating hypothesis or suggested solutions.

The success and acceptability of result obtained from any research work depends on the type of methodology employed in carrying out the research. However, it is the nature of the research, characteristics of the respondents and the time available for the research that determines the appropriate method to be used. This will allow the positioning of the research work within a pragmatic framework, leading the researcher to reflect upon the broader epistemological and philosophical consequences of his/her perspective. The aim of research methodology is to give the work plan of the research.

**Types of Research Methodologies**

However, there are usually three basic types of research methodologies:

1. Qualitative methodology
2. Quantitative methodology
3. Mixed Methodology (quantitative and qualitative methodologies)

As a researcher you do not know about a phenomenon, but you have a hunch to form the basis of certain assumption or guesses. You do and test these by collecting information that will enable you to conclude if your hunch was right. This is how hypothesis is constructed. The verification process can have one of the three outcomes, your hunch may prove to be:

1. Right
2. Partially right; or
3. Wrong

Without this process of verification, you cannot conclude anything about the validity of your assumption.

Hence, a hypothesis is a hunch, assumption, suspicion, assertion or an idea about a phenomenon, relationship or situation, the validity of which you do not know. A researcher calls these assumptions/ hunches hypotheses and they become the basis of an enquiry (Kothari, 2004).

A hypothesis can simply be defined as the claim that someone is making which must be investigated. It is usually stated in mathematical terms involving the population parameter (mean, variance or standard deviation). Hypothesis testing is a statistical decision making process for evaluating claims about a population (Kani S. M., 2016).

The stages involved in hypothesis testing are:

1. Define the population under investigation.
2. State the hypothesis that will be tested.
3. Give a significance level and find the critical values.
4. Select a sample from the population.
5. Collect the required data.
6. Perform the calculations required for the statistical test.
7. Reach a conclusion by either rejecting or accepting hypothesis

**Null and Alternative Hypothesis**

The process of hypothesis testing begins with a definition of the population under study, followed by a statement of hypothesis. There are two types of statistical hypothesis for each case under investigation: the null hypothesis and the alternative hypothesis.

**The null hypothesis:** usually denoted by Ho, is a statistical hypothesis that states that: there is no difference between a parameter and a specific value, or states that there is no difference between two parameters.

**The alternative hypothesis:** usually denoted by H1, is a statistical hypothesis that states the existence of a difference between a parameter and a specific value, or states that there is a difference between two parameters.

**Question**

1. **Research hypotheses on factors that influence students’ achievement and then identify some appropriate independent, dependent and control variables**.

Before the hypotheses on factors that influence students’ achievement, we have to discuss on the concept of variables.

Variable is a concept that can take on different quantitative values. Concepts such as weight, height, income are all examples of variables.

If one variable depends upon or is a consequence of the other variable, it is termed as a dependent variable, and the variable that is antecedent to the dependent variable is termed as an independent variable. For example, if we say that height depends upon age, then height is a dependent variable and age is an independent variable. If in addition to being dependent upon age, height also depends upon the individual’s sex, then height is a dependent variable and age and sex are independent variables. Similarly, readymade films and lectures are examples of independent variables, whereas behavioral changes, occurring as a result of the environmental manipulations, are examples of dependent variables (Kothari, Research Methodology Methods and Techniques, 2004).

When a prediction or a hypothesized relationship is to be tested by scientific methods, it is termed as research hypothesis. The research hypothesis is a predictive statement that relates an independent variable to a dependent variable. Usually a research hypothesis must contain, at least one independent and one dependent variable. Predictive statements which are not to be objectively verified or the relationships that are assumed but not to be tested are not termed research hypothesis. (Kothari, Research Methodology, 2004 p., 33-34).

Research hypothesis is a definite statement whose supposed truth or practicability is testable through the scientific method (Olanrewaju, 2014). It is a form of statement, which declares one’s prediction on the subject matter intended to help clarify certain ambiguities/doubts. Hypothesis is normally stated in negation form as follow:

Examples of research hypothesis:

1. There is no significant relationship between students’ academic achievement and their socio-economic background.
2. There is no significant relationship between students’ academic achievement and peer group influence.
3. There is no significant relationship between students’ academic achievement and their teachers’ professional qualifications.

Before the next question on open, closed and contingency questions let us briefly understand the concept of questionnaire.

The Questionnaire is usually the most used research technique to collect raw data of a research. This technique has been widely employed to collect data from a considerable number of people at a low cost (time, effort and money).Burns (2000, p. 571) defined the questionnaire as “Pre-determined questions that can be either self-administered (it may yield a higher response rate of completing the questionnaire, as the researcher meets the participants and asks them questions and records their answers on the questionnaire document). It can be administered by mail or asked by interviewers”. Neuman (2007, p. 167) argued that a questionnaire is a proper instrument for investigating self-reported beliefs and behavior.

2. **Uses of closed, open and contingency questions**

Questionnaire is a common data-gathering instrument among researchers. Questionnaire can be categorized as: *Close/Structured* and *Open/Unstructured*.

When structured/closed, respondents are provided with alternative answers from which they will select one or more answers depending on the way the question was structured. On the other hand, they are unstructured or open-ended when they (the questions) require free responses in the respondents’ words and style.

Contingency questions on the other hand are questions to be answered by some subgroup (s) of respondents. It may also be open ended or closed ended. Hence the word contingent (conditional), contingency (possibility) is just a name which is mostly used synonymously with set of questions.

3. **Draft five closed and open-ended questions related to some aspect of educational research.**

|  |  |
| --- | --- |
| **Open ended** | **Close ended** |
| How do you explain the use of charts, diagrams, graphs, posters and their likes towards effective teaching and learning? | Charts, diagrams, graphs, Posters and their likes are used to simulate concepts, facts and expressions. A. Yes [ ] B. No [ ] |
| How do you convince teachers to adopt the use of computer aided instruction to ensure students’ academic achievement in our schools? ] | Computer software for reading instruction aid teaching and learning process.  A. Yes [ ] B. No [ ] |
| Explain how use of resource materials enhances effective implementation of educational policy in Nigeria | Use of resource materials enhances effective implementation of any educational policy.  A. Yes [ ] B. No [ ] |
| Resource materials make teaching and learning more direct and effective. Do you support or oppose this assertion? Depend either of the views | Resource materials make teaching and learning more direct and effective.  A. Yes [ ] B. No [ ] |
| Teaching without a resource makes the process boring and abstract. Do you support or oppose this assertion? Explain your view | Teaching without a resource makes the process boring and abstract.  A. Yes [ ] B. No [ ] |

4. **Formulate a contingency question with accompanying instructions.**

Are you pregnant? *(the question is a contingency meant for only women)* State your pregnancy status by answering Yes or No (closed ended)

Have you ever had a prostate cancer? *(the question is a contingency meant for only men)* State your experience and medical treatment undergone (open ended).

5. **Draft three attitude statements (each with 5 scale response categories) that could be used to construct a scale for measuring students’ attitude towards mathematics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Attitudinal statements | Strongly Agree | Just agree | Neutral | Strongly disagreed | Just disagreed |
| 1 | I have positive attitude towards learning mathematics |  |  |  |  |  |
| 2 | I have negative attitude towards learning mathematics |  |  |  |  |  |
| 3 | My attitude towards learning mathematic is neutral |  |  |  |  |  |

**6. Explain the concepts of validity and reliability**

Validity and reliability are important aspects of survey research. Internal validity is achieved when the survey’s questions and answers accurately measure or reflect what the investigators want to know and are not distorted by some other factor.

External validity refers to how representative a sample of the population is. In survey research, it is important to factors in the return rate as well as the proportion of non-respondents to know if there are a statistically significant difference between respondents and non respondents with regard to certain characteristics (Given, 2008).

Reliability refers to the consistency of data gathering in measuring whatever the survey purports to measure. To ensure reliability, the researcher looks at question wording to ask whether the questions really ask for the information in the best possible way or to ask if people from different groups understand the questions in the same way. Reliability can be improved by asking the same question twice on a questionnaire or by following up to check on similarity of response in an interview (Given, 2008).

7. **List three aims that a good covering letter should address.**

A covering letter refers to the letter that is attached to the data collection sample; questionnaire to be filled by sampled population or respondents of the research questions. The attached letter introduces the researcher or investigator to the respondent(s), make it easier for the respondents and researcher have a common ground in relation to the research investigations. In addition, this letter formalizes the interaction between the researcher and the respondent(s), it makes the respondents to know that his/her information will be solely used for the said research (confidentiality) and no bad consequences in respect of answering the research questions or interview questions.

1. It formally introduce the candidate / student to the recipient
2. It serves like a guarantee to the holder
3. It also serves a form of security to the organization

8. **State the main objectives of a trial-testing program**.

In conclusion, the research methodology mentioned above would help me become a better researcher and would make my work (researches) more credible….

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