Knowledge on Research Methods and Technical Writing

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Abstract— Knowledge on research methods and technical writing skills are fundamental requisites for an young researcher. The methodology and techniques are easy to learn and practice. The prospective research scholars are inherently forbidden to enter into the field of research as they lack the knowledge on these lines.

At the same time it is true that learning the research methods is an ice breaker which will lead them to greater heights in their research aspirations. This paper aims at keep the researchers to rest assured about the practicality of the research activities and essence of individualistic talents.

Keywords— research methodology; experimental design; professional ethics; writing and presentation skills.

1. Introduction

The essence of research lies in the enthusiasm to learn new concepts and perseverance in innovations. Open minded researcher is able to understand the research methods, understand and assimilate the literature survey and database analysis, develop the skill of technical writing and keep up the professional ethics.

The methodical approach and consistent work leads to successful innovations and hypothesis which can later be proved as the theory of science or technology. Data analysis is the fundamental tool which acts as the guiding light to arrive at a meaningful solution.

2. Literature Survey/ database research

The research can aim at solving an existing mathematical problem or evolve a new line of thought or modify the already available solution. The area of research must be chosen by the research scholar based on his/her nishe area of interest, competency and social implication. Any research activity must be chosen in such a way that it is fruitful to the society. The scholar must be in pursuit of reading, analyzing and summarizing the research papers and arrive at a new school of thought based on the intensive reading and analysis. Scholar must necessarily be a voracious reader and consistent learner.

2.1 Choosing the topic

It is always a healthy practice to select the area of research and an outline idea of operation before approaching a guide. Choosing a guide and selecting a topic by force will never aid a real research operation.

The primary requisite of research is that the scholar must be thoroughly inclined towards the relevant subject area. "Working hard" is not a good choice; but "Putting one's heart to work" will fetch the real fruits success, which needs the research's minds to be bent upon the topic.

3. Research hierarchy

The identification of the problem must be followed by the selection of area and technology of operation and finally implementation of the process.

- Identify the problem
- Select the technology /tool
- Start implementation
- Arrive at a conclusion
- Formulate the theory

3.1 Technological Method of problem solving

Fig. 1: Technical method of problem solving
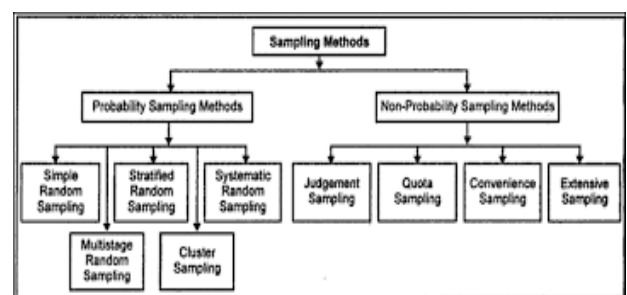
3.2 Sampling

Fig. 2: Sampling methods

There are different types of sampling methods which are used according to the problem in question, area of impact and cost and time factor of the research.

3.3 Research Theory Attributes

Research theory must possess the following attributes.
- It must be clear and unambiguous
- Testable
- Creative
- Logical and systematic
- Repeatable
- Generalized
- Extensible
- Scientifically proved.

3.4 Forms of Resources

The resources may be primary or secondary. The primary resources include books and proven theories supported by statistical proofs. For example, Newton's three laws of motion. The secondary resources include journal articles, research papers and theories of ongoing research. Website and e learning are providing avenues for acquiring new knowledge and innovative ideas.

3.5 Observation and hypothesis

The data must be gathered and observed with a view to bring out the truth hidden inside. Certain assumptions can be arrived at and based on that some hypothesis can be formulated. The next step is to prove the hypothesis by means of scientific techniques. If the hypothesis is proved beyond doubt and accepted by the society, it can be accepted as a scientific theory. As long as it is not disproved by another scientist it holds good.

3.6 Treatment of data

Collection and systematic analysis of data involves the statistical theories and mathematical approach. Any field of research culminates only with the data analytics and thereby drawing assumptions, proving /disproving the already accepted theories. Data mining and data warehousing are the essential branches of science which aid in the research activities. The data thus obtained are made available to the researchers to take up the next step, thus avoiding the reinventing of the wheel from the start again.

3.7 Tools and Techniques

Matlab and SPSS have become inevitable learning on the part of the research scholar to proceed with the research and end up with a successful theory. On one hand it has minimized the trouble of handling data towards drawing innovative ideology and on the other side helps in an accurate and precise evaluation of the proposals submitted by the researchers. Hence usage of such tools is twofold. It has created an impetus in the field of research.

3.8 Technical writing

Writing a research paper involves the following steps.
- Problem statement
- Related work in the area
- Suggestion of improvement
- Out of the box idea
- Experimentation
- Collection of data
- Statistical analysis of data
- Inference and suggestions
- Hypothesis
- Proof of Hypothesis
- Future work possible
- Conclusion
- References

4. Conclusion

Young and novice prospective researchers must be motivated to be familiar with all the latest trends in the research methodology. Veterans of the subject area are also instigated to use the latest tool and techniques to create as breakthrough with aid of new and modern technology of research.

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