



ABC of Research

Towards an informed society

Introducing ABC series ...

The Medical Research Institute is happy to introduce its ABC series as part of its research capacity building framework which includes seven blocks covering its staff, infrastructure, research direction, visibility, sustainability, networking and governance. The ABC series involves the running of several seminars and workshops and producing this research enhancement leaflet (ABC of Research), thus contributing to the building of blocks related to staff development and visibility. The ABC series will focus on research methods and procedures that are required by most researchers, thus giving researchers especially those starting their career with the necessary skills to perform their research and interpret the work of others.

However, It should be stressed that conducting proper research, in addition to methodology, requires good knowledge of the subject matter and an appreciation to the professional values of the related discipline. We hope that we are able to maintain this work which will be much facilitated by your contributions and encouragement.

**ABC
of
RESEARCH**

AIMS AT

*creating an awareness
of issues related to
research*

*providing a core of
knowledge that is
practice-based.*

*encouraging commu-
nication between
researchers*

Research and sources of knowledge

Research can be defined as the search for knowledge, or as any systematic investigation, with an open mind, to establish novel facts, solve new or existing problems, prove new ideas, or develop new theories, usually using a scientific method.

Sources of knowledge

A good starting point for the proper understanding of research is getting to know the various sources of knowledge available which we consciously or unconsciously use each with its advantages and limitations.

Tradition is useful in that it offers a common foundation for communication and interaction within any society or profession. However,

as a source of knowledge, tradition poses a serious problem in many situations it has neither been evaluated for its validity nor been tested against other alternatives.

Authority in many situations is the sole source of information, especially to the novice. When it states that something is true we accept it based on its success or reputation. This may be acceptable in the absence of scientific evidence but we should be careful that we might be following unsound and invalid knowledge.

Trial and error, a natural method that we all use when we lack the necessary knowledge for making ap-

propriate decisions especially when dealing with problems. Although widely applied, it is time consuming and when solutions are found they can't be widely applied.

Reasoning is a systematic process that has been used throughout history and involves the combination of personal experience, intellectual faculties and formal systems of thought. Two types of reasoning are common: deductive reasoning involves specific suggestions derived from general observations; inductive reasoning reflects the reverse, developing generalization from specific observations.

Scientific method is the most rigorous process for

acquiring new knowledge characterized by being systematic, empirical, and critical. The scientific method involves the proposition of a hypotheses followed by experimental studies to test these hypotheses through a number of steps otherwise known as the research process (see overleaf). The systematic nature of research ensures an acceptable level of reliability. The element of control is crucial in eliminating external influences that may lower the confidence in the knowledge obtained. Lastly, a commitment to critical examination through experimentation and scrutiny by other scientists minimizes the chances of obtaining bias knowledge.

Research Funding

Expenditure for research and development comprises public and private payments on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. The term research and development covers basic research, applied research, and experimental development.

Gross domestic product (GDP) refers to the market value of all final goods and services produced within a country in a given period. It is often considered an indicator of a country's standard of living.

The top eight countries in terms of percentage of GDP expenditure on research and development are Israel (4.53%), Sweden (3.73%), Finland (3.45%), Japan (3.39%), South Korea (3.45%), Switzerland (2.9%), Iceland (2.78%) and United States (2.62%).

According to World Bank data Egypt spent 0.26% and 0.23% of its GDP on research and development in year 2006 and 2007, respectively.

Available from; <http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS>



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The Research Process

Research, regardless of its type, involves a systematic process of chronological steps that guide our thinking, planning and analysis.



Step 1: Research question

In simple terms, a research question is the question which the research sets out to answer. Such questions are usually generated in response to problems identified in practice that have no answer. Before embarking on answering the research question, a literature review is necessary to ensure that the question has not been answered by others in similar circumstances and also to gather up to date knowledge about the related problem and the various approaches that have been investigated for its solution. In doing so the research question is expected to become more focused and precise leading to the generation of one or several research hypothesis which the research is set to test.

Step 2: Research design

In this step the researcher designs the study and plans methods for study implementation including material (subject) selection, data collection or measurement, interventions, and data analysis. Research design is determined mainly by the purpose of the research which may include the description of populations, finding relationships, or demonstrating cause and effect. It is important in this step to elaborate as much as possible on how the research will be conducted in order to standardize the conditions under which the research will be conducted, an important step in producing valid results. A good idea at this stage of what variables will be included in the data analysis and what statistical tests will be used will further guarantee the validity of the research results. All this should be documented in what is known as a research protocol.

Step 3: Implementation

During this step the researcher implements the research design and methodology that have been documented in the protocol. This is usually the longest part of any research during which the researcher collects the raw data in a manner that can be understood, recorded and finally analyzed. It is important before embarking on full scale implementation of the research to pilot the research methods set at step 2 in order to identify any unforeseen problems that require reconsideration of the research design or research methods.

Step 4: Data analysis

Data collected will be analyzed as planned and conclusions drawn up to answer the research question and consequently either support or accept the research hypothesis. During this step consultation with statisticians is crucial but made easy if consulted before hand in step 2.

Step 5: Dissemination

Research results that are not disseminated to colleagues and professional societies through publication or conference presentation are a waste of financial and human resources and may be considered unethical, especially if patients were involved. Research findings, whether negative or positive are equally important and should be given equal chances in their communication.

To conclude, the research process, once reaching its end is usually the start of another new research process with new research questions and hypotheses rising from its results, conclusions and recommendations.