



SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

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SCHOOL OF SCIENCE AND HUMANITIES

DEPARTMENT OF PHYSICS

UNIT – I – Design, Process and Methodology – SPHA5305

I. Introduction

Research is "creative and systematic work undertaken to increase the stock of knowledge, including knowledge of humans, culture and society, and the use of this stock of knowledge to devise new applications. It involves the collection, organization, and analysis of information to increase our understanding of a topic or issue.

NASA mission finds dwarf planet Ceres may be geologically active

New research on the dwarf planet Ceres, located in the asteroid belt between Mars and Jupiter, shows that the object may have had all of the requirements for life as in Fig 1.

Is there life on other planets?

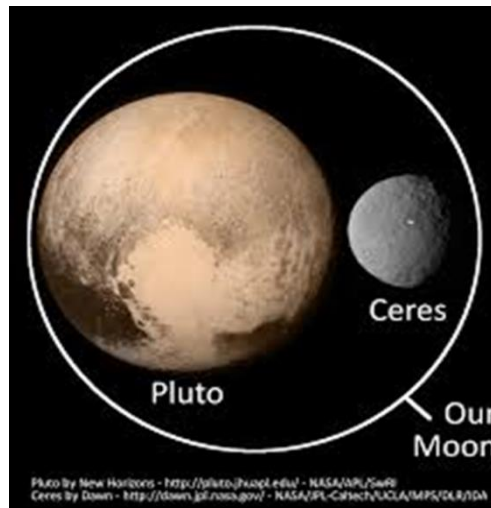


Fig 1. NASA mission finds dwarf planet Ceres

Is there a vaccine against corona virus?

India's indigenous coronavirus vaccine candidate COVAXIN has showcased promising results in the preliminary phase-1 human trials, and is therefore projected to be safe for human use in Fig.2



Fig.2. India's indigenous coronavirus vaccine

Research is defined as the creation of new knowledge and/or the use of existing knowledge in a new and creative way so as to generate new concepts, methodologies and understandings. This could include synthesis and analysis of previous research to the extent that it leads to new and creative outcomes.

Research has three steps

1. Pose a question
2. Collect data to answer the question
3. Present an answer to the question

Definition of Research

According to the American sociologist Earl Robert Babbie,

“Research is a systematic inquiry to describe, explain, predict, and control the observed phenomenon. Research involves inductive and deductive methods.”

Inductive research methods are used to analyze an observed event. Inductive approaches are associated with qualitative research as in Fig.3. Deductive methods are used to verify the observed event. Deductive methods are more commonly associated with quantitative research.



Fig.3 inductive and deductive methods

2. Types of Research Methods

Basic research:

A basic research definition is data collected to enhance knowledge. The main motivation is knowledge expansion. It is a non-commercial research that doesn't facilitate in creating or inventing anything. For example: an experiment to determine a simple fact.

Applied research:

Applied research focuses on analyzing and solving real-life problems. This type refers to the study that helps solve practical problems using scientific methods. Studies play an important role in solving issues that impact the overall well-being of humans. For example: finding a specific cure for a disease.

Problem oriented research:

As the name suggests, problem-oriented research is conducted to understand the exact nature of a problem to find out relevant solutions. The term “problem” refers to multiple choices or issues when analyzing a situation

Problem solving research: This type of research is conducted by companies to understand and resolve their own problems. The problem-solving method uses applied research to find solutions to the existing problems.

Qualitative research: Qualitative research is a process that is about inquiry. It helps create in-depth understanding of problems or issues in their natural settings. This is a non-statistical method.

Qualitative research is heavily dependent on the experience of the researchers and the questions used to probe the sample. The sample size is usually restricted to 6-10 people.

Open-ended questions are asked in a manner that encourages answers that lead to another question or group of questions. The purpose of asking open-ended questions is to gather as much information as possible from the sample.

Quantitative research: Quantitative research is a structured way of collecting data and analyzing it to draw conclusions. Unlike qualitative methods, this method uses a computational and statistical process to collect and analyze data. Quantitative data is all about numbers.

Quantitative research involves a larger population — more people means more data. With more data to analyze, you can obtain more accurate results. This method uses close-ended questions because the researchers are typically looking to gather statistical data.

3. Reliability and Validity of Research

Philosophical orientation may stem from one of the several paradigms and approaches in research – positivist, interpretive, phenomenology, action or participatory, feminist, qualitative, quantitative – and the academic discipline in which you have been trained.

Validity: It ensures that in a research study correct procedures have been applied to find answers to a question.

Reliability: It refers to the quality of a measurement procedure that provides repeatability and accuracy. Subjectivity is an integral part of your way of thinking that is ‘conditioned’ by your educational background, discipline, philosophy, experience and skills

For example, a psychologist may look at a piece of information differently from the way in which an A research design suitable for a specific research problem would usually involve the following considerations:

- i. The methods of gathering the information;
- ii. The skills and availability of the researcher and his/her staff, if any;
- iii. The objectives of the research problem being studied; iv. The nature of the research problem being studied; and
- v. The available monetary support and duration of time for the research work. anthropologist or a historian looks at it.

Bias, on the other hand, is a deliberate attempt to either conceal or highlight something.

Therefore, when you say you are undertaking a research study to find the answer to a question, this implies that the method(s) you are adopting fulfils these expectations

4. Characteristics of research design

A research design suitable for a specific research problem would usually involve the following considerations:

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- ii. The skills and availability of the researcher and his/her staff, if any;
- iii. The objectives of the research problem being studied; iv. The nature of the research problem being studied; and
- v. The available monetary support and duration of time for the research work.

At the beginning of every meaningful research, a researcher chooses a framework of methods and techniques to be used and applied in the research process. This framework is usually referred to as the research design as in Fig.4



Fig.4. Characteristics of research design

Types of Research Design

Descriptive research design

This is a theory-based design, where the researcher is primarily interested in describing the topic that is the subject of the research. It is applied to case studies, naturalistic observations, surveys, and so on.

Correlational research design

This method includes data collection, analysis, and presentation. It lets the researcher clearly present the problem statement in order to allow others to better understand the need for this kind

of research. Without a clear problem statement, you're not doing descriptive but exploratory research.

Just as its name suggests, correlational design allows the researcher to establish some kind of a relation between two closely related topics or variables. It's a non-experimental research design type that requires at least two groups of data.

It can be applied to case-control studies and observational studies.

Experimental research design

Researchers must design their experiments before they can initiate them to maintain the integrity and viability of the study.

They can rely on protocols from older experiments, general standards and practices, and guidance from assistance and supervisors.

The process of experimental research design can take weeks or months as researchers explore all aspects of a research project to develop the best design as in Fig.5

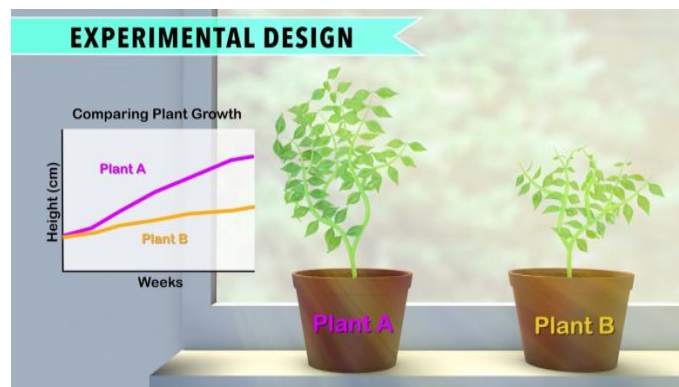


Fig.5. Experimental research design

Diagnostic research design

Imagine being a teacher in a new classroom. You begin teaching a lesson only to be met with stares of confusion from your students. When you ask the students if they understand what you are teaching, they reply that they have no idea what you're talking about. Now imagine teaching that same class after conducting a pretest to determine what the students already know about the topic.

Which scenario sounds preferable?

Which would result in a better experience for both the teacher and the students?

Diagnostic assessment

Diagnostic research is one of the research design types that aims to examine the underlying cause of a certain situation or phenomenon. It can help you find out more about the factors that lead to specific issues or challenges your students might be.

Explanatory research design

Again, the name is self-explanatory. Explanatory research design is used to further expand, explore, and explain the researcher's ideas and theories. This type of research design is used to elaborate on the unexplored aspects of a particular topic and try to explain the missing pieces

Case Study Design

A case study is an in-depth study of a particular research problem rather than a sweeping statistical survey or comprehensive comparative inquiry. It is often used to narrow down a very broad field of research into one or a few easily researchable examples.

Cohort Design

Often used in the medical sciences, but also found in the applied social sciences, a cohort study generally refers to a study conducted over a period of time involving members of a population which the subject or representative member comes from, and who are united by some commonality or similarity. Using a quantitative framework, a cohort study makes note of statistical occurrence within a specialized subgroup

Exploratory Design

An exploratory design is conducted about a research problem when there are few or no earlier studies to refer to or rely upon to predict an outcome

The research design refers to the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring you will effectively address the research problem; it constitutes the blueprint for the collection, measurement, and analysis of data

5. Characteristics of research design

A good research design often possesses the qualities of being flexible, suitable, efficient, and economical and so on.

A research design which minimizes bias and maximizes the reliability of the data collected and analyzed is considered a good design (Kothari 1988).

A research design which does not allow even the smallest experimental error is said to be the best design for investigation.

Further, a research design that yields maximum information and provides an opportunity of viewing the various dimensions of a research problem is considered to be the most appropriate and efficient design.

6. Scientific Research process

Developing and Testing Hypothesis

- Making a Formal Statement
- Verifying whether the hypothesis is valid or not
- Selection of a Random Sample And Computing An Appropriate Value
- Calculation of the Probability
- Comparison of the Probability
- Comparing the Probability
- Make a comparison of the probability calculated with the specified values.

If the probability works out to be equal to or smaller -tailed test, then the null hypothesis is to be rejected.

In case the null hypothesis H_0 is rejected, the researcher runs the risk of committing the Type I error.

On the other hand, if the calculated probability is greater, then the null hypothesis is to be accepted.

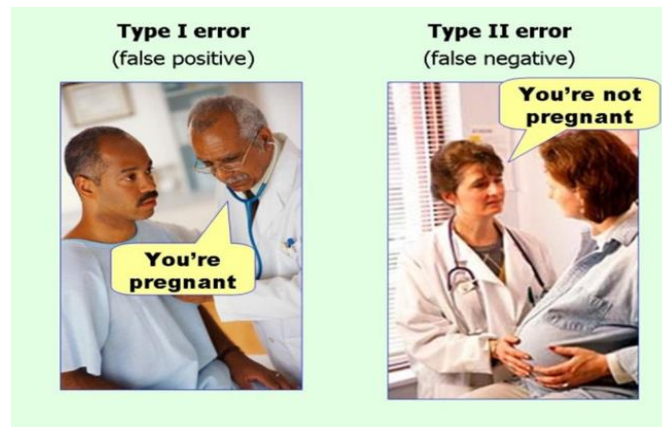


Fig.6 Type I nad Type II Error

Type I

A type I error occurs during hypothesis testing when a null hypothesis is rejected, even though it is accurate and should not be rejected.

The null hypothesis assumes no cause and effect relationship between the tested item and the stimuli applied during the test.

A type I error is "false positive" leading to an incorrect rejection of the null hypothesis. A type I error rejects an idea that should not have been rejected.

TYPE II

A type II error is a statistical term referring to the acceptance (non-rejection) of a false null hypothesis.

A type II error produces a false negative, also known as an error of omission.

For example, a test for a disease may report a negative result, when the patient is, in fact, infected.

This is a type II error because we accept the conclusion of the test as negative even though it is incorrect.



Fig. 7 Scientific process: Steps involved in research process

6. Selecting a sample

The accuracy of your findings largely depends upon the way you select your sample. There are three categories of sampling design

1. random/probability sampling designs,
2. non-random/non-probability sampling designs
3. 'mixed' sampling design.

The act, process, or technique of selecting a representative part of a population for the purpose of determining parameters of the whole population as in Fig.8



Fig.8 Sampling process

Sample: A small group from a population is supposed to carry all the characteristics of the population or which represent the whole population.

Sample frame: It is the list of all the sample units which are considered as a sample of a population.

Sample unit: The individual member of the sample frame is called the sample unit. . Simple random sampling (SRS) – The most commonly used method of selecting a probability sample. In line with the definition of randomisation, whereby each element in the population is given an equal and independent chance of selection.

To illustrate, let us again take our example of the class. There are 80 students in the class, and so the first step is to identify each student by a number from 1 to 80. Suppose you decide to select a sample of 20 using the simple random sampling technique. Use the fishbowl draw, the table for random numbers or a computer program to select the 20 students. These 20 students become the basis of your enquiry.

Stratified random sampling – As discussed, the accuracy of your estimate largely depends on the extent of variability or heterogeneity of the study population with respect to the characteristics that have a strong correlation with what you are trying to ascertain (Principle 3). It follows, therefore, that if the heterogeneity in the population can be reduced by some means for a given sample size you can achieve greater accuracy in your estimate. Stratified random sampling is based upon this logic.

In stratified random sampling the researcher attempts to stratify the population in such a way that the population within a stratum is homogeneous with respect to the characteristic on the basis of which it is being stratified. It is important that the characteristics chosen as the basis of stratification are clearly identifiable in the study population.

For example, it is much easier to stratify a population on the basis of gender than on the basis of age, income or attitude. It is also important for the characteristic that becomes the basis of stratification to be related to the main variable that you are exploring. Once the sampling population has been separated into nonoverlapping groups, you select the required number of elements from each stratum, using the simple random sampling technique. There are two types of stratified sampling: proportionate stratified sampling and disproportionate stratified sampling. With proportionate stratified sampling, the number of elements from each stratum in relation to its proportion in the total population is selected, whereas in disproportionate stratified sampling, consideration is not given to the size. Cluster sampling – Simple random and stratified sampling techniques are based on a researcher's ability to identify each element in a population. It is easy to do this if the total sampling population is small, but if the population is large, as in the case of a city, state or country, it becomes difficult and expensive to identify each sampling unit. In such cases the use of cluster sampling is more appropriate.

Cluster sampling is based on the ability of the researcher to divide the sampling population into groups (based upon visible or easily identifiable characteristics), called clusters, and then to select elements within each cluster, using the SRS technique. Clusters can be formed on the basis of geographical proximity or a common characteristic that has a correlation with the main variable of the study (as in stratified sampling).

Non-random/non-probability sampling designs in quantitative research

Non-probability sampling designs do not follow the theory of probability in the choice of elements from the sampling population. Non-probability sampling designs are used when the number of elements in a population is either unknown or cannot be individually identified. In such situations the selection of elements is dependent upon other considerations. There are five commonly used non-random designs, each based on a different consideration, which are commonly used in both qualitative and quantitative research.

These are:

1. quota sampling;
2. accidental sampling;
3. judgemental sampling or purposive sampling;
4. expert sampling;
5. snowball sampling.

What differentiates these designs being treated as quantitative or qualitative is the predetermined sample size. In quantitative research you use these designs to select a predetermined number of cases (sample size), whereas in qualitative research you do not decide the number of respondents in advance but continue to select additional cases till you reach the data saturation point. In addition, in qualitative research, you will predominantly use judgemental and accidental sampling strategies to select your respondents. Expert sampling is very similar to judgemental sampling except that in expert sampling the sampling population comprises experts in the field of enquiry. You can also use quota and snowball sampling in qualitative research but without having a predetermined number of cases in mind (sample size).

Quota sampling

The main consideration directing quota sampling is the researcher's ease of access to the sample

population. In addition to convenience, you are guided by some visible characteristic, such as gender or race, of the study population that is of interest to you. The sample is selected from a location convenient to you as a researcher, and whenever a person with this visible relevant characteristic is seen that person is asked to participate in the study. The process continues until you have been able to contact the required number of respondents (quota).

Let us suppose that you want to select a sample of 20 male students in order to find out the average age of the male students in your class. You decide to stand at the entrance to the classroom, as this is convenient, and whenever a male student enters the classroom, you ask his age. This process continues until you have asked 20 students their age. Alternatively, you might want to find out about the attitudes of Aboriginal and Torres Strait Islander students towards the facilities provided to them in your university. You might stand at a convenient location and, whenever you see such a student, collect the required information through whatever method of data collection (such as interviewing, questionnaire) you have adopted for the study.

The advantages of using this design are: it is the least expensive way of selecting a sample; you do not need any information, such as a sampling frame, the total number of elements, their location, or other information about the sampling population; and it guarantees the inclusion of the type of people you need. The disadvantages are: as the resulting sample is not a probability one, the findings cannot be generalised to the total sampling population; and the most accessible individuals might have characteristics that are unique to them and hence might not be truly representative of the total sampling population. You can make your sample more representative of your study population by selecting it from various locations where people of interest to you are likely to be available.

7. The Research Process: Characteristics and Requirements- levels.

These levels constitute the different stages (single, double or multiple) of clustering, which will be explained later of the stratum.

CHARACTERISTICS OF RESEARCH:

Research is a process of collecting, analyzing and interpreting information to answer questions. But to qualify as research, the process must have certain characteristics: it must, as far as possible, be systematic, controlled, rigorous, valid and verifiable, empirical and critical.

Systematic-this implies that the procedure adopted to undertake an investigation follow a certain logical sequence. The different steps cannot be taken in a haphazard way. Some procedures must follow others.

Controlled- in real life there are many factors that affect an outcome. The concept of control implies that, in exploring causality in relation to two variables (factors), we set up our study in a way that minimizes the effects of other factors affecting the relationship. This can be achieved to a large extent in the physical sciences (cooking, baking), as most of the research is done in a laboratory. However, in the social sciences (Hospitality and Tourism) it is extremely difficult as research is carried out on issues related to human beings living in society, where such controls are not possible. Therefore in Hospitality and Tourism, as you cannot control external factors, you attempt to quantify their impact.

Rigorous-you must be careful in ensuring that the procedures followed to find answers to questions are relevant, appropriate and justified. Again, the degree of Materials & Methods rigor varies markedly between the physical and social sciences and within the social sciences.

Valid and verifiable-this concept implies that whatever we conclude on the basis of our findings is correct and can be verified by us and others.

Empirical-this means that any conclusion drawn are based upon hard evidence gathered from information collected from real life experiences or observations.

Critical-critical scrutiny of the procedures used and the methods employed is crucial to a research enquiry. The process of investigation must be foolproof and free from drawbacks. The process adopted and the procedures used must be able to withstand critical scrutiny.

Processing and displaying data

The way you analyse the information you collected largely depends upon two things:

The type of information (descriptive, quantitative, qualitative or attitudinal);

The way you want to communicate

If your study is purely descriptive, you can write your dissertation/report on the basis of your field notes, manually analyse the contents of your notes (content analysis), or use a computer program.

If you want quantitative analysis, it is also necessary to decide upon the type of analysis required (i.e. frequency distribution, cross-tabulations or other statistical procedures, such as regression analysis, factor analysis and analysis of variance) and how it should be presented our findings to your readers

Irrespective of the method of data collection, the information collected is called raw data or simply data. The first step in processing your data is to ensure that the data is 'clean' – that is, free from inconsistencies and incompleteness. This process of 'cleaning' is called editing.

Editing consists of scrutinising the completed research instruments to identify and minimise, as far as possible, errors, incompleteness, misclassification and gaps in the information obtained from the respondents.

Sometimes even the best investigators can:

- forget to ask a question;
- forget to record a response;
- wrongly classify a response;
- write only half a response;
- write illegibly

Irrespective of the method of data collection, qualitative or quantitative, the information is called 'raw data' or simply 'data'. The processing of data includes all operations undertaken from when a set of data is collected until it is ready to be analysed either manually or by a computer. Data

processing in quantitative studies starts with data editing, which is basically ‘cleaning’ your data. This is followed by the coding of data, which entails developing a code book, pre-testing it, coding per se and verifying the coded data. In this chapter we have provided a prototype for developing a code book, detailing descriptions of how to develop codes for open-ended and closed questions, and a step-by-step guide to coding data, taking an example from a survey.

Computers primarily help by saving labour associated with analysing data manually. Their application in handling complicated statistical and mathematical procedures, word processing, displaying and graphic presentation of the analysed data saves time and increase speed. Statistics are desirable but not essential for a study. The extent of their application depends upon the purpose of the study. Statistics primarily help you to make sense of data, ‘read’ the data, explore relationships and the interdependence between variables, ascertain the magnitude of an existing relationship or interdependence and place confidence in your findings.

8. Research Report Writing

Writing the report is the last and, for many, the most difficult step of the research process.

This report informs the world what you have done, what you have discovered and what conclusions you have drawn from your findings.

If you are clear about the whole process, you will also be clear about the way you want to write your report.

Your report should be written in an academic style and be divided into different chapters and/or sections based upon the main themes of your study

A research proposal must tell you, your research supervisor and a reviewer the following information

- 1 about your study:
- 2 what you are proposing to do;
- 3 how you plan to proceed;
- 4 why you selected the proposed strategy.
- 5 Therefore it should contain the following information about your study
- 6 a statement of the objectives of the study;
- 7 a list of hypotheses, if you are testing any;
- 8 the study design you are proposing to use;
- 9 the setting for your study;
- 10 the research instrument(s) you are planning to use;
- 11 information on sample size and sampling design;
- 12 information on data processing procedures;
- 13 an outline of the proposed chapters for the report;
- 14 the study’s problems and limitations; and
- 15 the proposed time-frame.

A research proposal is an overall plan, scheme, structure and strategy designed to obtain answers to the research questions or problems that constitute your research project. A research proposal should outline the various tasks you plan to undertake to fulfil your research objectives, test hypotheses (if any) or obtain answers to your research questions. It should also state your reasons for undertaking the study.

Broadly, a research proposal's main function is to detail the operational plan for obtaining answers to your research questions. In doing so it ensures and reassures the reader of the validity of the methodology for obtaining answers to your research questions accurately and objectively. In order to achieve this function, a research proposal must tell you, your research supervisor and reviewers the following information about your study: what you are proposing to do; how you plan to find answers to what you are proposing; why you selected the proposed strategies of investigation.

Applied research has wide application in many disciplines.

Increase understanding in one's own profession and to advance the professional knowledge base. Directly or indirectly provide a service, such as health (nursing, occupational therapy, physiotherapy, community health, health promotion and public health), education, psychology or social work, the application of research can be viewed from four different perspectives:

1. service provider
2. service administrator, manager and/or planner
3. service consumer
4. professional

9. Basic Principles of Experimental Techniques

Replication: This is the principle of an experimental design.

It is a repetition of the basic experiment. In all experiments, some variation exists because the experimental units, such as, individuals or plots of land, cannot be physically identical. This variation is removable by using a number of experimental units. Therefore, the basic experiment is performed repeatedly.

Researchers repeat the same studies on different research participants to see if they produce the same statistically significant results each time.

A replicate is an individual repetition. Its number, shape, and size are influenced by the nature of the experimental material.

Replication helps in: obtaining an accurate estimate of the experimental error; decreasing the experimental error, thereby increasing precision; and obtaining a more precise estimate of the mean treatment effect.

The Principle of Randomization: When we conduct an experiment, the principle of randomization provides us a protection against the effects of extraneous factors. This means that this principle indicates that the researcher should design or plan the experiment in such a way that the variations caused by extraneous factors can all be combined under the general heading of 'chance'.

For example, when a researcher grows one variety of wheat, say, in the first half of the parts of a field and the other variety he grows in the other half, then it is just possible that the soil fertility may be different in the first half in comparison to the other half. If this is so the researcher's result is not realistic.

In this situation, he may assign the variety of wheat to be grown in different parts of the field on the basis of some random sampling technique i.e., he may apply randomization principle and protect himself against the effects of the extraneous factors.

Therefore, by using the principle of randomization, he can draw a better estimate of the experimental error.

Local Control: Randomization and Replication do not remove all extraneous sources of variation. A more refined experimental technique is required for that. A design should be chosen such that all the extraneous sources of variation come under control.

For this purpose, local control, which refers to the amount of balancing, blocking and grouping of the experimental units, is used.

Balancing implies that the treatments should be assigned to the experimental units such that the result is a balanced arrangement of treatments.

Blocking means that, similar experimental units should be collected together to form a relatively homogeneous group.

The main purpose of local control is to increase the efficiency of an experimental design by minimizing the experimental error.

In this case, local control should not be confused with the word control.

Control in experimental design is used for a treatment. It does not receive any treatment, but the effectiveness of other treatments should be found through comparison

10. TEAM RESEARCH

Team research is the source of some of the great breakthroughs of all time, such as the 1947 invention of the transistor, which took the complementary skills of applied researcher Walter Brattain, quantum theory researcher John Bardeen and solid-state physicist William Shockley. And today, despite the expediency of individual work, researchers are moving strongly and clearly in favor of teamwork because of its often strong advantages

Teams are often helpful in tackling complex and important problems. They often produce better work because they take on more ambitious projects, bring complementary knowledge and apply diverse research methods. Teams also have larger social networks than individuals do to collect input during research and disseminate results as they emerge. In addition, in the best situations, teamwork promotes not only timely but also high-quality work, as people in the team have a strong incentive to demonstrate excellence to their partners.

You should rely on technology to facilitate collaboration at a distance and help to bring team members closer together regularly to describe progress, share problems, exchange ideas and forge agreements about future plans. Meetings by phone, Skype or video conference can help groups of three to 30 to coordinate their activities, learn from each other and build trust. For larger groups, web conferencing tools like WebEx or GoToMeeting support presentations and

discussions, while wikis, blogs and deliberation systems provide durable records of substantive discussions including documents, links, data sets, videos and more.

An increasing number of journals now require teams to spell out the different roles that various people have played at the end of the published paper. Your team should discuss authorship order early in the project to ensure that expectations are clear to all. In fact, disagreement about credit for ideas is one of the major reasons for research groups to break up. On one occasion we resolved a strong disagreement about author order by pushing the research farther to develop the ideas into two strong papers.

In summary, teamwork in the small and the large can be difficult, but when done well it can be astonishingly productive, satisfying and even fun. And the bottom line is that perseverance and resilience in the face of difficulties is just as important for teamwork as it is for individual work.

11. LITERATURE REVIEW

HOW CAN WE FIND LITERATURE?

1. Request learned professors, librarians, or other familiar to suggest relevant references.
2. Find out whether any bibliography already prepared on the subject is available in the library.
3. Consult bibliographies in the these on the topic & related topics.
4. Examine periodicals, monographies, reports, conference proceedings & other materials including micro films available
5. Consult reference cited in the books & articles already located. Each book will be a means for locating additional references.
6. Consult the abstract journal on the subject
7. See the book review pages in the daily newspapers & in the journals.

Sources of Literature

Sources of literature can be divided into 3 :

1. Primary literature sources
2. Secondary literature sources
3. Tertiary literature sources

The different categories of literature sources represent the flow of information from original source.

Primary literature sources

Primary literature sources are the first occurrence of a piece of work.

It includes:

1. Reports

Reports include market research reports, government reports etc.

2. Conference proceedings

Conference proceedings referred to any symposia are often published as unique titles with in journals, or as books. Most conference will have a very specific theme.

3. These are the research papers contains details of research done in a particular topic. It is a good source of detailed information & further reference.

Secondary Literature sources

Secondary sources such as books & journals are subsequent Publication of primary literature. These publications are aimed at wider audience.

It includes:

1. Journals

Journals are also known as periodicals, magazines are published on a regular basis.eg.journal of management studies, people management etc.

2. Books

Books are written for specific audiences.the material in books are presented in a more ordered and accessible manner than in journals.

3. News papers

Newspapers are good source of topical events, developments within the business &government as well as recent statistical information..

Tertiary literature sources

Tertiary literature sources also called as “search tools” are designed either to help to locate primary & secondary literature or to introduce a topic.

They include indexes & abstracts as well as encyclopedias & bibliographies.

E.g.: subject catalogues of libraries

List of books and publishers bulletins

Recording of bibliographic information

1. for a book

Two formats are used in popular. They are as below

(a)Authors name (starting with last name) , the title of book, place of publication: the publisher's name, year.

E.g.:

Krishna swami, or, methodology of research in social science, Mumbai: Himalaya publishing house, 1993

(b) Authors name (starting with last name) , the title of book, the publisher's name, place, year.

E.g.:

Krishnaswami, o.r, methodology of research in If a work has 3 or more authors, the abbreviation “et al” meaning

„and others“ may be used after the first author.

E.g..

Koontz, harold, et al., management, new Delhi McGraw hill international book comany, 1980

If publication is an edited one ,use the abbreviation “ed” after the name.

2. For articles

Here also 2 forms are used.

(a) Authors name ,”the title of article", the journal name, place. publishers name, vol, issue no., date, pages

(b) Authors name ,”the title of article", the journal name, publishers name, place, vol, issue no., data, pages social science , Himalaya publishing house, Mumbai, 1993

LITERATURE REVIEW IS ESSENTIAL TO UNDERSTAND WHAT HAS ALREADY BEEN DONE IN THE SPECIFIC TOPIC.

ITS HELP TO UNDERSTAND THE BACKGROUND OF THE SPECIFIC TOPIC WHICH RESEARCHER INTENDS TO RESEARCH, METHODOLOGY OF RESEARCH DONE BY PREVIOUS RESEARCHERS, AND RESEARCH GAP.

12. ETHICS IN RESEARCH

This is the most common way of defining "ethics": norms for conduct that distinguish between acceptable and unacceptable behavior.

When most people think of ethics (or morals), they think of rules for distinguishing between right and wrong, such as the

Golden Rule ("Do unto others as you would have them do unto you"),

A code of professional conduct like the Hippocratic Oath ("First of all, do no harm"),

A religious creed like the Ten Commandments ("Thou Shalt not kill..."), or

A wise aphorisms like the sayings of Confucius.

Ethics-

It includes study of universal values such as the essential equality of all men and women, human or natural rights, obedience to the law of land, concern for health and safety and, for the natural environment. One may also define ethics as a method, procedure, or perspective for deciding how to act and for analyzing complex problems and issues.

Research Ethics is defined here to be the ethics of the planning, conduct, and reporting of research.

Other ethical challenges are rooted in many dimensions of research, including the: Collection, use, and interpretation of research data

Methods for reporting and reviewing research plans or findings

Relationships among researchers with one another

Means for responding to misunderstandings, disputes, or misconduct

Foster of research that protects the interests of the public, the subjects of research, and the researchers themselves.

It is clear that research ethics should include: Protections of human and animal subjects.

First, norms promote the aims of research, such as knowledge, truth, and avoidance of error.

For example, prohibitions against fabricating, falsifying, or misrepresenting research data promote the truth and avoid error.

Second, since research often involves a great deal of cooperation and coordination among many different people in different disciplines and institutions, ethical standards promote the values that are essential to collaborative work, such as trust, accountability, mutual respect, and fairness.

For example, many ethical norms in research, such as guidelines for authorship, copyright and patenting policies, data sharing policies, and confidentiality rules in peer review, are designed to protect intellectual property interests while encouraging collaboration.

Most researchers want to receive credit for their contributions and do not want to have their ideas stolen or disclosed prematurely

Third, many of the ethical norms help to ensure that researchers can be held accountable to the public.

For instance, federal policies on research misconduct, conflicts of interest, the human subjects protections, and animal care and use are necessary in order to make sure that researchers who are funded by public money can be held accountable to the public.

Fourth, ethical norms in research also help to build public support for research.

People more likely to fund research project if they can trust the quality and integrity of research

Finally, many of the norms of research promote a variety of other important moral and social values, such as social responsibility, human rights, animal welfare, compliance with the law, and health and safety.

Ethical lapses in research can significantly harm human and animal subjects, students, and the public.

For example, a researcher who fabricates data in a clinical trial may harm or even kill patients, and a researcher who fails to abide by regulations and guidelines relating to radiation or biological safety may jeopardize his health and safety or the health and safety of staff and students

Codes and Policies for research ethics

The following is a rough and general summary of some ethical principals that various codes address:

Honesty

Strive for honesty in all scientific communications. Honestly report data, results, methods and procedures, and publication status. Do not fabricate, falsify, or misrepresent data. Do not deceive colleagues, granting agencies, or the public.

Objectivity

Strive to avoid bias in experimental design, data analysis, data interpretation, peer review, personnel decisions, grant writing, expert testimony, and other aspects of research where objectivity is expected or required. Avoid or minimize bias or self-deception. Disclose personal or financial interests that may affect research.

Integrity

Keep your promises and agreements; act with sincerity; strive for consistency of thought and action

Carefulness

Avoid careless errors and negligence; carefully and critically examine your own work and the work of your peers. Keep good records of research activities, such as data collection, research design, and correspondence with agencies or journals.

Openness

Share data, results, ideas, tools, resources. Be open to criticism and new ideas.

Respect for Intellectual Property

Honor patents, copyrights, and other forms of intellectual property. Do not use unpublished data, methods, or results without permission. Give credit where credit is due. Give proper acknowledgement or credit for all contributions to research. Never plagiarise.

Confidentiality

Protect confidential communications, such as papers or grants submitted for publication, personnel records, trade or military secrets, and patient records.

Responsible Publication

Publish in order to advance research and scholarship, not to advance just your own career. Avoid wasteful and duplicative publication.

Responsible Mentoring

Help to educate, mentor, and advise students. Promote their welfare and allow them to make their own decisions

Respect for colleagues

Respect your colleagues and treat them fairly.

Social Responsibility

Strive to promote social good and prevent or mitigate social harms through research, public education, and advocacy.

Non-Discrimination

Avoid discrimination against colleagues or students on the basis of sex, race, ethnicity, or other factors that are not related to their scientific competence and integrity.

13. ETHICAL DEVIATIONS

Publishing the same paper in two different journals without telling the Editors

- ☐ Submitting the same paper to different journals without telling the editors
- ☐ Not informing a collaborator of your intent to file a patent in order to make sure that you are the sole inventor
- ☐ Including a colleague as an author on a paper in return for a favor even though the colleague did not make a serious contribution to the paper
- ☐ Discussing with your colleagues confidential data from a paper that you are reviewing for a journal

- ☐ Trimming outliers from a data set without discussing your reasons in the paper Using an inappropriate statistical technique in order to enhance the significance of your research
- ☐ Bypassing the peer review process and announcing your results through a press conference without giving peers adequate information to review your work
- ☐ Conducting a review of the literature that fails to acknowledge the contributions of other people in the field or relevant prior work
- ☐ Stretching the truth on a grant application in order to convince reviewers that your project will make a significant contribution to the field.

Stretching the truth on a job application or curriculum vita

- ☐ Giving the same research project to two graduate students in order to see who can do it the fastest

Overworking, neglecting, or exploiting graduate or post-doctoral students

- ☐ Failing to keep good research records
- ☐ Failing to maintain research data for a reasonable period of time
- ☐ Making derogatory comments and personal attacks in your review

of author's submission

- ☐ Promising a student a better grade for sexual favors
- ☐ Using a racist epithet in the laboratory
- ☐ Making significant deviations from the research protocol approved by your institution's Animal Care and Use Committee or Institutional Review Board for Human Subjects Research without telling the committee or the board

Not reporting an adverse event in a human research experiment

- ☐ Wasting animals in research
- ☐ Exposing students and staff to biological risks in violation of your institution's bio-safety rules

- ☐ Rejecting a manuscript for publication without even reading it
- ☐ Sabotaging someone's work
- ☐ Stealing supplies, books, or data

- ☐ Rigging an experiment so you know how it will turn out
- ☐ Making unauthorized copies of data, papers, or computer programs
- ☐ Owning over \$10,000 in stock in a company that sponsors your research and not disclosing this financial interest
- ☐ Deliberately overestimating the clinical significance of a new drug in order to obtain economic benefits



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SCHOOL OF SCIENCE AND HUMANITIES

DEPARTMENT OF PHYSICS

UNIT – II - Data Analysis, Statistical Modeling and Error Evaluation – SPHA5305

1. Introduction

Precision is a measurement of the repeatability, or consistency, of a measurement. It is possible to have a very precise measurement without scatter (or noise) that is repeatable and would be considered precise (repeatable), however, it can be inaccurate because of an instrument error. Several measurement provide answer very close to each other is known as precision.

Since the measured values are very close to each other, then the measurements are said to be precise.

Example: Let us consider a weight measuring instrument which measures the weight of steel cube. Exact weight of the steel cube is 50 kg.

The instrument shows the weight of the cube as 47.819 kg, 47.823 kg, 47.835 kg and 47.847 kg.

From the above observations, we can conclude that the instrument has some precision since it almost reproduces same output value 47.8 kg. But the instrument does not have accuracy since the measured values are not close to the actual weight 50 kg.

ACCURACY

Accuracy is defined as the extent upto which a given measurement agrees with the standard value for that measurement.

The degree to which several measurement provide answer very close to each other is known as precision. In other words, precision reflects the quality of measuring instrument as in Fig 1.

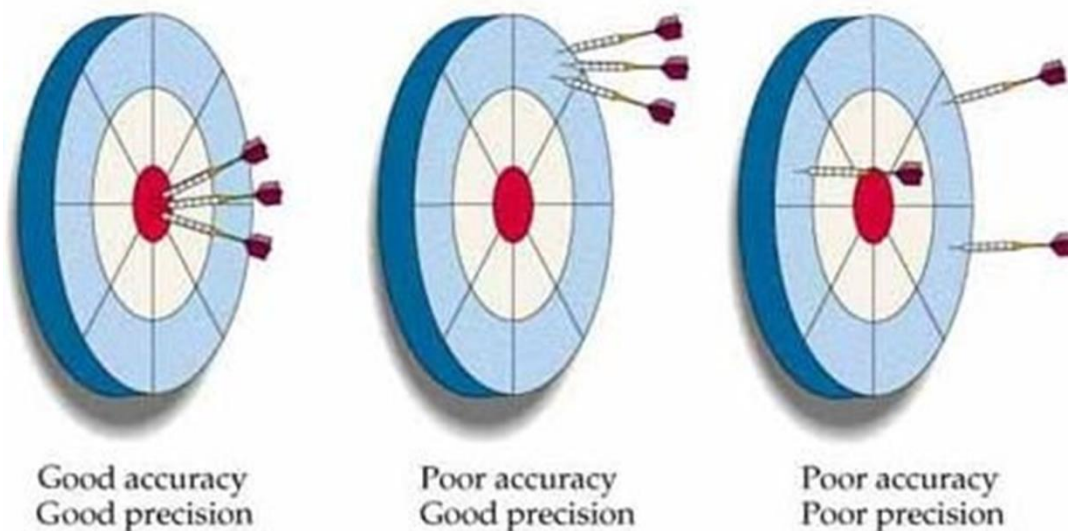


Fig 1. Precision and Accuracy

Errors in Measurement

Absolute error

Definition:

The magnitude of the difference between mean value and each individual value is called absolute error.

Example:

The diameter of a wire as measured by a screw gauge as in Fig 2 was found to be 1.002 cm, 1.004 cm and 1.006 cm. The absolute error in the readings will be:

Solution:

$$\begin{aligned}\text{Mean} &= \frac{1.002 + 1.004 + 1.006}{3} \\ &= 1.004 \text{ cm}\end{aligned}$$

Hence, absolute errors

$$\Delta a_1 = 1.002 - 1.004 = -0.002 \text{ cm}$$

$$\Delta a_2 = 1.004 - 1.004 = 0.000 \text{ cm}$$

$$\Delta a_3 = 1.006 - 1.004 = 0.002 \text{ cm}$$

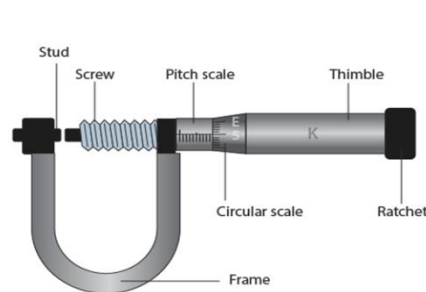


Fig 2. Screw Gauge The period of oscillation of a simple pendulum in the experiment is recorded as 2.63s, 2.56s, 2.42s, 2.71s and 2.80s. Find the average absolute error.

Answer

Average value

$$= \frac{2.63 + 2.56 + 2.42 + 2.71 + 2.80}{5} = 2.62 \text{ s}$$

Now $|\Delta T1| = 2.63 - 2.62 = 0.01$

$|\Delta T2| = 2.62 - 2.56 = 0.06$

$|\Delta T3| = 2.62 - 2.42 = 0.20$

$|\Delta T4| = 2.71 - 2.62 = 0.09$

$|\Delta T5| = 2.80 - 2.62 = 0.18$

Mean absolute error

$\Delta T = 5(|\Delta T1| + |\Delta T2| + |\Delta T3| + |\Delta T4| + |\Delta T5|) = 5(0.54) = 0.108 = 0.11s$

Systematic errors usually result from equipment that isn't correctly calibrated. Every measurement you take will be wrong by the same amount because there is a problem with your measuring device.

Random errors are unavoidable and result from difficulties taking measurements or attempting to measure quantities that vary with time. These errors will fluctuate but generally cluster around the true value.

2. Measure of Central Tendencies

MEAN

The mean is the most common estimator of central tendency. It is not a robust estimator, however, because an extreme value—one much larger or much smaller than the remainder of the data—strongly influences the mean's value.

What is the mean for the data

Masses of Seven Circulating U. S. Pennies

Mass (g)

3.080

3.094

3.107

3.056

3.112

3.174

3.198

Solution

To calculate the mean we add together the results for all measurements

$$3.080 + 3.094 + 3.107 + 3.056 + 3.112 + 3.174 + 3.198 = 21.821 \text{ g}$$

and divide by the number of measurements

$$X = 21.82173117 \text{ g} / 7$$

$$X = 3.2739 \text{ g}$$

STANDARD DEVIATION

- **The standard deviation is the most useful and most popular measure of dispersion.**
- **The standard deviation is defined as the positive square root of the arithmetic mean of the square of the deviations of given observations from their arithmetic mean.**
- **The standard deviation is denoted by ‘ σ ’.**

Standard Deviation

What is the standard deviation for the following set of data?

15, 15, 15, 14, 16

The process is as follows:

- Find the mean: $15+15+15+14+16=755=15$**
- Subtract the mean from each of the data points:**

$$15-15$$

$$15-15$$

$$15-15$$

$$14-15$$

$$16-15$$

iii. Square the result:

iv. Add the results up:

$$0+0+0+1+1=2$$

v. Divide by the number of data points less one.

$$\text{Therefore } 2/(5-1) = 2/4 = 0.5$$

vi. Square root the result:

$$\sqrt{0.5}=0.707$$

Answer:

The standard deviation for the above data = 0.707

That is 68% of all the data is within 0.707 of 15.

What is the standard deviation for the following set of data?

2, 7, 14, 22, 30.

The process is as follows:

i. Find the mean: $2+7+14+22+30=75 \div 5=15$

ii. Subtract the mean from each of the data points:

$$2-15, 7-15, 14-15, 22-15, 30-15$$

iii. Square the result:

$$-13 \times -13 = 169$$

$$-8 \times -8 = 64$$

$$-1 \times -1 = 1$$

$$7 \times 7 = 49$$

$$15 \times 15 = 225$$

iv. Add the results up:

$$169+64+1+49+225=508$$

v. Divide by the number of data points less one.

$$508/(5-1)=508/4=127$$

vi. Square root the result:

$$\sqrt{127}=11.3$$

Answer:

The standard deviation for the above set of data = 11.3 ie. $15+11.3=26.3$

$$15-11.3=3.7$$

That is 68% of all the data is within 11.3 of 15.

Standard deviation formula

Standard deviation – measures spread about the mean value.

Standard deviation is useful in comparing sets of data which may have the same mean but different ranges. This formula has been developed so that when standard deviation is quoted everyone understands its meaning.

E.g. compare:

i. 15, 15, 15, 14, 16

ii. 2, 7, 14, 22, 30

i. Mean = $15+15+15+14+16=75/5=15$

ii. Mean = $2+7+14+22+30=75/5=15$

Both have a mean of 15 but ii is more spread out.

To show this spread we use the standard deviation formula:

Standard deviation $= \sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$

Normal distribution or Gaussian Distribution

A bell shaped curve on a graph is symmetrical and has no skew.

The peak of the graph is in the center and the tails either side of the peak are a mirror image of each other.

The mean, median and mode are all in the same position on the graph (right through the center of the peak).

This is an example of an evenly distributed bell curve with the mode going through the center

Consider the following data set.

4; 5; 6; 6; 6; 7; 7; 7; 7; 7; 7; 8; 8; 8; 9; 10

This data set can be represented by following histogram. Each interval has width one, and each value is located in the middle of an interval.

The heights of the bars peak in the middle and taper symmetrically to the right and left.

Mean $= 112/16 = 7$

3.Skewness

When a graph is said to be skewed, this refers to the tail and not the peak of the graph. In a left skewed graph (also known as a negative skew) the mean is to the left of the median, whereas in a right skewed graph (also known as positive skew) the mean is to the right of the median, as can be seen in Fig.3

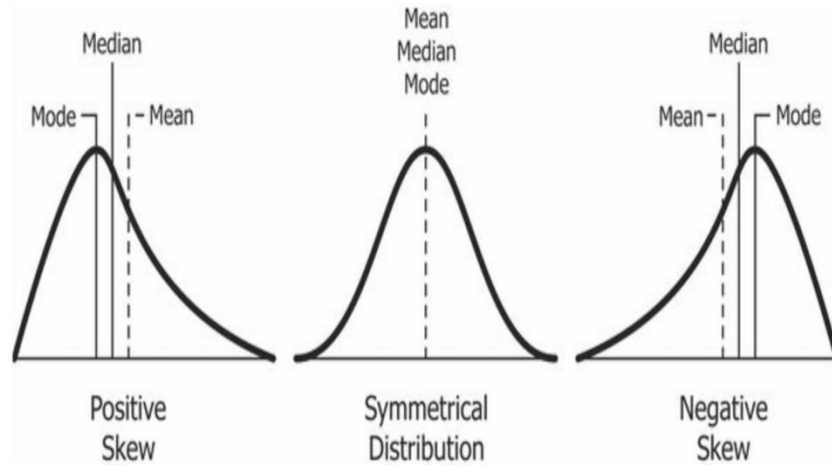


Fig.3 Skewness Definition of Skewness

Skewness is a number that indicates to what extent a variable is asymmetrically distributed.

Skewness refers to distortion or asymmetry in a symmetrical bell curve, or normal distribution, in a set of data.

If the curve is shifted to the left or to the right, it is said to be skewed

Skewness can be quantified as a representation of the extent to which a given distribution varies from a normal distribution.

Symmetry and Skew

The shape of a Histogram, Bar Chart, or Stem and Leaf plot tells us the type of data distribution we have.

If the tallest area (Mode) is in the middle of the Graph, with even reducing on each side of this, the Graph is called Symmetrical.

If the shape of the graph is not like this, and is bunched up on either the left or right side, we say the data is “Skewed”.

Skewed Data results for situations where there are either a lot of measured items that are very small, or a lot of items that are very large.

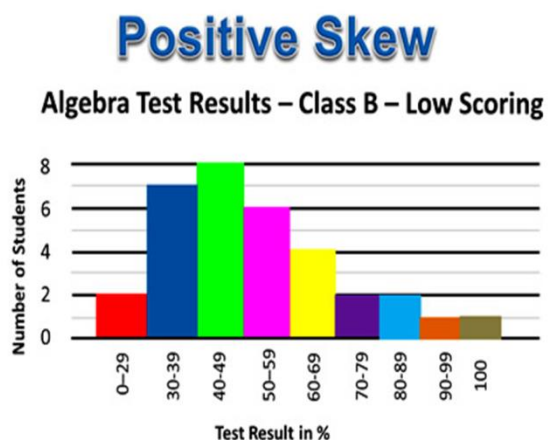
Skewed Graphs with their uneven shape affect the Mean Average Value.

This often means that we should use the Median as our average in these situations, and not use the distorted Mean value.

Positive Skew

The following example demonstrates and shows “Positive Skew”, where a Histogram stretches out to the right.

This particular class of students has not performed well on the Algebra Test, and so we have many low scores with tall bars on the left as in Fig.4



There are a small number of students who have done well, which makes this Graph stretch out horizontally to the right.

Going to the Right is Positive, so it has “Positive Skew”

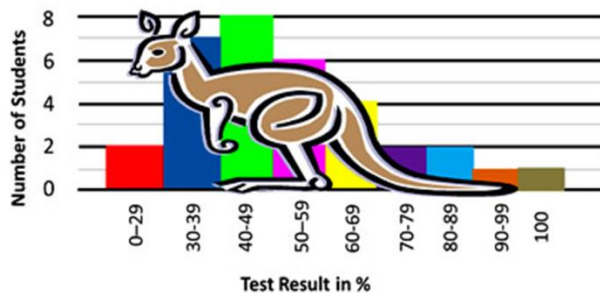
Fig.4 Positive skew

We can think of the shape of the Graph as resembling an Australian Kangaroo, and the direction of the Roo’s tail tells us the direction of the skew.

We call this the “Skew and Kangaroo Rule as in Fig.5

Positive Skew – Kangaroo Tail

Algebra Test Results – Class B – Low Scoring



The Kangaroo fits onto our graph with its tail going to the RIGHT.

Going to the Right is Positive, so it has "Positive Skew"

"Skew and Kangaroo Rule as in Fig.5

Having an uneven skew shape in the Graph also affects the Mean, Median, and Mode.

The Mode is to the left of the middle Median, because the tall bars are all on the left hand side of the graph.

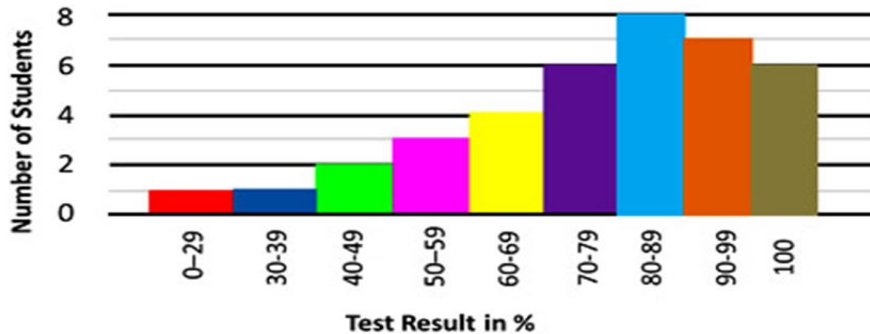
Due to the long tail of high values stretching to the right, the Mean will be dragged to the right of the Median.

Negative Skew

The following example demonstrates and shows "Negative Skew", where a Histogram stretches out to the left. This particular class of students has performed very well on the Algebra Test, and we have many high scores with tall bars on the right as in Fig.6

Negative Skew

Algebra Test Results – Class A – High Scoring



There are a small number of students who have done poorly, which makes this Graph stretch out horizontally to the left.

Going to the Left is Negative, so it has "Negative Skew"

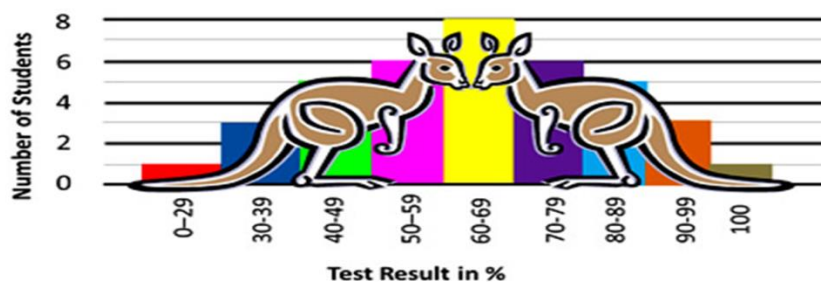
Fig.6 Kangaroo rule

Symmetrical Histogram

If our Histogram is a pyramid type balanced shape, with both sides of the Median pretty much the same shape, then we say it is "Symmetrical". The "Kangaroo Rule" fits onto a symmetrical graph as shown in Fig.7.

Symmetrical

Algebra Test Results – Class C – Normal



Two identical Kangaroos show this graph is a mirror image type shape.

The Graph is "Symmetrical"

87; 87; 87; 87; 87; 88; 89; 89; 90; 91

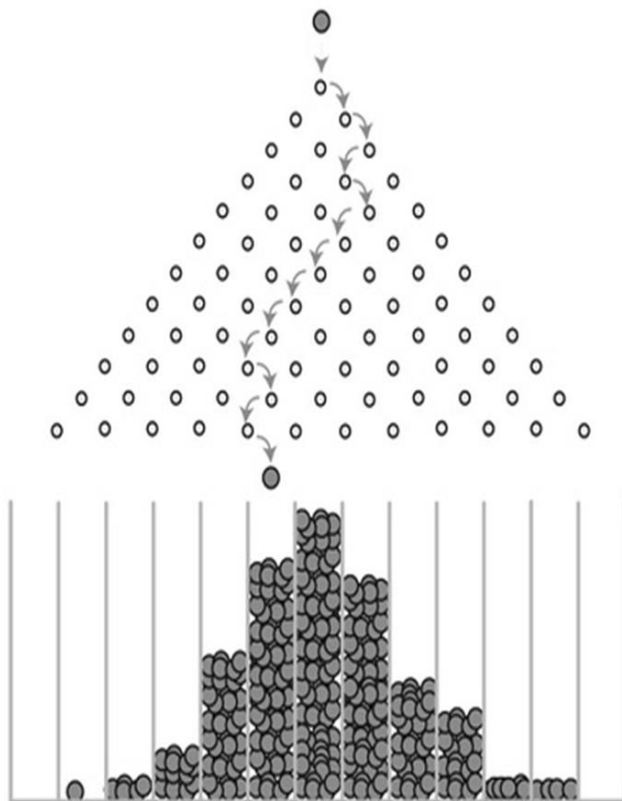
Answer

The data are skewed right. The median is 87.5 and the mean is 88.2. Even though they are close, the mode lies to the left of the middle of the data, and there are many more instances of 87 than any other number, so the data are skewed right.

5. Normal or Gaussian Distribution

In the 19th century, Francis Galton Fig.8 came up with a device called bean machine: an old fashioned pachinko which allows for balls to naturally arrange themselves into the typical Gaussian bell.

This is related with the idea behind the central limit theorem; after a sufficiently large number of independent, well defined trials, results should approximate a Gaussian curve, regardless the underlying distribution of the original experiment.



Example of How to Use a Bell Curve

A bell curve's width is defined by its standard deviation, which is calculated as the level of variation of data in a sample around the mean.

On a bell curve, for example, if 100 test scores are collected and used in a normal probability distribution, 68% of those test scores should fall within one standard deviation above or below the mean.

Moving two standard deviations away from the mean should include 95% of the 100 test scores collected.

Moving three standard deviations away from the mean should represent 99.7% of the scores (see the figure above).

Test scores that are extreme outliers, such as a score of 100 or 0, would be considered long-tail data points that consequently lie squarely outside of the three standard deviation range.

The most important shape in statistics is the shape of a purely random distribution, like that generated by tossing many pennies.

In class exercise: flipping seven pennies.

Student flip seven pennies and record the number of heads. The data for a section is gathered and tabulated.

The students then prepare a relative frequency histogram of the number of heads and calculate the mean number of heads from $\sum x \cdot p(x)$.

Seven Pennies

In the table below, seven pennies are tossed eight hundred and fifty eight times. For each toss of the seven pennies, the number of pennies landing heads up are counted.

# of heads x	Frequency	Rel Freq P(x)
7	1	0.0105
6	7	0.1305
5	21	0.1713
4	35	0.2657
3	35	0.2273

2	21	0.1399
1	7	0.0524
0	1	0.0023
128	1.00	

7. Regression analysis

Regression analysis is a method used in statistics to show a relationship between two different variables, and to describe how well you can predict the behavior of one variable from the behavior of another.

Paired Data and Scatter Diagrams

Best Fit Lines: Linear Regression

Is there a relationship between the time and the distance?

If there is a relationship, then data will fall in a patterned fashion on an xy graph.

If there is no relationship, then there will be no shape to the pattern of the data on a graph.

If the relationship is linear, then the data will fall roughly along a line.

Plotting the above data yields the following graph as in Fig.8.

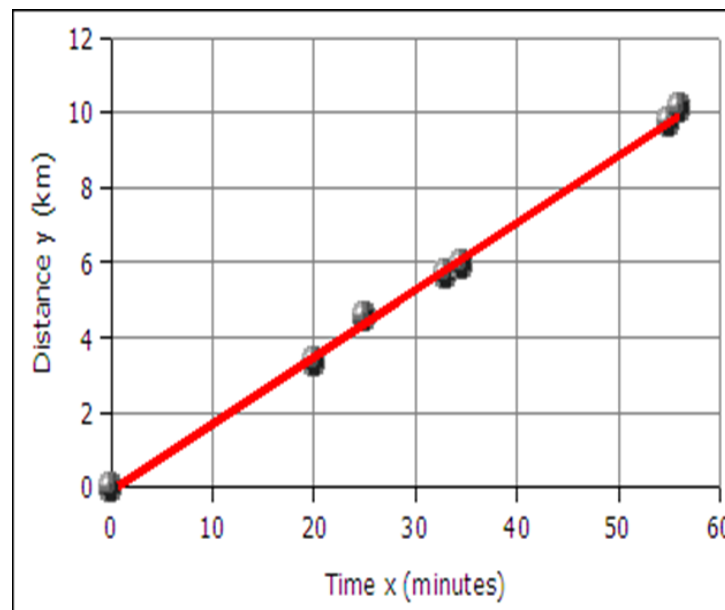


Fig.8 linear regression

The data falls roughly along a line, the relationship appears to linear. If we can find the equation of a line through the data, then we can use the equation to predict how long it will take the runner to cover distances not included in the table above, such as five kilometers. In the next image a best fit line has been added to the graph. The best fit line is also called the least squares line because the mathematical process for determining the line minimizes the square of the vertical displacement of the data points from the line. The process of determining the best fit line is also known linear regression.

The graph of time versus distance for a runner is a line because a runner runs at the same pace kilometer after kilometer.

The first question a statistician would ask is whether there is a relationship between the distance and mean cup data. Determining whether there is a relationship is best seen in an xy scatter graph of the data.

If we plot the points on an xy graph using a spreadsheet, the y-values can be seen to fall with increasing x-value.

The data points, while not all exactly on one line, are not far away from the best fit line.

The best fit line indicates a negative relationship.

The larger the distance, the smaller the mean number of cups consumed.

The following table uses actual data collected from these businesses

Sakau Market	distance/km (x)	mean cups per person (y)
Upon the river	3.0	5.18
Try me first	13.5	3.93
At the bend	14.0	3.19
Falling down	15.5	2.62

Visualizing Poisson distribution

When the value of m or lambda is given

We wish to find the probabilities of doing 0;1;2;3 and 4 sales for a given hour during the day. Say we wish to calculate for the next opening hour

$$p(x) = \frac{\lambda^x e^{-\lambda}}{x!} \Leftrightarrow$$

$$p(0) = \frac{2.1^0 e^{-2.1}}{0!} = 0.122$$

$$p(1) = \frac{2.1^1 e^{-2.1}}{1!} = 0.257$$

$$p(2) = \frac{2.1^2 e^{-2.1}}{2!} = 0.270$$

$$p(3) = \frac{2.1^3 e^{-2.1}}{3!} = 0.189$$

$$p(4) = \frac{2.1^4 e^{-2.1}}{4!} = 0.099$$

8. Spectral analysis

It is an important research tool for deciphering information in various fields of science and technology. Spectral analysis is based on the Fourier theorem which states that any waveform can be decomposed into a sum of sine waves at different frequencies with different amplitudes and different phase relationships. When summed up, these waves reconstitute the original waveform.

This process can convert the data domain to the spectral domain.

Spectral analysis studies the spectral frequency in discrete and uniformly sampled data.

9. F Test

An “F Test” is a catch-all term for any test that uses the F-distribution.

In most cases, when people talk about the F-Test, what they are actually talking about is The F-Test to Compare Two Variances.

However, the f-statistic is used in a variety of tests including regression analysis

Assumptions

Several assumptions are made for the test. Your population must be approximately normally distributed (i.e. fit the shape of a bell curve) in order to use the test. Plus, the samples must be independent events. In addition, you'll want to bear in mind a few important points:

The larger variance should always go in the numerator (the top number) to force the test into a right-tailed test. Right-tailed tests are easier to calculate.

For two-tailed tests, divide alpha by 2 before finding the right critical value.

If you are given standard deviations, they must be squared to get the variances.

If your degrees of freedom aren't listed in the F Table, use the larger critical value. This helps to avoid the possibility of Type I errors.

The F-test of overall significance indicates whether your linear regression model provides a better fit to the data than a model that contains no independent variables.

R-squared tells you how well your model fits the data, and the F-test is related to it.

General Steps for an F Test

- State the null hypothesis and the alternate hypothesis.
- Calculate the F value. ...
- Find the F Statistic (the critical value for this test).
- Compare your calculated value with the table f-value.
- If the f-table value is smaller than the calculated value, you can reject the null hypothesis.
- Support or Reject the Null Hypothesis.

Difference between T and F tests

T - test is used to if the means of two populations are equal (assuming similar variance) whereas F-test is used to test if the variances of two populations are equal.

Step by Step Calculation of an F-test

Below are the steps where the F-Test formula is used to null hypothesis that the variances of two populations are equal:

Step 1: Firstly, frame the null and alternate hypothesis.

The null hypothesis assumes that the variances are equal. $H_0: \sigma_1^2 = \sigma_2^2$. The alternate hypothesis states that the variances are unequal. $H_1: \sigma_1^2 \neq \sigma_2^2$. Here σ_1^2 and σ_2^2 are the symbols for variances.

Step 2: Calculate the test statistic (F distribution). i.e. $= \sigma_1^2 / \sigma_2^2$, Where σ_1^2 is assumed to be larger sample variance and σ_2^2 is the smaller sample variance

Step 3: Calculate the degrees of freedom. Degree of freedom (df1) = $n_1 - 1$ and Degree of freedom (df2) = $n_2 - 1$ where n_1 and n_2 are the sample sizes

Step 4: Look at the F value in the F table.

There are different F Tables for different levels of significance.

Step 5: Compare the F statistic obtained in Step 2 with the critical value obtained in Step 4.

If the F statistic is greater than the critical value at the required level of significance, we reject the null hypothesis.

If the F statistic obtained in Step 2 is less than the critical value at the required level of significance, we cannot reject the null hypothesis.

Relevance and Uses

F-Test formula can be used in a wide variety of settings. F-Test is used to test the hypothesis that the variances of two populations are equal.

Secondly, it is used for testing the hypothesis that the means of given populations that are normally distributed, having the same standard deviation, are equal.

Thirdly, it is used to test the hypothesis that a proposed regression model fits the data well.



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SCHOOL OF SCIENCE AND HUMANITIES

DEPARTMENT OF PHYSICS

UNIT 4 - Presentation of Research Findings – SPHA5305

1. Methods of presentations

The best way to make your presentation memorable is to encourage active participation

Four Methods of Oral Delivery | Excellent Presentations

You have four choices to deliver your oral speech termed as methods of oral delivery. These four methods of oral delivery of presentations are:

- extemporaneous
- reading
- memorization
- impromptu delivery

1. Extemporaneous

Deliver speech with the help of already prepared notes, handouts, or outline.

Most preferred way to audiences and speakers.

Outline may include quotations, comments, and facts and figures to reinforce, support, and strengthen your speech.

It allows more eye contact with the audience and helps you establish direct contact with them.

Frequent presentation will enable you to use fewer notes and feel more confident than a beginner does 2.
Reading

In case of long speeches, it may be necessary to read some parts of your speech text.

There are occasions when you have to convey some critical and complex or technical information, or some official statement.

In that case, you do not want to make mistakes or look absurd by ad-libbing. There you must read it verbatim—word for word.

The good thing with reading method is that there are minimum chances of any mistake—technical, grammatical, or that of pronunciation.

3. Memorization

Works best for those who are novices or beginners in this skill.

They feel stage fright, and feel embarrassed when presenting their ideas before audience.

They memorize the speech before they deliver it. This gives them a sense of command, and courage to face the audience.

But care should be taken that you make your memorized speech look spontaneous and natural.

The flow your ideas should not be speedy and mechanical.

You are able to maintain maximum eye contact with the audience, which means you will be able to maintain maximum eye contact.

But the risk of memorization is forgetting your text.

4. Impromptu

You may be called upon at the last moment to share your opinion or offer your comments.

When you speak “off the cuff”—without preparation—without a prior information that you will speak, you are speaking impromptu.

Most of the times, you have to express your opinions before the audience on the spur of the moment. You are asked to address the gathering without preparation, rehearsal, or thought in advance.

Impromptu way of oral delivery calls for vast knowledge, experience, and practice.

After a lot of practice, and long presentations you are able to speak impromptu.

That means an ordinary speaker is not able to perform excellently if they are asked to make an impromptu speech.

2. Communication to conferences, journals in a prescribed template

Manuscript should be submitted by:

Researchers, faculty members, industrialist and other professionals in engineering & management Science.

Only original, unpublished work is sought.

Any proposal submitted to present identical or substantially similar work either already published or under review for another conference or publication may not be considered.

Abstract

Abstract should be within 250-400 words. English font “Arial” size “12” and Hindi Font “Kruti dev 10” Size=“14”

Submission should

Submission should include a separate title page which clearly indicates the name(s) of the author(s), affiliation(s), complete mailing address(es), telephone/fax numbers and e-mail address(es) and title of the paper.

Authors.

Authors are requested to submit their manuscript in MSWORD (2003/2007) template.

Paper Template

Please find the template for manuscript submission ([template link](#)).

Submit Online

Submit the manuscript online [here](#).

Accepted Paper.

The authors of the accepted papers will be allowed to make a correction in accordance with the suggestions of the reviewers and submit final camera-ready papers within the stipulated deadline.

Copyright Form

The authors are requested to sign the copyright form with final manuscript.

Conference Proceeding

The conference proceedings will be distributed amongst the participants during the conference Structure the paper well, with a clear introduction, body, and conclusion.

Write your paper with the audience in mind

Use language that is simple and clear.

Explain any technical terms that you have used Adhere to time limits

Generally, paper presentation sessions at conferences are 20-30 minutes long, so prepare your material accordingly.

Also, be prepared for any last-minute changes in session timings.

If you have been allotted 20 minutes, be ready with a short skeleton outline, just in case the speaker before you has overshoot his/her time limit and you only get 10 minutes to present

3. TYPES OF JOURNALS

Academic journals

Many academic journals provide LaTeX templates for authors to submit articles (also known as publications or papers) for review.

An introduction to LaTeX

LaTeX, which is pronounced «Lah-tech»

It is a document preparation system for high-quality typesetting

It is most often used for medium-to-large technical or scientific documents

It can be used for almost any form of publishing.

LaTeX is not a word processor!

Instead, LaTeX encourages authors not to worry too much about the appearance of their documents but to concentrate on getting the right content.

These templates typically mimic the layout of the articles published by the journal and allow the author to preview their written work in this final layout.

Due to copyright restrictions, the templates provided in this category cannot be edited by LaTeX Templates and are available exactly as they are offered by their respective journals LaTeX Features

- Typesetting journal articles, technical reports, books, and slide presentations.
- Control over large documents containing sectioning, cross-references, tables and figures.
- Typesetting of complex mathematical formulas.
- Advanced typesetting of mathematics with AMS-LaTeX.
- Automatic generation of bibliographies and indexes.
- Multi-lingual typesetting.
- Inclusion of artwork, and process or spot colour.
- Using PostScript or Metafont fonts.

Public Library of Science

The Public Library of Science (PLOS) allows authors to submit their manuscript formatted in LaTeX to any of their journals.

For this, they provide a template which contains the structure and reference style they would like for submissions.

Journals published by PLOS include: PLOS ONE, PLOS Biology, PLOS Medicine, PLOS Computational Biology, PLOS Genetics, PLOS Pathogens, PLOS Neglected Tropical Diseases and PLOS Currents.

American Society of Mechanical Engineers allows authors to submit their manuscripts formatted in LaTeX to any of their journals and conferences.

For this, they provide three templates which contain the structure and referencing style they would like for submissions.

If you are submitting a journal article for initial review, you should use the two-column journal template; if your journal article has been accepted then you should use the one-column journal template for production purposes.

If you are submitting to an ASME conference, use the conference template.

Science Journal Allows authors to submit their manuscripts formatted in LaTeX.

For this, they provide a template which contains the structure and reference style they would like for submissions.

The template provided here includes a filled-out example article, the Science bibliography style, example bibliography and the cite package used for formatting the reference numbers.

The template is extensively commented and sectioned to make writing your Science manuscript easy.

The Institute of Electrical and Electronics Engineers (IEEE) allows authors to submit their publications formatted in LaTeX to any of their 100+ transactions journals.

For this, they provide the IEEE tran class and demo templates which contain the structure and reference style they would like for submissions.

The IEEE Photonics Society also provides the IEEE phot class and a demo template for submissions to IEEE Photonics.

American Chemical Society

Allows authors to submit their manuscripts formatted in LaTeX to any of their journals.

For this, they provide a demo template which contains the structure and reference style they would like for submissions.

The demo template provided here includes the achemso class, bibliography style, documentation and an example template with associated bibliography.

The demo template features a single-column layout for easy reviewing and all of the document elements that are typically found in journal articles: article information, author information, tables, figures, equations, references and more Elsevier's elsarticle Document Class

Elsevier's elsarticle document class and templates can be used by academics to write and submit journal articles to all Elsevier journals.

There are presently over 2,700 journals published by Elsevier with over 250,000 articles published per year.

Popular journals include Cell, The Lancet, Lancet Infectious Diseases and Lancet Neurology but a complete list of all Elsevier journals can be found [here](#).

Elsevier explicitly state that this class and templates are their preferred format for articles submitted to all of their journals

4. Graphical Abstract

A graphical abstract is a single, concise, pictorial and visual summary of the main findings of the article.

This could either be the concluding figure from the article or a figure that is specially designed for the purpose

It captures the content of the article for readers at a single glance.

A graphical abstract should allow readers to quickly gain an understanding of the main take-home message of the paper

Intended to encourage browsing, promote interdisciplinary scholarship, and help readers identify more quickly which papers are most relevant to their research interests.

Authors must provide an image that clearly represents the work described in the paper.

A key figure from the original paper, summarising the content can also be submitted as a graphical abstract.

Graphical abstracts should be submitted as a separate file in the submission system by selecting "graphical abstract Specifications:

A graphical abstract should be a one-image file and should visualize one process or make one point clear. For ease of browsing, the graphical abstract should have a clear start and end, preferably "reading" from top to bottom or left to right. Try to reduce distracting and cluttering elements as much as possible.

Image size:

Please provide an image with a minimum of 531 x 1328 pixels (hwx) using a minimum resolution of 300 dpi. If you are submitting a larger image then please use the same ratio (200 high x 500 wide).

Please note that your image will be scaled proportionally to fit in the available window on ScienceDirect; a 500 by 200 pixel rectangle.

s" from the drop-down list when uploading files. Font:

Please use Times, Arial, Courier or Symbol font with a large enough font size as the image will be reduced in size for the Table of Contents to fit a window of 200 pixels high.

File type:

Preferred file types are JPEG (Joint Photographic Experts Group), TIFF(Tagged Image File Format), EPS (Encapsulated Postscript), PDF(Portable Document Format)or MS Office files.

No additional text, outline or synopsis should be included. Any text or label must be part of the image file. Please do not use unnecessary white space or a heading “graphical abstract” within the image file.

There is a plethora of software available to draw your graphical abstracts.

If you want something familiar and free/low-cost, than Paint or PowerPoint can do the job.

If you are prepared to tackle powerful free programs that may be challenging at first, give an opportunity to Gimp and Inkscape.

If you want a full professional experience at a price, than go for commercial software such as Adobe Photoshop and Illustrator, CorelDraw, Affinity Designer or ChemDraw

5. Origin

It imports data files in various formats such as ASCII text, Excel, NI TDM, DIADem, NetCDF, SPC, etc.

It also exports the graph to various image file formats such as JPEG, GIF, EPS, TIFF, etc.

There is also a built-in query tool for accessing database data via ADO.

Origin is available in two editions, the regular version Origin and the pricier OriginPro.

The latter adds additional data analysis features like surface fitting, short-time Fourier Transform, and more advanced statistics.

Origin graphs and analysis results can automatically update on data or parameter change, allowing you to create templates for repetitive tasks or to perform batch operations from the user interface, without the need for programming.

Extend the capabilities in Origin by installing free Apps available from website. Connect with other applications such as MATLAB™, LabVIEW™ or Microsoft© Excel, or create custom routines within Origin using scripting and C languages, embedded Python, or the R console

Features of ORIGIN

Impressive Import Speed for Large Data

Importing large text files is easy and fast in Origin.

Import speed in Origin is a factor of 10 or more compared to Excel 2016, and compared to older versions of Origin. The gain in speed has been achieved by making full use of the processor's multi-core architecture

5. Case Study

1. Highlight the key take away from the case study

When creating a case study, you should identify the key takeaways from your research. Use catchy language to sum up this information in a sentence, and present this sentence at the top of your page. This is “at a glance” information and it allows people to gain a top level understanding of the content immediately.

2. Use icons to summarize information

In a case study you should use icons to highlight areas of your research that are particularly interesting or relevant

3. Use data to make concrete points

When conducting any sort of research stats, facts, and figures are like gold dust (aka, really valuable). Being able to quantify your findings is important to help understand the information fully. Saying sales increased 10% is much more effective than saying sales increased

5. Use high contrast shapes and colors to draw attention to key information

Help the key information stand out within your case study by using high contrast shapes and colors. Use a complementary or contrasting color, or use a shape such as a rectangle or a circle for maximum impact.

6. PowerPoint: Presentation

Think of a movie that has breathtaking special effects but no storyline. Does it have any chances of becoming a blockbuster? Of course not. The same is true with a PowerPoint presentation. No matter how beautiful the visuals of your slide deck are, it will never be a success if it doesn't follow a logically sound structure.

A. Presentation structure:

1. INTRO SLIDE:

Title of presentation, date, presenter name

2. OUTLINE SLIDE:

Main points of what you will talk about

Then follow the structure you've laid out

Start broad, finish specific

Rank Information (What NEEDS to go on the slide)

Simplify

3. CONTENT SLIDES:

Cover detailed information based on your outline

As many slides as you need, as many as 1-2 per minute

Remember Powerpoint is more visual than verbal: "a picture is worth a thousand words"

4. FINAL SLIDE:

Audience will likely take away the last thing you say

So make a point to have the last slide be meaningful

provide contact information for follow up?

pose a question for discussion?

finish with a joke/or light hearted conclusion?

At the very least put a blank slide at the end

provides a non-distracting placeholder for discussion

prevents clicking through back to Power point application

5. Slide types:

TEXT:

Highlight your presentation, don't create a substitute for it

Bullet points, not complete sentences

4-6 points per page

No large blocks of text, audience stops listening, and reads

Consider showing one point at a time, using animation

helps the audience focus on what you are saying

6. IMAGES:

Images should be good: not pixilated, out of focus, too dark

Cropped to remove distractions

7. GRAPHS/DIAGRAMS:

Make them as simple as possible

To be grasped in just a few moments, not studied at length

8. Design issues:

TEMPLATES:

Use a consistent background and layout for all slides

The template sets the tone of your presentation

choose it carefully

Avoid really bright backgrounds, or cluttered layouts

9. FONTS:

Choose two at most, nothing cursive or ornamental

Stick to sans-serif fonts, for legibility

Minimum of 18 point, 20 to 24 is better

Main points/titles bigger than subpoints/content

10. COLOR:

High contrast dark on light, or light on dark

Use color with care, to emphasize your talk

Avoid extremely bright colors, hot pink, neon orange, acid green

Do not combine red/green, yellow/purple, or blue/orange

11. ANIMATION:

Use sparingly, and be consistent

Avoid distracting or annoying sound effects

7. Basic concepts of paper writing

Although we'll focus more on the organization and writing of a research paper in this article, the research process is an important first step. Research will help you in several ways:

- understanding your subject
- formulating ideas for your paper
- developing a thesis statement
- speaking about your topic with authority

Gather resource materials and begin reviewing them. Here are a few good information sources:

Google Scholar

Online encyclopedias, almanacs, and databases

Books and periodicals

Newspapers

Government publications, guides, and reports

As you read and evaluate the information you discover, take notes. Keep track of your reference materials so you can cite them and build your bibliography later. The Purdue Online Writing Lab (OWL) and other university writing lab websites are excellent resources to help you understand what information you'll need to collect to properly cite references.

Most research papers begin with a thesis statement at the end of an introductory paragraph. Even if it's not a requirement, it's a good idea to write a thesis statement as you begin to organize your research. Writing the thesis statement first is helpful because every argument or point you make in your paper should support this central idea you're putting forward.

Most research papers fall into one of three categories: analytical, expository, or argumentative. If you're presenting an analysis of information, then your paper is analytical. If you're writing to explain information, then your paper is expository. If you're arguing a conclusion, then it's argumentative or persuasive. Your thesis statement should match the type of paper you're writing.

Invest time in writing your thesis statement—it's the main idea of your paper, from which everything else flows. Without a well-thought-out thesis statement, your paper is likely to end up jumbled and with an unclear purpose. Here's more guidance from Purdue OWL.

The Outline

An outline will help you organize your thoughts before you dig into the writing process. Once you've developed your thesis statement, think about the main points you'll need to present to support that statement. Those main points are your sub-headings. Now, organize your thoughts and information under each sub-heading.

Any information that doesn't fit within the framework of your outline, and doesn't directly support your thesis statement, no matter how interesting, doesn't belong in your research paper. Keep your focus narrow and avoid the kitchen sink approach. (You know, the one where you throw in every bit of interesting research you uncovered, including the fungal growth in the U-joint of your kitchen sink?) Everything you learn may be fascinating, but not all of it is going to be relevant to your paper.

The Introduction

Here's where you present the background and context for the rest of your article. Craft a strong opening sentence that will engage the reader. Just because you're writing an academic research paper doesn't mean you have to be dry and boring.

Here's a tip: See Step 4 in our guide to better content writing. Although it's about writing for the web, it's relevant here, too.

Explain the purpose of your paper and how you plan to approach the topic. (Is this a factual report? An analysis? A persuasive piece?) Describe how you've organized your approach to the topic. Conclude the introductory paragraph with your thesis statement.

The introduction is the broad beginning of the paper that answers three important questions:

What is this?

Why am I reading it?

What do you want me to do?

You should answer these questions by doing the following:

Set the context – Provide general information about the main idea, explaining the situation so the reader can make sense of the topic and the claims you make and support.

State why the main idea is important – Tell the reader why he or she should care and keep reading. Your goal is to create a compelling, clear, and convincing essay people will want to read and act upon.

State your thesis/claim – Compose a sentence or two stating the position you will support with logos (sound reasoning: induction, deduction), pathos (balanced emotional appeal), and ethos (author credibility).

The Body

Here's where your outline will come in handy. As you're writing, remember that your outline isn't meant to be a prison—it's a guideline to keep you on track. Your paper may evolve, so keep it fluid, but do remember to stay focused on your thesis statement and proving your points. Don't let your sources organize your paper! Organize first and use your sources as they become relevant.

Consider the Rule of Three. Find supporting arguments for each point you make, and present a strong point first, followed by an even stronger one, and finish with your strongest point

Conclusion

Briefly summarize the points you've made. Take a moment to explain why you believe those points support your case. If your research is inconclusive, take a moment to point out why you believe this topic bears further research..



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

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www.sathyabama.ac.in

SCHOOL OF SCIENCE AND HUMANITIES

DEPARTMENT OF PHYSICS

UNIT 4 Quality of Research — SPHA5305

IV. Quality of Research

Mark Monitor Inc.

It is an American software company founded in 1999. It develops software intended to protect corporate brands from Internet counterfeiting, fraud, piracy, and cybersquatting. It also develops and publishes reports on the prevalence of brand abuse on the Internet

Clarivate Analytics

It is a public traded company, listed on the New York Stock Exchange. It offers solutions that drive the entire lifecycle of innovation: Web of Science

The Master Journal List is an invaluable tool to help you to find the right journal for your needs across multiple indices hosted on the Web of Science platform. Clarivate WEB OF SCIENCE transform today's ideas into the scientific and technical realities of tomorrow.

Web of Science: Scientific and academic research

Clarivate Web of Science is the global standard for finding and connecting scholarly content across disciplines and around the world. Web of Science Core Collection includes only journals that demonstrate high levels of editorial rigor and best practice.

Web of Science Core Collections : Biological Abstracts, BIOSIS Previews, Zoological Record, and Current Contents Connect, as well as the Chemical Information products.

With Web of Science you can:

- quickly pin-point and access quality, peer-reviewed full-text research
- reliably discover and connect more of the research relevant to your area of inquiry
- produce better research and manage your career with confidence
- keep up to date, and capture an accurate view of your citation impact.

Core Collection Databases:

SCIE – Science Citation Index Expanded (included in JCR)

SSCI – Social Science Citation Index (included in JCR)

AHCI – Arts & Humanities Citation Index

ESCI – Emerging Sources Citation Index

IMPACT FACTOR

There are few metrics which was taken into consideration for the evaluation of online published articles. Few of them are I10-Index, H-Index & finally Impact Factor of that journal.

The impact factor is an objective measurement of a journal's quality, expressed in terms of numerical figures. The impact factor acts as a measuring medium for the number of citations received by articles in a particular journal. If a published article is cited one time, it denotes an impact factor of 1.0. Similarly, if the article is cited two and half times, it implies an impact factor of 2.5. Journals with high impact factors are notable than those with low impact factors.

There are few agencies which provide official article metrics like Google Scholar, Journal Citation Reports (JCR) or you can say like Royal Society of Chemistry, Clarivate Analysis & Scopus.

i10-Index = the number of publications with at least 10 citations. ... This very simple measure is only used by Google Scholar, and is another way to help gauge the productivity of a scholar.

I- index

I10-Index

It will give you a number of your online published articles citations and how much of it was cited by other authors with more than 10 times. If your article has been referred by more than 10 authors and citation in their research articles means your article is having a separate core value as far as the quality article metrics concern. The highest citation which was reported on google scholar is Charles Robert Darwin scientist. He is the man of revolution done in a various subject like naturalist, geologist & biologist

Scopus

It gives four types of quality measure for each title; those are h-Index, CiteScore, SJR (SCImago Journal Rank) and SNIP (Source Normalized Impact per Paper).

Also, it is Elsevier's abstract and citation database .

There is no impact evaluation here.

Web of Science

It is an online subscription-based scientific citation indexing and maintained by Clarivate Analytics. Web of Science employs various search and analysis capabilities such as citation indexing. selection of the papers is basis of impact evaluation.

It has six online databases.

2. University Grants Commission of India

The University Grants Commission of India (UGC India) is the primary regulatory body created by the Indian Government in accordance with the UGC Act of 1956 under the Ministry of Human Resource Development. It has been made responsible for the coordination of Indian Universities, determination of the standards for Indian universities and maintenance of standards of higher education in India. It also promotes and coordinates university education, frame rules on minimum standards of education, and setting standards for examination like ICAR NET, UGC NET & CSIR UGC NET.

UGC's ultimate goal is to bring every approved university to become standardized and under the same umbrella so there are no discrepancies in the quality of education being provided and that no student feels cheated

Journals are the medium through which budding candidates publish their articles about their research.

These sources are made available because of the UGC.

If the aspirants choose any private journal except for UGC approved journals for their research other than that, it is not considered as valid.

As of now, the UGC Approved Journals list have now been replaced by UGC – CAREUGC aims to stimulate, empower and help grow the Indian academia through its “Quality Mandate”.

UGC aims to eradicate any plagiarised and sub-par material that might damage the reputation and standards of international research

How to publish the paper in UGC approved journal Submit the research article and manuscript in .DOC/.DOCX file format via email or online submission. For online submission, you have to click on the official link. Through the mail you have to write down the Submission of Manuscript/Research Paper: Name of Paper” along with the paper category and also the name of author, designation, contact number in the message body of the email.

After the submission one must prepare the research paper or manuscript in the format of the paper and the language must be English. After this, you can track the submitted paper status online by login author account for login. And you have to use the paper registration id.

After this, you will receive the paper to accept or reject notification. If you get rejection then you have to make modifications according to the review committee.

- When the payment of the publication fees, submitted then you have to submit the documents in single mail to editor undertaking by Author Form that are asked for submission.

UGC Journals by subject

UGC journal for Medical

UGC journal for Dental

UGC journal for Pharmacy

UGC journal for Computer science

UGC journal for Education

UGC journal for Materials Science

UGC journal for Engineering

ICI indexed journal Index Copernicus Value is an evaluation standard for scientific journals.

Its unique character is guaranteed by the fact that it enables annual organising the list of scientific journals from all around the world within ICI Journals Master List.

It also gives a specific guidelines in relation to functional areas of a scientific journal that have to be improved in order to increase citation rate.

The higher the value of ICV is, the higher probability that a journal in the future will:

- increase the citation rate of published papers,
- receive higher evaluations within journals assessments that are carried out,
- get more interesting manuscripts with great potential to be noticed by the scientific community,
- attract recognised authors and reviewers.

3. Blind reviewed journal

This journal uses double-blind review, which means that both the reviewer and author identities are concealed from the reviewers, and vice versa, throughout the review process. To facilitate this, authors need to ensure that their manuscripts are prepared in a way that does not give away their identity

Peer reviewed Journal

Peer-reviewed (or refereed) journals Peer-reviewed or refereed journals have an editorial board of subject experts who review and evaluate submitted articles before accepting them for publication. A journal may be a scholarly journal but not a peer-reviewed journal. Reviewers play a pivotal role in scholarly publishing

The peer review system exists to validate academic work. Helps to improve the quality of published research. Increases networking possibilities within research communities.

4. Intellectual Property

Intellectual property (IP) refers to creations of the mind, such as inventions;

- literary and artistic works;
- designs;
- symbols, names and images used in commerce.

IP is protected in law by, for example, patents, copyright and trademarks, industrial designs, geographical indications and trade secrets which enable people to earn recognition or financial benefit from what they invent or create.

What is copyright?

Copyright (or author's right) is a legal term used to describe the rights that creators have over their literary and artistic works.

Works covered by copyright range from books, music, paintings, sculpture, and films, to computer programs, databases, advertisements, maps, and technical drawings.

PATENT

A patent is an exclusive right granted for an invention.

It patent provides the patent owner with the right to decide how - or whether - the invention can be used by others.

In exchange for this right, the patent owner makes technical information about the invention publicly available in the published patent document

A patent is used to prevent an invention from being created, sold, or used by another party without permission.

It is a type of intellectual property rights that come to people's minds when they think of intellectual property rights protection.

A Patent Owner has every right to commercialize his/her/its patent, including buying and selling the patent or granting a license to the invention to any third party under mutually agreed terms.

There are three different categories that patents can fall under:

Utility: A utility patent protects the creation of a new or improved product, process, composition of matter, or machine that is useful.

Design: A design patent protects the ornamental design on a useful item.

Plant: A plant patent protects new kinds of plants produced by cuttings or other nonsexual means.

TRADEMARK

A trademark is a sign capable of distinguishing the goods or services of one enterprise from those of other enterprises.

The Legal protection of a trademark is administered by the Controller General of Patents, Designs and Trade Marks, a government agency which reports to the Department of Industrial Policy and Promotion (DIPP), under the Ministry of Commerce and Industry

Industrial designs

An industrial design constitutes the ornamental or aesthetic aspect of an article. A design may consist of three-dimensional features, such as the shape or surface of an article, or of two-dimensional features, such as patterns, lines or color.

Geographical indications

Geographical indications and appellations of origin are signs used on goods that have a specific geographical origin and possess qualities, a reputation or characteristics that are essentially attributable to that place of origin. Most commonly, a geographical indication includes the name of the place of origin of the goods.

Trade secrets

Trade secrets are IP rights on confidential information which may be sold or licensed. The unauthorized acquisition, use or disclosure of such secret information in a manner contrary to honest commercial practices by others is regarded as an unfair practice and a violation of the trade secret protection.

5. Innovation in Scientific Pursuit for Inspired Research (INSPIRE)

A Scheme of the Government of India.

Offers outstanding opportunity for pursuing Doctoral Research at any recognized University or Institute in India

Through Fellowships in par with National Eligibility Test (NET) qualified candidates

INSPIRE Fellowship Scheme of INSPIRE Programme

Eligibility

i) INSPIRE Scholar having secured minimum 70% marks (or CGPA equivalent) in aggregate at M.Sc. or Integrated M.S. / M.Sc.

ii) 1st Rank Holder at University level examination in Post-Graduate (PG) level examinations in Basic/ Applied Sciences including Engineering, Medicine, Pharmacy, Agricultural sciences and Veterinary Sciences from any recognized University and academic Institutions (Excluding Autonomous Colleges) in India.

Number and Duration of Fellowships

It offers financial support in the form of a Fellowship as per Gov. norms fellowship (Junior Research Fellowship / Senior Research Fellowship) and research grant to the candidate.

There is a provision of 1000 INSPIRE Fellowships to be offered/given every year to eligible students and each Fellowship

It is tenable for a maximum period of five years or completion of the PhD degree

The continuation of the Fellowship for selected candidates is based on satisfactory performance as certified by the parent institution as per stipulated GOI guidelines for this Fellowship.

Fellowship Details

Each selected INSPIRE Faculty Fellow will be eligible to receive a consolidated amount of Rs.1,25,000/-p.m as fellowship.

In addition, a Research Grant of Rs.7 lakh every year for 5 years will also be provided to each successful candidate including the carry-forward amount, if any, from the previous year.

The consolidated amount of Rs.1,25,000 per month is an all-inclusive fellowship and taxable as per the Indian IT Act.

The INSPIRE Faculty Fellowship is for a maximum period of 5 (five) years. No Fellow shall avail two fellowships concurrently during the tenure of this Fellowship period.

Eligibility Criteria for PSU Jobs in 2020

Most PSU's have made the GATE and NET Exam as eligibility criteria for interview that is, the eligibility criteria for PSUs depend on GATE and NET Exam which is different from all companies.

Age Limit is also very imp factor in selection process.

Relaxation to SC/ST/OBC Candidates in age limit is also exists

PSUs companies have their own job portal, through which people can apply for jobs However, after getting shortlisted through the GATE scores, candidate may need to appear for several rounds of interview such as – GD, Personal Interview, Medical Checkup, etc.

PSUs also conduct recruitment through NET Exams, candidate those who qualify (CSIR NET / UGC NET) they can use NET Score to take entry in the PSU's company recruitment Process.

6. GATE: Basic Details

The GATE entrance examination of 2021 will be conducted by the Indian Institute Of Technology (IIT) Bombay. The exam will be conducted in online mode on February for a total of 24 papers. This time a new paper "Statistics" has been added to the examination.

GATE is a national level exam in India who wants to take admission in M.Tech/M.E and Ph.D. courses at IITs, IISc, GFTIs and NITs and many other top universities in India.

The examination is generally conducted by IISc in Bangalore and all the seven IITs on behalf of the National Coordination Board (NCB)-GATE.

The candidates who want to sit for the GATE examination will be allowed to select only one paper of GATE for examination.

The validity of the scorecard will be valid for three years from the date of the announcement of the GATE result for the admissions in M.Tech.

The notification of the GATE 2021 will be released on July 2020.

The application form of the examination will be available from September 2020.

The GATE entrance examination 2021 will be conducted over 200 cities in India and in around 6 cities in abroad

New Rules Of GATE –

GATE 2021 has included a new paper Statistics coded as "ST" in the examination

Candidates are allowed to apply online even after the last date of the examination for an extended period but have to pay a late fee. The late fees for the candidates in India are Rs. 500 if they apply between the dates of September to October. For those who are foreign candidates have to pay a late fee of 20 USD

- Release Notification: The notification for GATE will be released on July 2020
- Registration Of GATE: The registration of the GATE 2021 through GOAPS will start from September, 2020
- Last Date Of Registration: The last date of GATE is 21st September 2020
- Extended Date: The extended date of the examination of GATE along with the late fee is October 2020
- Mock Test: The most test of GATE 2021 examination will be available from the third week of November 2020. Candidates can practice them to know the pattern of the examination
- Admit Card: The admit card of GATE will be out on 4th January 2021

- Examination Date: The GATE entrance examination will be held on February 2021
- Answer Key: The answer key of GATE will be out on the third week of February 2021
-

The eligibility criteria for the GATE entrance exam for the year are given below –

Age Limit: The age limit for GATE is not given. Candidates of any age can apply for the examination

Nationality: The candidates of the GATE should be an Indian citizen. However, the candidates from Nepal, Bangladesh, Sri Lanka, Singapore, United Arab Emirates can also apply for the GATE

Qualification: The candidates who have applied for GATE should be in the final year or have completed the final year of Bachelor's degree in Technology or Engineering. For the candidates who have studied nonprofessional course, they must have completed post-graduation in any subject of Science

Percentage: There is no minimum pass percentage for the candidates in order to be eligible for the GATE examination

Result: The result of the GATE examination will be announced on March 2021

Scorecard: The scorecard of GATE will be available on March 2021 Here are some lists of the eligible courses for GATE

B.E/B.Tech/B.Pharm

B.Sc (Research)/ B.S

B.Arch

M.A/M.Sc/MCA or any equivalent course

Professional Society Examination(equivalent to B.Tech/B.E/B.Arch)

Integrated M.Sc/ Integrated B.S/M.S

Integrated M.E/M.Tech or maybe both after the 12th examination

GATE 2021 Application Form

The application form of GATE will be released by IIT Bombay on September 2020.

The whole process of the application will be done through GATE Online Application Processing System (GOAPS).

The final date for filling the application form is September 2020.

If any of the candidates fail to submit or fill the application on time then he or she will not be allowed to sit for the examination.

Mode Of Exam: The GATE entrance examination will be conducted through online mode only. No offline mode is available for the exam

JEST

Joint Entrance Screening Test is one of the most popular exams among the graduates. Aspirants who are seeking admission to Ph.D. or Integrated Ph.D. Programme in Physics/Theoretical Computer Science/Neuroscience or Computational Biology can appear in the exam.

JEST is considered as a National Eligibility Test (NET) by SERB (Science and Engineering Research Board) in their office Memo.

Other Research Funds

India-Republic of Korea Joint Applied R&D Programme 2014 Funding
Deutsche Forschungsgemeinschaft (DFG – German Research Foundation)
Indo French Centre for the Promotion of Advanced Research (IFCPAR)
Indo-US Science & Technology Forum
UK India Education and Research Initiative (UKIERI)
Global innovation Technology alliance

5. NPTEL

Web and video courses across 23 disciplines are available on the portal nptel.ac.in.

Certificate from the IITs/IISc

Certification courses are offered twice a year (Jan-Jun, Jul-Dec). Joining a course is free.

Anyone can learn from these courses anywhere anytime. No pre-requisites, no age limit, no entrance criteria to enroll. Learning can be done by watching videos and this is tested by the weekly assignments, that are to be submitted online within the prescribed deadline.

Any queries/doubts you may have, you can post in the respective discussion forum, which will be answered by the faculty and his/her team. There is an optional proctored certification exam that the learner can take for a nominal fee at the end of the course to earn certificates from the IITs. The main benefits of participating in an online course under NPTEL are:

Students: credit transfer and better resume

2. Faculty: Refresher courses, AICTE recognized FDP courses

3. Working professionals: For upskilling and reskilling

Industry can adapt one or more courses on a specific subject to train student population and offer them better financial rewards and career opportunities.

Through NPTEL, a part of the IIT training, flavour and the rigour with which they are given is made available to teachers and student community at large.

By an NPTEL course is useful for only to develop your skill. ... It is an one of most valuable courses. These NPTEL courses are part of a life long learning process

NPTEL(National Programme on Technology Enhanced Learning) is the official SWAYAM national coordinator for engineering section.

SWAYAM (Study Webs of Active Learning for Young Aspiring Minds)

MOOCs portal being developed by Ministry of Human Resource and Development, Govt.

All the courses are valid in the country and also, UGC has announced a “Credit Framework for Online Learning Courses through SWAYAM” Regulations, 2016 in the Gazette of India on July 19, 2016 where credit transfer for SWAYAM courses is defined.

6. Collaboration in academic research

The term "collaboration" in academic research is usually thought to mean an equal partnership between two academic faculty members who are pursuing mutually interesting and beneficial research. Today, however, much collaboration involve researchers of differing stature, funding status, and types of organizations.

Advantages

If they collaborate, the researchers can combine their strengths and do sophisticated statistical analyses of the data from the field experiments.

Usually the goal of collaborative research is to publish the results, and the researchers will divide up the work of writing up the results and navigating the publication process

Collaborative research can result in more reliable and powerful results that come to publication faster than they would if the research were done independently.

Researchers can pool their knowledge and critique each other’s work before starting the publication process

Disadvantage

A collaborator may be difficult to work with, or researchers may not reach a consensus about their results.

Another common pitfall is struggles over authorship or ownership of the research.

In many academic publications, being the “first author,” or having one’s name listed first as the author on an article, carries the most professional prestige, and may be important for career advancement.

Therefore, deciding who will be the “first” author is potentially contentious.

Here are the top five ways to lead a high performing team and collaborate with them most effectively:

- get people to work with you on the same goals. ...
- Set expectations. ...
- Use tech tools. ...
- Be open about everything. ...
- Hold effective team meetings.

Best Practices for Collaborating on Research

- ✓ Address mutual expectations. ...
- ✓ Clearly divide and establish who's responsible for each task. ...
- ✓ Determine authorship. ...
- ✓ Communicate frequently. ...
- ✓ Take minutes of meetings and then distribute to everyone involved in the research. ...
- ✓ Access to data. ...
- ✓ Discuss the expectations for the data with all researchers before research begins.



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SCHOOL OF SCIENCE AND HUMANITIES

DEPARTMENT OF PHYSICS

UNIT 4 - Introduction to Word processing package – SPHA5305

1. Creating and editing a word document

A header is the top margin of each page, and footer is the bottom margin of each page. Headers and footers are useful for including material that you want to appear on every page of a document such as your name, the title of the document, or page numbers.

To open Microsoft Word:

First click on the "Start" button..

Basic Rules for formatting text

To change the formatting of text, highlight the text you wish to change and then choose your formatting options. You may want to increase the font size, change the font color, change the font design. To change the formatting, including the font size, font, color, and many other properties.

- right click on the selection and choose what you'd like to change
- use the toolbar (1997 - 2003 versions) or
- Select the options on the Format Menu to change

Word 2007 and later uses tabs and ribbons to interface (interact) with users. To change text formats, be sure you have clicked the Home tab and are using the options found in the Font grouping.

If you change the formatting options without any text being selected, then these options will apply to any further text entered after that point in the document.

Entering Text

When you start MS-Word for Windows, you see a blank area. (This blank area is called a Normal Template). To work effectively with Word, you must understand that every Word Document is based on template.

1. The Blinking Vertical Line that marks the insertion point, the location where text you type will be inserted into the document and where certain editing actions will occur.
2. The horizontal line is the end-of-document marker.

There are a number of different views available for working on the text, available on the View menu. The simplest is the 'Normal' view, while the most complex view, but the best for working on heavily formatted pages is the 'Print layout' view.

Menu Structure

When you work with MS-Word for Windows, you give it commands to instruct the program to carry out the desired tasks. Commands are usually entered by means of menus. MS-Word for Windows has three types of menus:

1. The Main Menu is displayed in the menu bar, on the second line of the screen.
2. A Pull-down Menu is a list of commands associated with each choice on the main menu. When you choose a command on the main menu, its pull-down menu is displayed.

3. A Context Sensitive Menu is pop-up screen when you right-click the mouse. Wherein it shows a list of commands to work with.

Dialog Boxes

When MS-Word for Windows needs additional information to carry out a command, it displays a dialog box. Dialog boxes contain a number of components, but mainly contain only some of these components.

Components of Dialog Box

1. A dotted outline or highlight bar indicate the current dialog box item.
2. The title bar gives the name of the dialog box, which is the command used to display the dialog box.
3. A text box is used to enter and edit text information.
4. A list box displays a list of items from which you can choose. If the list is too big to display at one time, a vertical scroll bar lets you scroll up or down the list.
5. The command buttons to either confirm or cancel the dialog box.

Working with A Document

MS-Word is used by people with widely varying levels of skill and experience, and there are often several different ways to do some tasks. Most commands are available through the Menu and sub menus. For frequently used commands, there are often iconic shortcut buttons on the Tool bars that can be selected with the mouse. For people with better keyboard skills or experience, there are keyboard shortcuts, often using the Control (CTRL), Shift (SHIFT) or Alternate (ALT) keys on the PC and Command or Option keys of the Macintosh.

Create a New Document

- Choose File ⇨ New from the menu bar.
 - This may ask you to select which document template to use for the new document.
- Click the New Blank Document button of the tool bar.
- Press CTRL + N on the keyboard. (Depress and hold CTRL, Press and release 'N')

Open an Existing Document

- Choose File ⇨ Open from the menu bar.
- Click the Open button on the toolbar.
- Press CTRL + O on the keyboard.

NOTE: Each method will show the Open dialog box. Select the drive the file was saved on, choose the file, and click the Open button.

Save a Document

- Select File ⇨ Save from the menu bar.
- Click the Save button on the toolbar.
- Press CTRL + S on the keyboard.

Navigate to the location where you would like to save the document. Make a note of the drive where the document is saved for future reference. To save an existing open document under a different name, select 'File ⇨ Save As'.

Renaming a Document

To rename an existing, but not open, Word document while using the program,

- Select File ⇨ Open (or press CTRL + O on the keyboard) and find the file you want to rename.
- Right-click on the document name with the mouse and select Rename from the shortcut menu.
- Type the new name for the file and press the ENTER key.

Working with Multiple Documents

Several documents can be opened simultaneously if you are typing or editing multiple documents at once. All open documents are listed under the Windows menu. The current document has checkmark beside the filename. Select another name to view another open document or click the button on the Windows taskbar at the bottom of the screen.

Closing a Document

- Selecting File ⇨ Close from the menu bar
- Click the close window icon if it's visible on the menu bar
- Press CTRL + W or CTRL + F4 on the keyboard.

Exiting Word

- Choose the File ⇨ Exit on the menu bar.
- Click the Close button align with the title bar.
- Press ALT + F4 on the Keyboard.

2. Creating a research paper

The research you conduct should of course be novel, timely, rigorous, and hopefully interesting.

- But you must also transmit your scientific research into writing—a well-written paper will greatly improve your chances of getting accepted into journals. All of the parts of your paper should fit together in an order that makes sense.
 - Include all necessary information in each section needed to understand the other sections.
 - Do not repeat information unless it is necessary.
 - Ensure that your sentences are grammatically and logically coherent.

Perhaps the most important rule is to conform to the formatting guidelines and other style conventions of the journal to which you are submitting.

Check the “**GUIDE FOR AUTHORS**” section of the journal or conference, or if the paper is for a class, ensure that you are using the proper formatting requirements.

Introduction Section

- *Discusses the problem to be solved (purpose statement)
- *Describes where your research fits into the current science (background and context)
- *Uses primary literature with citations and summarizes the current understanding of the problem (“literature review”)

When do you write it?

- *Write it last—after the conclusion and before the title and abstract

Methods Section

1. Tells how you did the study—what materials and methods of research and analysis were used.
2. *First section you write—after preparing your figures and tables

Results Section

- *Explains the important findings of your study that help to answer your research question or hypothesis and addresses your purpose statement.

When do you write it?

- *After the Methods and before the Discussion/Conclusion

Discussion/Conclusion Section

Discussion/Conclusion Section

- *Explains what your findings mean and what the implications and importance are both to your specific area of research and in a broader context (i.e., to the wider field or to society).

- *Includes limitations to your study and discusses possible future research that is needed to answer your research question more clearly and address closely related questions.

3. Writing cover letter

1. Add a custom header that illustrates a personal brand

2. Give the cover letter template a decorative border

This could represent the applicant’s career path, their sense of adventure, or the places their experiences have taken them

3. When picking an image for header, look for an image that isn’t too busy.

Too much going on will distract from the header text—and the text is the most important part!

For example, this cover letter template uses a tranquil lake scene in the header to show off the applicant’s photography skills

4. Include a personal logo to make the cover letter more memorable

For example, this cover letter template uses a logo created by putting the applicant's initial inside a triangle.

- Simple and sleek Use icons to illustrate information like your experience, skills, or passions.
- Icons are simplified vector graphics used to represent concepts.
- They're perfect for adding a bit of creativity to your cover letter design.
- Customize the cover letter for each company you apply to
- Don't just provide a list of skills, or a few flattering paragraphs about your background.
- Tie your story to what the company cares about!

If you're not sure what the company cares about, go to their website. Read their About Us page.

Try to figure out what they value (this is not hard – a lot of companies share their core values somewhere on their site).

Pick which of those core values resonate most with you.

Then, tailor your letter to those values.

Opening paragraph - Grab the reader's attention with 2-3 of your top achievements

Second paragraph - Explain why you're the perfect candidate for the job

Third paragraph - Explain why you're a good match for the company

Formal closing

4. Writing a Resume

Why is the fresher resume format you choose important?

Freshers need a different format that focuses on their strengths while also equally highlighting them as a strong candidate for the position

Every resume should contain

- skills and qualities needed to be successful in the role
- have the same set of core values as the employer
- Choose the keywords on they are applying for.
- Include your name, address (or city and state), phone number and email address
- Include links to social media profiles, personal websites, personal blogs or personal portfolios
- Everything on your profile is professional
- Convey who you are as a professional, career goals are
- Convey your knowledge and passion for the role you are applying
- Convey how you will be of value to the employer.
- Choose the technical hard skills and soft skills you have which are most relevant to being successful in the position you are applying for.
- Use a one- or two-column format that states the skill and your level of experience with the skill.
- Highlight the most relevant education, training and certifications you have.
- Include your major and minor in college,
- professional licenses and certifications,
- Certificate courses taken in college and additional professional training.
- Earned honors,
- Exceptional grades or scholarships

- Properly include interests and hobbies. This shows a level of dedication and work ethic.

Keep your resume to one page. Try to keep your resume clear, direct and simple. Highlight your willingness to learn. Highlighting honors, scholarships and exceptional grades you have earned while in school is a great way to show this. Include a miscellaneous section if needed. A miscellaneous section can include languages you are proficient in, accomplishments you are most proud of that didn't fit in another section of your resume, your personal philosophy and professional references.

6. Watermarks

A watermark is a faint image that appears on the page, often behind your actual text. These are typically used to display the word "Confidential", "Priority" or "Draft" behind the text that appears in a document. Watermarks do not make the text harder to read, but they are a means of displaying important information to the reader.

Makes it easy for viewers to see who took that photo.

Picture Watermark - Allows you to insert a picture or graphic. You can use colour or greyscale pictures for watermarks. The scale option lets you easily scale the picture on the page. In most cases it is best to select Washout so the picture does not interfere with the readability of the document.

Text Watermark - Type the text you want to appear in the Text list box. In most cases it is best to select semi-transparent so the text does not interfere with the readability of the document.

7. Creating Tables and Charts

Tables are made up of cells. A horizontal line of cells is called a "row" and a vertical line of cells is called a "column".

You can use tables to set up side-by-side text paragraphs that wrap around independently or graphics such as charts that sit side-by-side.

Tables can be useful for creating newsletters, brochures, web pages and forms.

Tables play a crucial part in any Word document so it is important you can manipulate them quickly and avoid the time consuming mistakes.

8. Excel chart

If you have cropped close to the image and need to add space between the image and the border. Select the graphic and hold down Shift while you drag the handles to increase the space.

To display charts (or pictures) next to each other place them in a table with multiple columns.

The easiest way to insert a windows metafile (.wmf) into a document is to select (Insert > Picture > From File).

A quick way to import an chart Excel graph into a Word document is to just drag and drop it.

Rows & Columns

Columns are identified by letters A-Z for the first 26 columns and AA-AZ for the next 26 columns. The last column is XFD.

Selecting Rows and Columns

You can select a whole column by either using the left mouse button to select the column heading, or by using the shortcut key (Ctrl + Spacebar).

Similarly you can select a whole row by either selecting the row heading or by using the shortcut key (Shift + Spacebar).

It is also possible to select multiple rows and columns as well as non adjacent ones.

When a column is selected all 1,048,576 cells are selected and likewise when a row is selected all 16,384 cells are selected

Excel will generally widen a column automatically to accommodate numeric entries but text entries require manual adjustment.

Row height will automatically increase if font size increases but again manual adjustments may be needed.

8. Creating A Mail Merge

Mail Merge is most often used to print or email form letters to multiple recipients. Using Mail Merge, you can easily customize form letters for individual recipients. Mail merge is also used to create envelopes or labels in bulk

How to Use Mail Merge in Microsoft Word

In a blank Microsoft Word document, click on the Mailings tab, and in the Start Mail Merge group, click Start Mail Merge .

Click Step-by-Step Mail Merge Wizard .

Select your document type. ...

Select the starting document. ...

Select recipients. ...

Write the letter and add custom fields.

Advantages

- Send personalized emails with Gmail Mail Merge.
- Include different file attachments, schedule emails for sending later, CC and BCC support, track email opens, clicks, and bounces messages.
- Send personalized email messages to your contacts with Mail Merge for Gmail.

- Each email message is unique and, unlike putting email addresses in the CC or BCC fields, every recipient will receive your intended message as if it were sent solely to them.
- Email tracking will help you know when people have read your email.

Mail Merge Features

One-click importing of Google Contacts for sending personalized emails

- ⇒ Insert different file attachments for each email recipient.
- ⇒ Included emojis and animated GIF images in the message body and emoji in the subject
- ⇒ Upload files from your computer or select existing documents from your Google Drive

Send merged emails immediately or schedule messages for sending later.

- ⇒ Automatically CC or BCC every email message to your CRM or any other email address.
- ⇒ Send emails on behalf of any other email address that is configured as an alias in Gmail.
- ⇒ Write your messages in plain text, rich HTML, or use an existing Gmail draft as and email template.

9. Creating a Webpage

A webpage is a document, commonly written in HTML, that is viewed in an Internet browser.

It can be accessed by entering a URL address into a browser's address bar.

It contain text, graphics, and hyperlinks to other web pages and files.

It provide information to viewers, including pictures or videos to help illustrate important topics.

It may also be used as a method to sell products or services to viewers.

When you click a link provided by a search engine, you are accessing a web page. The Internet consists of millions of web pages, with more being added every day.

Tips to create a webpage

- The website, blog name, logo, or company name is often in the top-left corner of each web page.
- The logo may also include a slogan or brief statement about the site to give visitors an instant understanding of the site.
- Also, this section of the web page is usually a link that may link back to the homepage.
- The search allows a visitor to search a website for related information and should be available on every page.
- The navigation bar, or menu for a web page, is often found on the top or left side of each web page.
- It should include links to each of the major sections of the website.

Procedure to create a WEBPAGE

A Web page structure appears, in which you can click and drag to select a section to change, and then type text to replace the selection.

Change the heading, and replace existing text with your own.

Delete any existing text that you no longer need as a placeholder.

Change the attributes of any text. You can change text's font size, type, or color, and apply any attributes, such as boldface, italics, or underline.

To add a background color, click Format, Background and choose a color. If you want to include a fill effect instead of a solid-color background, click Format Background, Fill Effects.

Periodically save the page as a Web page. Click File, Save As.

Click Web Page, give the page a name, indicate the location (disk and folder) where the file should be saved, and click Save.

A Web page filename cannot contain spaces

10. Creating a Newsletter

Newsletters should be much narrower than a standard web page and should use less complex layouts. Ideally the layout should only be one or two columns.

A newsletter is a printed or electronic report containing news concerning the activities of a business or an organization that is sent to its members, customers, employees or other subscribers.

Newsletters generally contain one main topic of interest to its recipients.

A newsletter may be considered grey literature. A newsletter is a tool used to communicate regularly with your subscribers

Delivering the information you want in your email boxes

These messages can contain simple text or a structure composed of images and formatted text.

What is the purpose of a newsletter?

Newsletters are often used by people who have websites, blogs, or e-commerce to

Advertise a product, content, article

Communicate an event

Engage in remarketing campaigns, such as the abandoned cart — not forgetting the typical transactional communication (order confirmation, sending, etc.).