### RESULTS AND CONCLUSION Lecture 11

The next step after performing the actual research work on the chosen problem is preparation of results and conclusion of the performed work. Predictions, results and conclusion are ultimate goals of the research performed.

There are two indispensable rules of modern research. The freedom of creative imagination necessarily subjected to rigorous experimentation. In the beginning any experimental research on a specific subject, imagination should give wings to the thought. At the time of concluding and interpreting the facts that were collected observation, the imagination should be dominated and prevailed over by concrete results of experiments. We should analyse cause and effect. We should pay attention to minute details also. In fact keenness in observation is the hallmark of any scientific research.

Proper interpretations of the results must be made. *Interpretation refers to the task of drawing inferences from the actual research work*. It also means drawing of conclusion. Conclusion is based on the study performed. It would bring out relations and processes that underlie the findings. The utility of the outcome of the research greatly lie on proper interpretations and is the hardest part of solving a scientific problem. Interpretation of results is important because it

1. links the present work to the previous,
2. leads to identification of future problems,
3. opens new avenues of intellectual adventure and stimulates the quest for more knowledge,
4. makes others understand the significance of the research findings and
5. often suggests a possible experimental verification.

The basic rule in preparing results and conclusion is to give all the evidences relevant to the research problem and its solution. A bare statement of the findings are not enough. Their implications must be pointed out. Discuss your answers to the following questions with experts:

1. Are the supporting evidences sufficient?, and if not, What to do?
2. How many pieces of evidence are required? Instead of producing all, is it possible to restrict to one or two pieces of evidence? If so, what are they? and
3. Why are they sufficient?

and so on. Such directions can help us minimize work and the quantity of presentation of the report. Do not rely on a bogus evidence which would increase the chances of errors. The investigator has to give suggestions. These should be practical and based on logic, reasoning and fact. The suggestions should be such that they can be actually implemented.

According to Feynman (Surely you’re Joking, Mr.Feynman!) if we are doing an experiment, we should report everything that we think might make it invalid–not only what we think is right about it; other causes that could possibly explain our results; and things we thought of that we have eliminated by some other experiment, and how they worked–to make sure that other fellow can tell they have been eliminated. Further, details that could throw doubt on the given interpretation must be included, if such is known. You must do the best you can–if you know anything at all wrong–to explain it. If you make a theory, for example, and advertise it, or put it out, then you must also put down all the facts that disagree with it, as well as those that agree with it.

The researcher should not be in hurry while preparing the results and conclusion. After preparing them the researcher may ask the following questions:

1. Are the quantitative and qualitative analysis performed *adequate* for the conclusion drawn?
2. Are the results and conclusion *general*?
3. Are the results and conclusion *valid only for the particular situation* considered in the present work?
4. Is the conclusion *too broad* considering the analysis performed?
5. Is any evidence which *weaken* the conclusion omitted?

The results and conclusion prepared can be revised based on the answers to the above questions.

Each and every statement made in the results and conclusion sections must be based on evidence obtained from theoretical or experimental analysis. Baseless statements should never be made.

While doing research particularly experiments, one may land up with an unexpected result or a finding contrary to the underlying theory. Such an observation should not be ignored blindly. It may be pursued to some extent to check whether it yields some useful result. As noted by Warrier [7] the history of science records such fortuitous breaks that led to many classic discoveries.

Never yield to the temptation of fabrication of results and interpretation. Plagiarism in the form of copying data or findings from others’ report without acknowledging the source will make you in trouble. Don’t attempt to report the already reported findings of others as yours. Citing the original sources actually enhances the credibility of your work.

One should note that the observations, claims and the conclusions drawn in a research report are subjected to a criticism by the experts in the concerned field. Therefore, the researchers have to think twice before presenting the outcomes of the research in a journal and in a scientific meeting.



**Assignment:**

(9) For each of the following topics write at least two questions, the answers to which must be available in the respective topics. For example, for the topic, *introduction*, a relevant question is *Why am I doing it?*.

(i) Introduction, (ii) Review of a research topic, (iii) Methodology, (iv) Research design, (v) Results, (vi) Discussion and (vii) Conclusion.



### XV. PRESENTING A SCIENTIFIC SEMINAR-ORAL REPORT

**A.** What is an Oral Report? What are the Importance of an Oral Report?

Presentation of one’s research work in a scientific meeting is an *oral report*. Scientific meetings include conference, seminar, symposium, workshop, departmental weekly seminar, etc.

Researchers in certain research institutions not only discuss their own work but also have discussions on very recently reported work of other scientists.

An oral report provides a bridge between the researcher and audience and offers greater scope to the researcher for explaining the actual work performed, its outcome and significance. It also leads to a better understanding of the findings and their implications. In an oral report, the researcher can present the results and interpretations which are not clearly understood by him and may request the experts in the audience to give their opinions and suggestions. Oral reporting at a conference or a seminar requires more elaborate preparation than the written report.

A Nobel Prize winner Paul Dirac said: *A person first gets a new idea and he wonders very much whether this idea will be right or wrong. He is very anxious about it, and any feature in the new idea which differs from the old established ideas is a source of anxiety to him. Whereas some one else who hears about this work and talks it up doesn’t have this anxiety, an anxiety to preserve the correctness of the basic idea at all costs, and without having this anxiety he is not so disturbed by the contradiction and is able to face up to it and see what it really means.*

## **B.** Points to be Remembered in Preparing an Oral Report

Before starting the preparation of an oral report, an outline can be drawn based on the time duration of the report and the quality of the audience. Departmental seminar is usually 45 minutes duration. In other meetings time duration is fixed by the organizer based on the number of days of the meeting, number of speakers and the status of a speaker.

For a long time report, that is, 45–60 minute presentation, one may have enough time to

1. introduce the topic,
2. discuss the definition of the problem,
3. describe the method and technique employed,
4. give technical details, and
5. present results and conclusion.

Consequently, these aspects can be prepared in detail.

For a 15–30 minute, oral presentation one cannot find enough time to discuss complete details of the work. In this case less informative materials must be dropped. Methods and techniques used can be presented very briefly without going into technical details. Much time should be reserved for results, conclusion and further directions.

Prepare a write-up of the oral presentation. It is a good and very helpful practice to write the talk before presenting it orally. Then evaluate the written material. Ask:

1. *Why should the audience listen to your presentation?*
2. *Is the presentation match with the standard of the audience?*

Revise the presentation until you get convincing answer to the above two questions. Make sure that your objective would convince the audience that you have done your job well, your methodology is sound and the findings are useful.

The success of a presentation lies in making it *long enough to cover the topic and short enough to arouse curiosity*. Oral presentation can be made effective and attractive by using modern visual devises, power-points, slides and transparency sheets. Title of the report, author’s name, plan of the presentation, very important content of it and conclusion can be printed in the slides or sheets possibly point by point with bold and sufficiently large size letters. Merely reading out measured or computed data will never catch the attention of the audience. They may be displayed in the form of histograms. Important formulas, equations, tables, figures and photographs can be prepared using transparency sheets or slides. Slides and transparency sheets should not contain running matters. *Researcher should not simply read the content in the sheets*. That is, the descriptive portion of the report should not be prepared on the sheets. An abstract or a short write-up of the presentation may be circulated to the participants of the meeting. Sophisticated softwares developed for preparing the text on transparency sheets/slides are available in internet and can be freely downloaded. In order to make the presentation, more lively, the researcher could use multimedia. Nowadays, the use of *power-point* of Microsoft Windows is common. It is an easy and compact utility software especially for preparing classroom presentations. The following are the web sites from which one could download the software at free of cost:

http://www.office.microsoft.com/downloads

http://www.lb.com/download-free-power-point-presentation.org

One could use the audio aspects also to facilitate his presentation in a better way. While presenting the topic, the researcher should strictly follow the class room teaching methodology. For example, one should allow interaction; don’t forget to modulate the voice as and when required and don’t violate the time frame. Logical continuity is another key aspect. Move from the simple to the complex, from the known to the unknown. Your statements should sound sensible and reasonable. Do not speak too fast and compromise on clarity, or speak too slowly and bore the audience. Make the session interactive by posing questions. As pointed out by Warrier, there is a dictum to be followed in good speeches: *First tell them what you are going to tell. Next, you tell them. Then tell them what you told them*.

The most crucial part is the actual presentation in front of the listeners. Stage fright is the bane of most presenters. There is no shortcut to overcome this fear. One has to practice, practice and practice. You can improve your presentation skill by getting the feedback after you have spoken. Avoid repeated use of words or phrases such as “well”, “your see”, “you know”, “I mean”, “I think”, “that is” and “basically”. You should also concentrate on your body language. Smooth movements of limbs, an occasional smile and pleasing manners would endear us to the listeners. Look relaxed and comfortable. Eye contact should be maintained with the audience. Let your eyes move uniformly around the entire audience and not focus on any particular person or a particular part of the audience.

One or two rehearsals of the report in the presence of colleagues, supervisor and collaborators can be exercised in order to

1. complete the presentation within the allotted time,
2. improve the quality of presentation and
3. maintain the fluency of the presentation.

During a long presentation, the speaker can stop the presentation at various stages, seek comments and questions from the audience and then proceed. This will make the presentation attractive, interesting and also allow the audience to clarify their doubts so that they can follow the work. Your clarifications should be clear and convincing. Never go into arguments. Your confidence gets boosted, if you approach the situation with a feeling that the expert panel is there to help you. An important point is to consider the tone to adopt so that you sound genuine.

For more details on how to make your presentation more effective, see ref.[10].