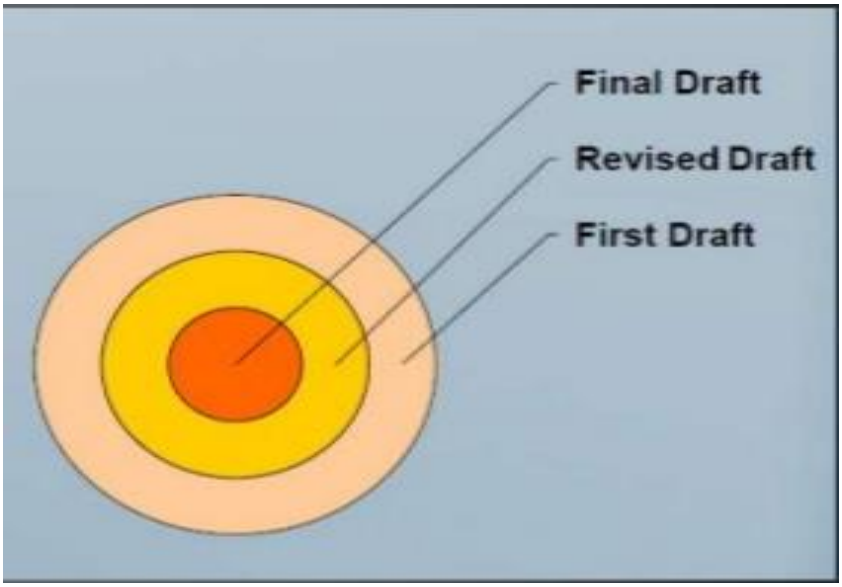
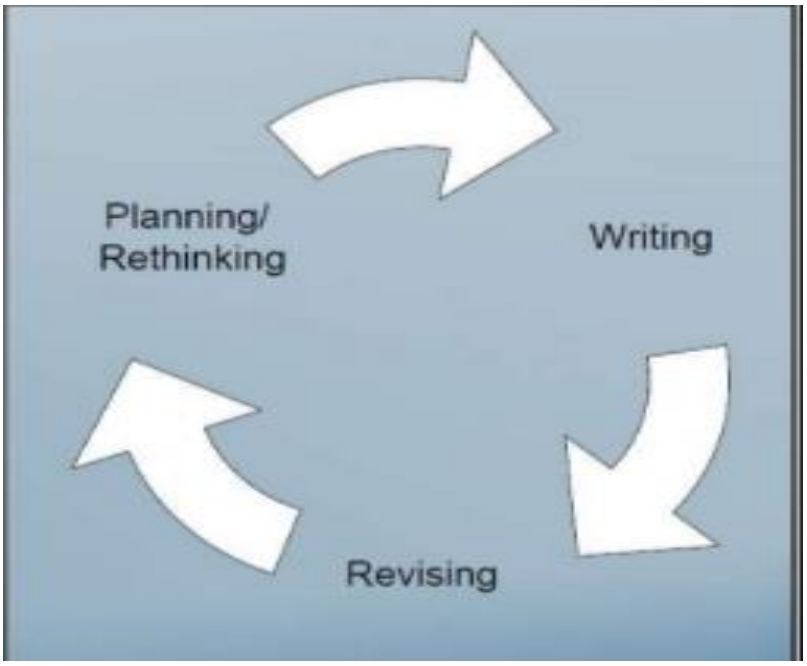
Technical writing is a process

- Good writing does not happen overnight. It requires planning. Drafting, rereading, revising and editing.

- Learning and improvement requires self-review, subject matter expert feedback, and practice.

Hedging





Our aim & Goals

- Understand the importance of English in the fields of science and technology and engineering.
- Understand technical vocabulary in specialist fields.
- Identify the structure of technical research paper/ report wiring of project/thesis.
- Familiar with how to write title, abstract, introduction,

materials/methods, results, discussion/conclusion sections of research paper in a specialist field.

Quality of good writing depends on the properties (basic characteristics)

- Planning
- True
- Appropriate for intended audience
- Clarity
- Logical and sequential = can not contradictory itself.
- Accuracy
- Comprehensive
- Accessibility (Readers can locate the information they seek, include headings and lists in the report)
- Conciseness
- Correctness (it must be free from grammatical errors, punctuation mistakes and should have appropriate format standard.)
- Simplicity
- Word choice
- Active voice/passive voice
- Use language that is simple, concrete and familiar
- Make your report attractive to look at.

Some Tips for writing a Technical paper/report

- Know how to strengthen or weaken the interpretation of research findings through hedging.

- Understand the importance of references, citations and avoidance of plagiarism.

- Follow common conventions for citation and referencing information in a research article.

Note!

- Always assume that reader is intelligent, but uninformed.
- Before you start to write, always decide what the exact purpose of your report and make sure that every paragraph, every sentence, every word, makes a clear contribution to that purpose.
- Use language that is simple, concrete and familiar.
- Use good grammar
- Use active voice
- Avoid long and complex sentences
- Use positive statements.
  Example: Negative: Don't close the valve.
  Positive: Leave the valve open.

Structure of the Research articles/ project report

- Title
- Abstract
- Key words
- Materials and method/Methodology
- Results

- Discussions
- Conclusion
- References
- Acknowledgement

Title of the project work/research paper

In TW acts as a billboard for documents.

Readers can determine your message and decide whether or not explore the information further.

-

Titles are phrases that introduce the topic of the entire document/

Well-crafted

Can quickly determine if the work is relevant to their needs.

Reference Book

Science Research Writing for non-native speakers of English.

//Hilary Glasman-Deal//, Imperial College Press, London, UK. 2010.

ID: 029 Develop E-learning web site for CSE and DCSA of Bangladesh Open University

017 Job application system: a case study of BOU

ID: 07 Web site development of BOU

015 system tutor

001: Analysis of the consumer service in a digital survey platform: www. reviewbd.com

A platform for reviewing consumer services: a case study of Bangladeshi products

004: Library management system of BOU

003:

Web-based Inventory management system of BOU

030: Stationary management system

43: exam system

006: Admission portal for DCSA and CSE of BOU

046 Hospital management system

016: Online semester registration system of BOU: a case study of CSE program

027 Develop a BOU web site with feedback, complain for HSC and Degree

Feedback and complain management system for HSC program of BOU

024 Continuous assessment management system for CSE of BOU

34 system routine

010 Online students' class attendance system for CSE of BOU

011 Web-based Pharmacy management system

Office (Excel)

Latex

Math lab

7 August 2020

Mr. Md. Al-Amin, Administrative officer

01926001743

Introduction

In introduction, four basic components are described.

1. Establishing significance/ importance of your field of interest.
    - Provide background facts/information;
    - Define the terminology in the title/key words;
    - Present the **problem area/ current research** focuses.
2. **Previous and /or current** research and contributions
3. Locate a **gap/question/problem** in the research/project
    - Describe the problem.
    - Present a **prediction** to be tested.

4. Describe the present work.

For these you have to review the literature!
Need literature reviewing!!

What is literature review?

The literature review is a critical discussion and summary of your field. One of the important academic requirements. Relevance to your area and topic of the research/project problem in your field.

- It describes how the proposed research is related to prior research in particular area.
- It shows the originality and relevance of your research problem. Shows deference from other researcher.
- Justifies your proposed methodology.
- Demonstrate your preparedness to complete the research.

For this purpose, you should spend a lot of time on your literature review, because if you do it well, you can use most of it in your project/research report or document.

Importance of literature review

In literature search you will:

- Discover what IT/CSE knowledge exists related to you project topic;
- Increase your IT/CSE knowledge in your research area;

- Find gap in published research/project;
- Generate new original ideas;
- Avoid duplicating results of other researchers;
- Justify the relevance of your proposed research /project.

What to do while going to reviewing literature?

- Remember that you are not just summarizing. For each reference you **read, think, outline** critically about the content.
- And ask the following questions yourself:

➢ What is author trying to say?
➢ Is the relevant to your research? Is yes then why it is?
➢ What is original about the methodology used by the author?

Source of literature reviewing

➢ Main source is libraries;
➢ Web sites/web links, Various URL, Google;
➢ Online publication document;
➢ Book, Journals/report/review articles etc.
➢ Materials/documents published previously;
➢ Various project works etc.
➢ Attend dept. seminars, conference, workshop.
➢ Various Corporate office in IT field.

Some sentences used in writing an 'Introduction' are follows:

Group-1 (Model sentences)

- Much research in recent years has focused on database/web designing/……
- The importance and strength of the model have been demonstrated by…..

Gourp-2

- The algorithm has been proposed for these applications….
- An alternative approach was developed by….
- Initial attempts focused on identifying the cause of ……
- Their study suggested a possible cause of….

Goup-3

- Previous work has focused only on …
- An alternative approach is necessary.
- Unfortunately, these methods do not always guarantee…..

Group-4

- The purpose of the study is to describe and examine…..
- In this paper/work we present….
- This paper introduces……
- In this report we test the accuracy/hypothesis/ that…
- This paper introduces a scheme/flowchart/algorithm/which solves these problems.

and so on

Date: 21 August 2020

Writing Methodology

It sometimes called

- Materials and Methods
- Procedure
- Experiment
- Simulation Technique/ Computational Experiment
- Model/methodology

Experimental and Simulation

Choice of Methodology

It depends on the project/research topic/area of study.

What is your output?

What are your objectives?

It is mandatory for writing a project report/document.

Objectives must be more than one.

Findings depend on the objectives.

Accuracy depends on the method/methodology

What should contain in methodology?

The methodology should contain sufficient details for readers/researchers-

- to replicate the work done and obtain similar results.
- To communicate information about a new method, a new procedure/ approach, experiments so that everyone it can not

only carry it out and obtain similar results. But also understand and accept your procedure.

Language and writing skills

Language areas which are important in the TW, in methodology part it is very important:

- Use active and passive pairs
- Use of 'A' and 'The'
- Use adverbs

In formal academic writing (also in methodology writing) do not write: 'by me' or 'by us'.

---- has been analyzed.

Model-1:

We (I) collected the samples.

- ✓ The samples were collected.

Model-2:

Samples for gas analysis were collected using the method describe by Brown (1999), which uses a--------.

Use 'a' and 'The'

Model-3:

- I bought a new computer but the keyboard was faulty.
- We removed the softest layer of membrane.

What should describe in the methodology?

Some areas should be described in the methodology:

(points below are mandatory while you are going to write methodology)

- Provide a general introduction and overview of the methods and give the source of materials/experiment you used. Example: The impact tests used in this work were a modified version of ----.
- Supply essential background of information. Describe instruments, equipment or locations etc.
- Provide specific and precise details about materials and methods. (quantities, temperatures, duration, sequences, conditions, locations, sizes etc.)

  Note: Instead of writing only was done or was used need more specific: explain what was 'done' in the project report/paper/document.
- Justify choices made
  - Introduce the reasons for choice you made, such as in order to------.
  - Includes verbs that specify the advantages of the choice you made, like enable and facilitate.

- Indicate that appropriate care was taken

  Use adjectives – 'careful' as well as adverbs 'carefully'
- Relate materials/ methods to other studies

  This provides:

  To distinguish between procedures/ materials/tests which were exactly the same as those by other researchers' procedure were similar to other which were significantly different.

  Don't be cheated
- Indicate where problems occurred

Includes-

- Ways of minimizing the problem;
- Minimizing your responsibility;
- Maximizing the good aspects;
- Suggesting solution to the problem.

Example:

Continuing research will examine a string of DC-DC converters to determine, if the predicted efficiencies can be achieved in practice.

Model-1:

The mirrors are positioned near the focal plane.

Model-2:

Attempt, consideration, determination

was formulated

Model-3:

1. For the sake of simplicity, only a single value was analyzed.
2. The advantage of using three-dimensional analysis was that the out of plane stress field could be obtained.

Model-4

The specimen was monitored constantly for a period of 24 hours.

Model-5

1. Developmental evaluation was carried out using the Bakley scales of Infant Development (Bayley, 1969).

2. The protein was over expressed and purified as reported previously.

   There are some methods ().
   Lot of methods have been reported earlier ().
   ---- method/ algorithm has been used in this work. -------
   ----- used ---method but

28 August

Discussion and/ Conclusion

It is short, usually comprising one or two paragraphs focusing on specific results/ contribution and specific aspects of the discussion.

In introduction, you wrote about the work of other researchers creating a kind of research map for your readers so that they could see what type of work existed in this field.

In the Discussion/ Conclusion

- ❖ Locate your study in relation to that map.
- ❖ Locate a gap in research in Introduction
- ❖ Expect to say to what extent you have solved that problem.
- ❖ Create that interface in reverse and enable you to move away from the central report section.

Then you can see when you come to ask your three questions:

- How do I start the Discussion/Conclusion section?
- What type of information should be in this section, and in what order?
- How do I end this section?

Grammar and Vocabulary

The model verbs that are commonly used in TW in the field of science and technology:

May, might, could, can, should, ought to, need to, have to and must.

'Can' or 'may' for 'permission' are not discussed/ used in this section.

Model verbs are often used to modify the 'Truth value' of a sentence.

To express ideas, such as possibility, necessity, permission etc.

Example:

The drop in pressure was due to a crack in pipe.

There is no model verb. You have empirical evidence to prove it.

If you write

The drop in pressure may have been due to a crack in pipe.

(It shows perhaps or not)

The drop in pressure must have been due to a crack in pipe.

(You contain cause of drop of pressure but you have no evidence.)

What should include in this section?

- ❖ Reasons
- ❖ Interpretations/
- ❖ Implication of your results/contribution.

How to proceed to write?

- ➢ Revising previous sections
- ➢ Summarizing key results from results section
- ➢ Refining the implications
- ➢ Mapping (relationship to existing research)

----consistent with---

--provides support for---

Exam:

1. To the knowledge of the authors, the data in the Fig. 4-6 is the first of its kind.
2. The results of this simulation therefore challenge --- assumption that percentage --- increase with increasing – levels.
3. Our current findings expand prior work {ref.}

- ➢ Your achievement / contribution is often stated in the present perfect tense, especially when you refer to it in the conclusion.

Exam: We have demonstrated/described/ investigated/developed/ shown/ studied/ focused on etc.

1. The presence of such high levels is a novel finding,
2. The system presented here is a cost-effective----.

3. Our study provides the framework for future studies to assess the performance characteristics.

- Limitations/ currents and future work

(the limitations of the present work provide directions and suggestions for future work.)

Exam: should be replicated and future work is need.

1. Our results are encouraging and should be validation in larger ---- data.
2. This finding is promising and should be explored with other --- cases.
3. Future work should focus on the ---- in the larger groups of patients.

- applications

your work may or may not direct application but they are mentioned here. You should indicate possible applications or applicability and in many cases.)

Exam:

1. Our technique can be applied to wide range of simulation applications.
2. It should be possible, therefore, to integrate the --- on to a microchip.
3. This approach has potential in areas as fluid density measurement.
4. This could eventually lead to the identification of novel biomarkers.

Cognitive behavior stress management skills and quality of life in stress-related disorders
Discussion

Date: 4 September 2020
Lecture- 8

References

- Include all references that have been cited in the text.
- Contain all key sources in the field as well as previous studies that support or motivate the present work.

Note: You must use the references format that is mandated by the journal/ organization to which you are going to submit.

What to include in your text?

Usually, we include data or any information in the text using Tables and Figures.

Tables and Table captions

How to write?

- Include in a separate section after the references section or you can include it in text.
- Table should be headed with a caption and title in bold.

Examples:
Table-1: Material properties.
Table-2: Comparative studies for different combinations.
Table-3: Values of thermodynamic parameters.
Table-4: Comparison between two methods.

Note: Make sure that table is referred to in the manuscript text, may be in the Results section, Methodology, Discussion section etc.

Figures and Figures captions

How to proceed?

- Figures can also be placed in a separate section after reference section.
- All figures need a caption. The caption should identify the figure in bold.
- Make sure that each figure is referred to in the manuscript text.

Examples:
Figure-1: Relay driving circuit
Figure-2: Lights connected with data pins.

Now we will know how to make list of reference. i.e Style of referencing.

Style of referencing

Some types of style of referencing are there in academic writing usually.

- Harvard style
- APA (American Psychological Association) style
- IEEE citation style

(a) Harvard style

Popular style using author-data system for text citations. It consists mainly-

In-text citation

- The author's last name and the year of publication in round brackets placed within the text. ( ) and page numbers if it is directly quoted.

In reference list References

- List should be ordered alphabetically by the last name of the first author of each work.
- No full stop and space between the initials.
- Last name comes first.

Example:

In-text citation	Reference list
---(Neville 2010) or Neville(2010, p25)	1. Neville, C 2010. The complete guide to referencing and avoiding plagiarism, Open University Press, New York.
In case 2/3 authors: Mitchell, Coyne and Thomson, 2007, p. 189)	Last name>initial>year>title of the book/work>comma(,)>publishers> location (town).
In case more than 3 authors:	

Mitchell el al (2017,p.189) or (Mitchell et al, 2017, p. 189)	

Et al – Latin Phrase, meaning "and others". Short list of authors' names.

For Journal article

Dismuke, C and Egede, L, (2015). Title of the paper, journal name, 7(5), pp.183-195. Vol. 7, Number (issue 5)

(b) APA (American Psychological Association) style

- Developed by the American Psychological Association. It is widely used style in the publication and social sciences.

In-text citation

Author's last name with comma (,) and the year of publication.

Reference list

Ordered alphabetically by the last name of the author with year within the bracket( ) of the first author.

Example:

In-text citation	Reference list
----(Noville, 2010) or Neville(2010) stated that "-----" (p.25).	Noville, C. (2010). The Complete guide to referencing and avoiding plagiarism (2nd edition).

	New York, NY: open University Press.

If Journals articles

1. Reference list

   4 authors:

   Hart D, keller, M, Edelslein,W, & Hofmann,V, (1998) Childhood Personality Influences on social-cognitive development: a longitudinal study, journal of personality and Social Phycology, 74, 1488-1289.

   More than six authors:

   1st, 2nd, 3rd, 4th, 5th, 6th authors name, el at (2000) an experimental evaluation of theory-based mother and mother-child programs for children of diverse. Journal of counselling and Clinical psychology, 68, 843-876.

   In-text citation:

   ---- as well, for example (Dering, Rossiter, & Munro, 2002; Thomas, 2004)----.

   --- Derwing et al. (2002) conducted ----.

   Et al – Latin Phrase, meaning “and others”. Short list of authors’ names.

(c) IEEE style citation

IEEE citation style is used primarily for electronics, engineering, telecommunications, computer science and information technology reports. The three part of a reference are as follows:

- Author's name listed as first initial of first name, then full last.
- Title of article, patent, conference paper etc. in quotation marks.
- Title of journal or book in *italics*.

Citation within the text

- Each citation must be noted within the text through use of simple sequential numbers.
- A number enclosed in square brackets [ ], placed in the text of the report, indicates the specific reference.
- Each reference number should be enclosed in square brackets on the same line as the text, before any punctuation, with a space before the bracket.

Example:

1. "The theory was first put forward in 1987 [1]."
2. "Scholtz [2] has argued-----"
3. "for example, see [7]."
4. Several recent studies [3, 4, 5, 15, 22] have suggested that…."

In reference list

Books: Single Author

[1] W. K. Chen, Linear Networks and Systems. Belmont, CA: Wadsworth Press, 2003.

Three or more Authors

[4] R. Hayes, G.Pisano, and S. Wheelwright, *Operations, Strategy, and Technical Knowledge*, Hoboken, NJ, Wiley, 2007.

Journal paper

(b) paginated by annual volume

[8] K. A. Nelson, R. J. Davis, D. R. Lutz, and W. smith, "Optical generation of tunable ultrasonic waves," *Journal of Applied Physics*, vol. 53, no. 2, Feb. pp. 1144-1149, 2002.

[9] R. W. Lucky, "Automatic equalization for digital communication," *Bell syst. Tech. J.* , vol. 44, no. 4, pp.547-548, Apr. 1965.

Title
Abstract
Key words
Introduction
Methodology
Results
Discussion/conclusion
References
Appendix

Results/Findings/Contribution of the project

Usually we prepare the document as -
Results or data analysis, discussion and Conclusion

In results/Data analysis, reports your comments on what you found/ observed.
In most of the cases, the results of the work can be given in graphs, equations, tables or images.

So why then should you bother to write a Results section again?

Results do not speak for themselves.
If they did, the tables, graphs, images would be enough.
Your readers do not have to agree with you but they need to know your comments/opinion and understanding of your results.

So it is clear that somethings cannot be achieved by just using tables, graphs, images of your results. They can be achieved only by using words (your opinion).
Importance:

- Your results may be more interesting or significant than others and it is difficult to communicate this results in a table or graph.
- Also, it is essential to relate your results to the aims or objectives of the project.

So, you are asked to answer the following questions:

- What types of information should be in this section and in what order?
- How do I end this section?

  This section contains some comments on what you found or observed rather than just a description of your findings and observations.

  Four basic components (menu) are given below, from which you select those items appropriate to your research topic and the journal you are submitting to.

- 1. Revisiting the research aim(objectives)/ existing research
  - Revisiting/expanding methodology
  - General overview of results
- Inviting to view results
  - Specific/key results in details with or without explanations
  - Comparisons with results in another research

- Comparison with model predictions

➢ Problems with results

➢ Possible implication, applications of results.

Results section (Model)

1. Data obtained in previous studies[1,2] using a fixed on-site monitor indicated that by car resulted in lower CO exposure than travel on foot.
2. According to Figo et. al.(1999), the median exposure of car passengers was 11% lower than for those walking[2].
3. In our study, modelled emission rates were obtained using the Traffic Emission Model (TEM), a CO exposure modelling framework developed by Ka[3].
4. Modelled results were compared with actual road side CO concentrations measured hourly at a fixed monitor.
5. Figure 1 shows the results obtained using TEM.
6. As can be seen, during monitoring peak-time journeys the CO concentration for car passengers were significantly lower than for pedestrians, which is consistent with results obtained in previous studies[1,2].
7. However, the modelled data were not consistent with these results for afternoon journeys.
8. Although the mean CO concentrations modelled by TEM for afternoon journeys on foot were in line with those of Fig el. Al., a striking difference was noted when each of the three peak hours was consider singly (Fig.2).
9. It can be observed that during the first hour (H1) of the peak period, journeys on foot resulted in a considerably lower level of CO exposure.

10. Although levels for journeys on foot generally exceeded those modelled for car journeys during H2, during the last hour (H3) the levels for journeys on foot were again frequently far lower than for car journeys.
11. A quantitative analysis to determine modelling uncertainties was applied, based on the maximum deviation of the measured and calculated levels within the considered period.
12. Using this approach, the uncertainty of the model prediction for this study slightly exceeds the 50% acceptability limit defined by Jiang.7
13. Nevertheless, these results suggest that data obtained using TEM to simulate CO exposures may provide more sensitive information for assessing the impact of traffic management strategies than traditional on-site measurement.

For implication and application of your results

These results nevertheless suggest that monitoring Unidentified Flying Object (UFO) activity may provide useful input for earthquake prediction strategies.

Writing the abstract

Readers should be able to understand the key point and results of the research even if they never see the whole article.

The abstract, in this sense is a representation of the research article.

The style and length of the abstract depend on where you plan to submit it and that decision may be taken late in or even after- the writing process.

You should not simply cut and paste whole sentences from body of the article.

The abstract does not contain materials which is not already in the paper. This means that you don't need to create completely new sentences.

You should select from relevant sections.

Abstract is easier to write that the rest of the paper.

You come to ask the following three questions:

- **How do I start the abstract? What type of sentence should I begin with?**
- **What type of information should be in the abstract and in order?**
- **How do I end this sanction?**

What information should contain in abstract section?

- **Background of factual information;**
- **Combination general aim and specific aim of the study;**
- **Summarization of methodology;**
- **Indication the achievement of the study;**
- **Presentation of implication/ application of the study.**

What to do I do if there were problem with my study-do I mention those in the abstract?

It is better not to say that something will be discussed. The abstract should provide/ summaries the exact details of your findings. Important implications, data and findings are included. Not left out. This includes problems, if (but only if) they were important and directions for future work.

But they are relatively rare in the abstract.

Model abstract-1

Using summary model.

Title: Physical properties of crude oil from acoustic measurements

1. **The speed of sound in a fluid is determine by and therefore an indicator of the thermodynamic properties of that fluid.**

2. **The aim of this study was to investigate the use of an ultrasonic cell to determine crude oil properties in particular oil density.**
3. **An ultrasonic cell was constructed to measure the speed of sound and tested in crude oil sample.**
4. **The speed of sound was measured at temperatures between 260 and 411 K at pressures up to 75 MPs.**
5. **The measurements were shown to lead to an accurate determination of the bubble point of the oil.**
6. **This indicates that there is a possibility of obtaining fluid density from sound speed measurements and suggests that it is possible to measure sound absorption with an ultrasonic cell to determine oil viscosity.**

Model -2

Using more common type of abstract.

Title: Effect of polymer coatings on drug release

1. **This paper reports the use of a novel water-soluble polymer blend as a coating to control drug release.**
2. **It was found that using a blend of methylcellulose and a water-soluble copolymer significantly slowed the release rate of ibuprofen compounds in Virto and allowed for amore consistent release rate of 10-20% hour.**

Use grammar/ verb/tense

- **If write gap/problem/background, use present simple tense**

Exam: This study reports an improved design for…..

- If refer methodology use past simple tense, use past simple tense

  Exam: the data obtained were evaluated using…..
- Results can be expressed in either present simple or past simple tenses.

  Examples: 1. We find that does not vary…….

  2. This findings correlated with…..
- Achievements can be expressed in present perfect tense or present simple tense.

  Example: We have demonstrated the feasibility of the approach by ….

  Exam: The algorithm presented here ensure that …..

- Application are stated in the present simple tense.

Example: This process is suitable for the production of …..

Example: This framework can be used to evaluate…….

Length of the abstract

The abstract usually has a strict word limit. Most are between 80—150 words and we written as a single paragraph.

Acknowledgement

- **Use singular heading, even if many acknowledgements.**
- **Avoid expressions such as "One of us (S.B.A) would like to thank…."**
- **Sponsor and financial support acknowledgements are included in the acknowledgement section.**
  For example; This work was supported in the part by the Bangladesh Open University under Grant BOU123456;
- **Researchers that contributed information or assistance to the project/article also be acknowledged in this section.**
- **Supervisor/guide and own university under whom you are working to complete the project also be acknowledged in this section**

Note that the acknowledgement section is placed at the end of the paper/document (if it is research article) before the reference section.

If it is project report/document, the acknowledgement section is placed in first before the content starts.

Model:

Acknowledgement

The author wishes to acknowledge and thank …… for…….

I would like to express my gratitude to my supervisor for……. I also thankful to my class mates and staff of BOU who provided research articles and input for completing this document over the semester.
The author also wishes to thank Librarian of the public library, Dhaka for providing materials and books.
The project work was supported in part by a grant from Bangladesh Open University, Gazipur.

For project report/document

Acknowledgement
Title
Abstract
Key words: PHP, Continuous Assessment, web-based, Online, off-line, On Air, Live, stream, video streaming
Introduction
Methodology (PHP)
Results
Discussion/conclusion
References
Appendix A
Appendix B
Appendix C