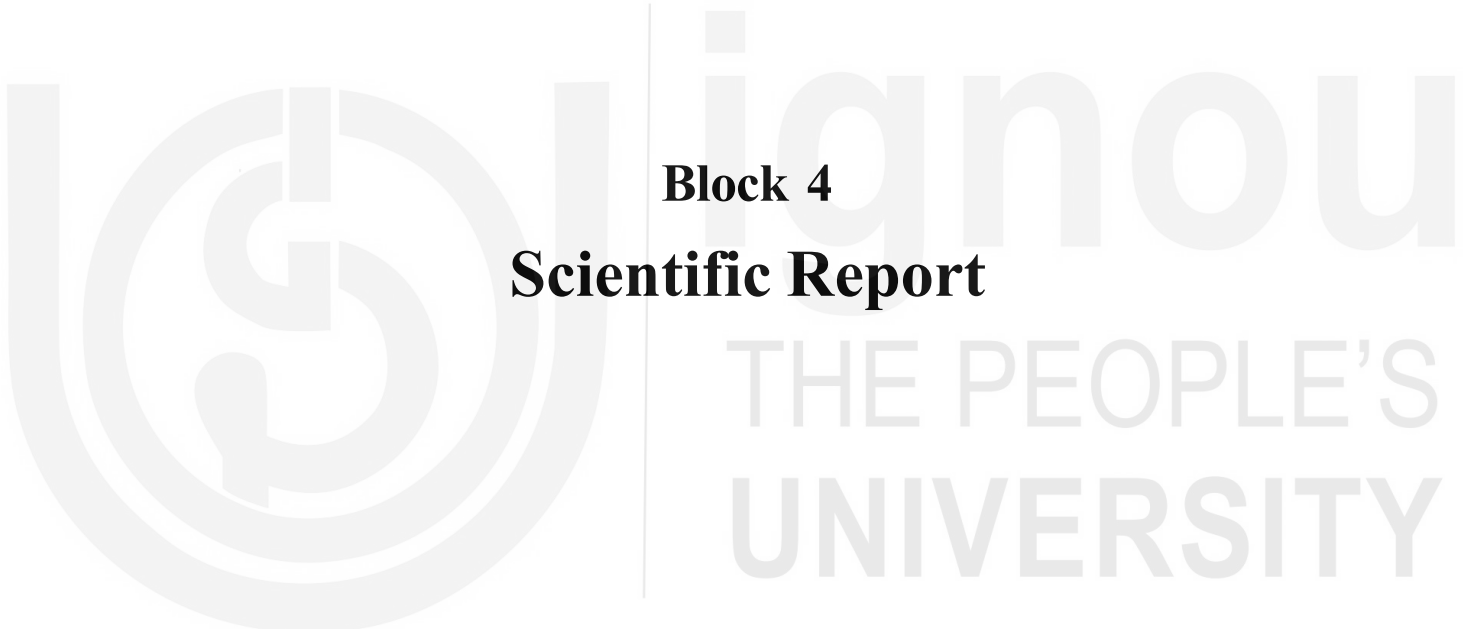


The background of the page features a large, light gray watermark of the Open University logo. The logo consists of a stylized 'U' on the left and the text 'Open University' on the right, with 'THE PEOPLE'S UNIVERSITY' written in a smaller font below it.

Block 4

Scientific Report

BLOCK 4 INTRODUCTION

Block 4 “Scientific Report” discusses the organisation of reports and thesis, broad contours of a research paper, the peer review process, ethics in research and publication and Intellectual Property Rights (IPR).

Unit 13 “Organisation of Reports and thesis” deals with the importance and types of reports/theses and how to effectively write and organize a report/thesis.

Unit 14 “Research Paper” deals with the outline of the research paper, the significance of writing a scientific paper, and the peer review process in a detailed manner.

Unit 15 “Ethics and Intellectual Property Rights” deals with the importance of ethics in research and publication. The unit also focuses on various ethical issues related to confidentiality, publishing, plagiarism, citation, reproducibility, copyright and intellectual property rights.

Objectives

After studying this block, you should be able to:

- explain the need and importance of reports and theses;
- describe a simple and effective method of writing reports and theses;
- explain the process of writing a research paper;
- outline the structure of the research paper;
- describe the process and types of peer review;
- explain the significance of ethics in research;
- explain ethical issues in research conduct and publication process; and
- explain the legal initiatives to protect intellectual property rights.

We hope that after studying this block, you will acquire an understanding of scientific reports, thesis, research papers, ethics and Intellectual Property Rights.

Wishing you success in this endeavour!

UNIT 13 ORGANISATION OF REPORTS AND THESES

Structure

- 13.1 Introduction
- 13.2 Objectives
- 13.3 What is a Report?
- 13.4 What is a Thesis?
- 13.5 Need for Reports/Theses
- 13.6 Difference between Report, Dissertation, and Thesis
- 13.7 Types of Reports
- 13.8 Types of Theses
- 13.9 Layout and Structure
- 13.10 Components and Language
 - 13.10.1 Academic writing style is formal
 - 13.10.2 Clarity
 - 13.10.3 Objectivity
 - 13.10.4 Accuracy
 - 13.10.5 Description and Narration
 - 13.10.6 Analysis vs Data dumping
 - 13.10.7 Cohesion and Brevity
 - 13.10.8 Citation of Sources/References
 - 13.10.9 Language Components
 - 13.10.10 Editing and Proofreading
- 13.11 Let Us Sum Up
- 13.12 Key Words
- 13.13 Suggested Further Reading/References
- 13.14 Answers to Check Your Progress

13.1 INTRODUCTION

"Writing is easy. All you have to do is cross out the wrong words..."

- MARK TWAIN

Communication is the very essence of human existence. Every species in the world communicates in its way for the sake of co-existence. The complex nature of the human environment warrants different methods of communication vis-à-vis verbal, non-verbal, written, and visual communication. Depending on the situation, time, need, and importance, any

of the four methods of communication can be used exclusively or in combination. In verbal communication, the message is transmitted through face-to-face communication in the form of oral discussions, discourses, meetings etc. In non-verbal communication, the message is transferred through physical movements like postures, gestures, and body language like a warm smile while greeting somebody. Visual communication is the transmission of messages through pictures, artwork, diagrams, graphs etc. and can complement other types of communication to deliver effective messages. For example, social media uses visual communication predominantly while combining other forms of communication as well. Written communication is the use of letters and symbols to convey a message. It is widely used in books, letters, e-mails, formal documents, minutes of meetings etc.

When the content to be communicated is complex and has to be read several times to understand, written communication is the most preferred. Writing can also be informal, such as writing letters to friends and family, and formal like business letters and reports. Thus, reporting is an important skill in whichever profession you belong to, be it a student, teacher, manager, journalist, employee or politician in public service. Regardless of the professions, we still may have to communicate some issues in writing for records as well as to bring clarity to the concerned problem at hand. As a student, the first report which we experienced is the Progress Report given to us by the teacher. It is a formal report of the students' progress which can be used for various purposes by the school. In the case of an employee, it could be an appraisal report which ensures, there can be a possibility of a pay hike/promotion/training, to be given to the concerned employee by the business establishment.

In this unit, we will look into the meaning, importance and types of reports/theses and how to effectively write and organize a report/thesis.

13.2 OBJECTIVES

After studying this unit, you should be able to:

- explain the need and importance of reports and theses;
- describe a simple and effective method of writing reports and theses; and
- structure the report/thesis for the desired purpose.

13.3 WHAT IS A REPORT?

The word 'report' originated from the Latin word 'reportare' which means to carry back (re = back + portare = to carry). In old French 'report' means 'an account brought by one person to another'. By the 15th century 'report' was given a more formal meaning as information from a reputable source or authority (Harper, D., n.d.). A report is thus a piece of information about an event or situation that is carried back to the person who was not present in the

event. It can be news being reported to the public, an investigative report to an authority or a piece of information regarding an event that has happened or will happen in the future. According to Sharma and Mohan (2017), a report *"is a formal communication written for a specific purpose; it includes a description of procedures followed for collection and analysis of data, their significance, the conclusions drawn from them, and recommendations if required"*. In formal contexts like office establishments, minutes of meetings, letters, e-mails, and project developments will fall under the category of reports.

Some of the reports of international organizations include the World Development Report by the World Bank, the World of Work Report by the International Labour Organization (ILO), the Global Corruption Report by Transparency International, and the Global Competitiveness Report by the World Economic Forum (WEF). Reports are thus an important part of our daily decision-making.

13.4 WHAT IS A THESIS?

The word "thesis" is derived from the Greek word "tithenai" meaning "to place or to put forth" something. In modern times, 'theses' plural for 'thesis' is referred to as "a long piece of writing on a particular subject that is done to earn a degree at a university (Merriam-Webster, n.d.). Graduate students in many colleges, have to, write a thesis on a topic of their specialization or major during their final year at the college. Since it involves a sound knowledge of the subject and research skills, it can be a formidable task to complete the research thesis if not done systematically.

13.5 NEED FOR REPORTS/THESES

Reports are essential for the success of organizations or institutions. There are various reasons for business organizations, educational institutions and national/international organizations to prepare or seek reports. According to Forsyth (2013), some of the important reasons for the preparation of reports are to:

- inform;
- recommend;
- motivate;
- prompt or play a part in debate;
- persuade;
- impress;
- record;
- reinforce or build on existing situations or beliefs; and
- instruct.

Looking into the wider scope of the report writing, one should also understand that majority of the reports have more than one reason and are thus effectively used for decision-making in organizations. For example, at the individual level, a progress report can be used to inform the progress of a student, recommend a promotion to the next grade, motivate the student and at the same time help in giving directions for a future corrective course of action, if any. In a broader sense, the student's progress and their employability and job skills would help the government to frame educational policies that enhance their knowledge and skills necessary for socio-economic development. Writing reports is thus a crucial part of the research. All the efforts made by the student/researcher can be highlighted and communicated to the concerned authorities only through writing effective reports or theses.

For instance, the Centers for Disease Control and Prevention (2022) in the United States of America (USA) have the 'COVID-19 Vaccine Reporting Systems' which educates the citizens on covid-19 vaccines, their types, side-effects, allergic reactions, safety protocols to be followed and many questions related to vaccines. The covid-19 vaccination reports of the Indian government are available through applications like Aarogya Setu and the website of Mygov (an online citizen forum supported by the Government of India).

12.6 DIFFERENCE BETWEEN PROJECT REPORT, DISSERTATION AND THESIS

Academic research reports can be of different types like project reports, dissertations and thesis. In India, the term 'project /research report' is used in the context of professional degree programmes like engineering, where the student is supposed to submit a report on the topic of their specialization to get the degree. Indian universities use the term 'thesis' at the doctoral level. In Britain, the term 'dissertation' is used at the master' level and 'thesis' at the PhD or doctoral level. However, science and engineering courses at the master's level in some universities in India use the term 'dissertation' as in Britain. But in the case of universities in the USA, the meaning of the terms are reversed -- the term 'thesis' is the final report for the master's level qualification and 'dissertation' is at the doctoral level.

Both the terms 'dissertation' and 'thesis' are together called 'thesis' by some universities across the world, though they acknowledge the differences by using the words master's and doctoral before the thesis. The crucial part of a doctoral thesis is the public oral defence or justification of the thesis to be accepted by the University, whereas for master's theses, the defence or justification happens at a closed level before the examiners. Universities generally have a standard framework and layout of the report/ dissertation/ thesis which is more or less the same for master' and doctoral programmes

except for the length of the report, complexity and the originality of the research.

In this Unit, we will use the term 'theses' from a post-graduate point of view and understand the structure and layout of theses at the post-graduate / master's level.

13.7 TYPES OF REPORTS

There are several types of reports that are used in formal and informal contexts. Reports can be both oral and written. Oral reports can save a lot of time as the information is conveyed directly to the concerned person. An example of an oral report could be a student reporting to the teacher or the entire class regarding his/her project progress. In most cases, it requires a lot of concentration on the part of the listener and cannot be listened to again (unless it is recorded), if we need more clarity on the content. Oral reports are good as long as it is short and simple and are directed at the audience who is ready to receive them.

Sharma and Mohan (2017) have divided report types into three categories based on their content and purpose. They are:

- informational;
- interpretive; and
- routine reports.

Let us discuss the report types in the ensuing paragraphs:

Informational reports include facts and figures in an organized manner without any investigation and recommendations. For example, annual reports of a business enterprise include the overall performance of the enterprise in the previous year, its financial condition in the present and also the prospects of the enterprise in a clear, visually appealing format and much other necessary information for the stakeholders. Other reports like activity reports, progress, and conference reports come under this category. The information given should be specific, complete and useful for the reader to make desired choices.

Interpretive reports along with the information report data contain details of evaluation, analysis, interpretation, and recommendations. Reports like market analysis, feasibility reports and investigation reports give detailed information about the problem, interpret the problem and recommend corrective actions that need to be taken by the management. This will help the management/reader to make informed decisions.

Routine reports are reports that are written strictly according to the given format. The reports are very brief and contain items that are listed in the format. The required data is check marked in the list and may also include

summary remarks or opinions, if necessary. This is mainly to record details which have to be maintained periodically. These reports have the elements of informative and interpretive types as well but owing to their regularity they come under the routine category. Periodic reports, inspection reports, and laboratory reports all fall under this category.

Besides the above-mentioned report types, research reports which belong to the interpretive report category can be classified into two types: Technical Reports and Popular Reports (Kothari, C.R., 2004). Technical Reports use specific methods for the research with assumptions, limitations and findings. Generally, such reports require some technical knowledge to understand. However, Popular Reports are simple, attractive and have implications for practical value and policy making.

Check Your Progress 1

Note: i) Use the space given below for your answers.

ii) Check your answers with those given at the end of the unit.

1. What do you understand by the term 'report'?

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2. Explain the need for reports in the digital age with a suitable example.

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3. Briefly describe the term interpretive reports.

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13.8 TYPES OF THESES

The thesis can be of different types depending on the content and purpose of the research. Based on the content, research theses can be divided into two major types (the University of Nebraska at Kearney, 2008). They are:

- (i) Qualitative theses and
- (ii) Quantitative theses.

Some theses (mostly doctoral) can include the essence of both qualitative and quantitative theses but the post-graduate / master's theses may generally focus on any one of the above types.

(i) Qualitative theses are also called creative theses which include different ways of exploring the topic by the students. The qualitative or creative theses may be descriptive, exploratory, analytical, or creative and are mostly used by humanities and social sciences subjects at the graduate level. Subjects like anthropology, sociology, management and political science can have topics of qualitative research. They deal with general issues like lifestyle, day-to-day problems faced by society etc. and try to find solutions through in-depth analysis of the problem at hand.

For example: 'A study on the ageing population and its impact on the society.

The above qualitative study clearly cannot use any scientific instruments or scale for measuring the impact of an ageing population. Rather they use survey questions/interviews as instruments to provide a solution

(ii) Quantitative theses use data or measurements which are obtained from instruments, such as scientific devices and mathematical models. The focus is more on quantifying the data and analyzing it using statistical methods (for selecting the sample, testing hypotheses, deducing inferences and the like). It is more experimental. Of late, social sciences have also been implementing quantitative techniques to analyze the numerical parts of qualitative data. Sciences including medical science and mathematics use quantitative methods.

For example: 'Measuring the efficacy of 2 different antacid drugs on the control group vs the experimental group'.

In the above quantitative study, the researcher may have to use specific lab instruments / medical equipment to test the group of people on the efficiency of the drugs and use statistics for standardizing the drug levels.

Thus, it is important to research and discuss with the supervisor which type of thesis one has to choose. It also depends on the research topic that is being chosen. Be it qualitative or quantitative, apart from the general framework, the specific details of the theses have to be obtained from the concerned university/department supervisors. The structure and layout of the theses of both types may slightly differ, but there are some common themes which have to be adhered to.

13.9 LAYOUT AND STRUCTURE

Taking into consideration the various types of reports, the layout and structure may be different for different purposes. Despite their differences, the academic reports commonly follow a standard format for the submission of the thesis. A master's thesis is mainly for the graduate student to produce a scholarly work in their subject area and demonstrate their strength of knowledge.

The structure and layout of the thesis refer to the systematic arrangement of the content that makes it interesting and easy for the reader. The structure and layout are crucial for understanding the master's thesis and reaching out to the concerned supervisors effectively. It refers to the number of paragraphs, tables and images that needs to be incorporated into the content.

Apart from the structure, the layout refers to the arrangement and design of the thesis which makes the content display formal and presentable for the readers and befits the purpose of the study. In short, the structure and layout refer to the overall flow of the research process which starts right from choosing the research question to the presentation of the findings of the research.

A master's thesis has to follow a standard structure for evaluation. Normally, the college or university gives the students official guidelines for the submission of a thesis. The university gives the preferred template of the theses. According to Kothari (2004), the layout of the thesis generally includes the preliminary pages, the main content pages, and the end pages.

Structure and layout of the thesis

- The preliminary pages
 - ◆ The **title** page/cover page
 - ◆ Acknowledgement page
 - ◆ **Abstract** (or the executive summary)
 - ◆ Table of **contents**
 - ◆ List of **figures**/list of tables
- The main content pages
 - ◆ Chapter 1: **Introduction**
 - ◆ Chapter 2: **Literature review**
 - ◆ Chapter 3: **Methodology**
 - ◆ Chapter 4: Research **findings**/results/Data analysis
 - ◆ Chapter 5: **Discussion**/analysis of findings/interpretation
 - ◆ Chapter 6: **Conclusions** and Recommendations

- The End pages
 - ◆ Reference list
 - ◆ Appendices
 - ◆ Glossary

Let us understand the above segments in detail.

The Preliminary Pages

The preliminary pages contain the ‘The **Title Page**/Cover Page’ which has the topic, the date, names of the researcher, supervisor and the university.

The next page contains the ‘Acknowledgement Page’ in which the researcher thanks the people who have supported them in their research. It is customary to thank the supervisors, other professors who have clarity on the topic, institutions or people who supported the study and all those who played a part directly or indirectly in the research.

It is followed by the ‘Abstract Page’ where a summary of the research process is provided along with an introduction, purpose, key findings and implications. This should give a glimpse of the research in short for the readers. Generally, the abstract is written after all the writing parts are completed. This will help in writing the overview of the research concisely.

Next in line is the ‘**Table of Contents, followed by the ‘List of Illustrations/List of Tables’** along with the page numbers to make the reader find it easy to go to the concerned charts/tables for further detail.

The Main Content Pages

The main content pages include five or six chapters depending on the preference of the universities. It includes the following chapters to be written by the graduate student and facilitates the research to be explained based on a standard structure.

Chapter 1: Introduction

In the introduction, the researcher introduces the topic, the reasons behind the topic chosen and the purpose of the study. It should also contain the research questions, and research hypothesis framed for the study and goes on to explain the gap in the existing research. This is followed by the limitations and delimitations of the research. Limitations are the weaknesses in the research due to time limits, limited access to data, lack of funds and the like which are not under the control of the researcher but may influence the outcome of the study. Delimitations are the factors that are completely under the researchers’ control, like choosing a particular area of study, using specific research methods or excluding some resources.

Chapter 2: Literature Review

This chapter includes the research studies related to the chosen topic and its implications for the present research both in theory and practice. The key points can be explained through charts or images and organized into themes and paragraphs to give a holistic view of the topic. It includes the recent research and also important milestones on the topic of research collected from books and various sources.

Chapter 3: Methodology

This chapter deals with the research methods/design used in the study and is key for the examiners to evaluate the scientific basis of the study. It includes the data collection methods like surveys, interviews, etc. and how the methods match with the purpose of the thesis. It talks about the samples (selected representatives from a larger population) used, their relevance for selection, credibility (for qualitative studies), reliability, statistical analysis (for quantitative methods) used for the study, and the ability to generalise the research findings in another situation.

Chapter 4: Research Findings/Results/Data Analysis

This chapter includes the findings of the research process and the statistical analysis of the data. All the elements should be stated through tables and figures for better understanding. The content display should be logical and data can be presented based on the research questions or the hypothesis. It should answer all the questions studied and fulfil the purpose of the research findings. The presentation can have separate headings to facilitate a better understanding of the data. Some universities as discussed earlier, suggest combining chapters four and five to form a single chapter namely 'data analysis and interpretation'.

Chapter 5: Discussion/Analysis of Findings

Chapter five includes findings of the research study through discussion and interpretation and its implications. This chapter is explained in a simple and effective style, which is also convenient for the general readers to understand.

Chapter 6: Conclusions and Recommendations

The conclusion of the study is written by summarizing the main points of the research and recommendations, for the benefit of the stakeholders. It contains a complete overview of the research questions, their implications in the real world, the scope of the study and its importance in furthering the research. The stakeholders are mainly interested in the real-world usability of the research.

The End Pages

The end pages of the theses include the references, appendices and glossary.

Reference List

The reference list includes the primary sources of the research study, like the original documents and secondary sources like the books, journal articles, and websites which have helped directly or indirectly in the research study. The references should be written based on the formats of the American Psychological Association (APA), Modern Language Association (MLA) or other guidelines as given by the University, failing which the theses would not be accepted as authentic by the research committee.

Appendices

Appendices include the relevant articles, survey questionnaires and any other information that are a useful resource for the research. They can be added for additional information or their significance in the research study.

Glossary

The glossary includes the definitions and meanings of the research terms used in the study in the context of the research. It may contain new terms or technical terms that need to be clarified to comprehend the research.

13.10 COMPONENTS AND LANGUAGE

As discussed earlier, the main aim of report writing is to communicate the event or the issues at hand in a simple and clear language. Language is fundamental for human communication be it talking or writing. Depending on the situation, language can be used in a formal or informal context. We have seen the different types of report writing and how based on the purpose, the writing style is different. In this section, we will look into the components and the language involved in academic writing style, grammar, vocabulary, spelling, punctuation, paragraph etc.

Unlike other forms of writing, academic writing has to follow some of the basic conventions. Academic writing differs from journalistic writing and creative writing. In journalistic/creative writing, the people or the writer takes the centre stage more than the writing itself. In the case of academic writing, the ideas take the centre stage and writers are in the background (Monippally & Pawar, 2010). This implies that the idea and the logic behind the writing are more important than the writers' own emotions and feelings behind the idea.

For this purpose, certain notions are followed to maintain the standards of writing and to give the right meaning in the right context. This helps in the interpretation of the content exactly as it is supposed to be understood. In the case of journalistic and creative writing, there is way more meaning given to the content depending on the words used, the context and the author.

According to Klein (1965), academic writers need to have orderly thought processes, organise data, analyse, sort out, discern, discriminate and discard unnecessary details to achieve their research processes. Some of the basic components of academic writing include the writing style, clarity, objectivity,

accuracy, description and narration, analysis vs data dumping, cohesion and brevity, and citation of sources. Let us examine these components in the following section.

13.10.1 Academic writing style is formal

Academic writing, including thesis writing, is mainly for communicating scientific knowledge that is tested empirically or conceptually. Hence, the writing has to be formal which means that contractions are not used while writing. For example, the words like 'can't', 'won't' and other words used in oral communication are not used. Similarly, colloquial expressions like 'buck' for a dollar and 'vax' for a vaccine are not to be used in the theses. Researchers avoid using dramatic language as in creative writing and focus on appropriate words to be used to interpret it correctly. For example, let us look into the following table.

Table 13.1 Other Types of Writing and Academic Writing

Other types of writing	'He was back with a bang with his unbelievable goal'.
Academic writing	'The player made a significant comeback with a winning goal'.

In the above example vis-à-vis Academic Writing, the word 'back with a bang' is replaced with 'significant comeback' and the words 'I, We, He' are very sparingly used and unlike other types of writing, emphasis is given to the content rather than the player and the emotions involved.

13.10.2 Clarity

The theses need to be presented in clear and simple language. There cannot be any ambiguity in writing, resulting in misinterpretation and misrepresentation. To enhance the clarity of data, pictures and charts can be made use of, as it looks orderly and easy to interpret.

Let us look into the following statement:

'The officer was critical after training'.

In the above sentence, the word 'critical' could convey two meanings depending on the context. The meanings could be interpreted as follows: Either the officer was 'not happy' with the training (or) the officer was 'critically ill or unwell' after the training programme. Therefore, the statement should be clear enough to give the correct meaning.

13.10.3 Objectivity

The researcher may seem to be very enthusiastic and excited about his/her ideas. The research would have been done systematically and the much-desired results are achieved, but still, there is scope for improvement as there

could be several limitations while conducting the survey or the experiment. Taking into account all the factors that cannot be controlled, the statements made are generally tentative. For example, look at this statement - 'Online learning seems to be gaining ground' is written instead of 'online learning is gaining ground'. The reasons for the popularity of online learning could be the pandemic, a greater number of adult learners, flexibility in learning and flexible timing, etc. There could be themes under online learning that were not covered in the research due to various reasons like lack of technology, lack of funds etc. Unless all the factors are taken into account, it is not possible to make an authoritative statement. So the terms 'seems to be', and 'could be' are used instead of command statements.

13.10.4 Accuracy

Another factor in theses writing is the accuracy of the facts, which gives credibility to the research. Researchers should not write the words like 'many', 'quite a few' and the like. One needs to be exact in using the facts. For instance, instead of using 'many students benefited from the online learning programme', it is best to use 'nearly 80 per cent of the survey students benefitted from the online learning programme'. Similarly, it is best to use percentages or numbers rather than the term 'quite a few'.

13.10.5 Description and Narration

In the case of academic writing, description and narration are the foundation for the main research. Description deals with how something is done, the steps, and the nature of the survey or experiment in a factual way. Similarly, the narration is used to give the background of the study as well as the progress of the study. For instance, in the job satisfaction survey that was conducted by a researcher, the factors like salary, education level, work-life balance and career development were studied. However, factors like urban-rural location, and work environment were not included in this survey as it is located in the heart of the city and a technology hub. In the above paragraph, the factors that are included/excluded are written which enhances the understanding and scope of the research.

Both description and narration prepare the readers for the actual analysis and interpretation by painting a factual picture of the research process. Because they are based only on facts, they help in the replication of the research survey/experiment that is conducted. This ensures that the examiners evaluate the research objectively.

13.10.6 Analysis versus Data Dumping

The analysis is the core of the research process. After collecting data, it has to be analyzed with its pros and cons, develop reasons and provide supportive evidence to prove the point. While analyzing, one should be aware to use only the relevant information instead of dumping data.

In the process of obtaining data, one may come across many original data or facts that are not important or directly related to the present research. These facts are not to be used as they may result in giving away too much information without any reason and may prove to be a distraction to the readers. According to Rogers and Rymer (1995), in analytical writing, the writer has to evaluate ideas, assume a position, develop reasons and examples and organize the material logically. Hence, the analysis has to be systematic and logical as it is the essence of academic writing.

Steps in the analysis of data:

1. Determine the problem statement.
2. Collect data from reliable sources.
3. Narrow down the data to its essential factors by removing errors, duplicates and unnecessary details.
4. Structure the data by themes, and evaluate and interpret them.
5. Check with your supervisor and stakeholders for the conclusion.

13.10.7 Cohesion and Brevity

Academic writing has to be cohesive for the theme to be understood clearly. Cohesion is the ability to connect one idea with the other and bring out a smoothness in the paragraph that is written. There is unity in the structure of the paragraphs with the sentences well connected using connectors like 'however', 'besides', 'but' and thus meaning is drawn from the sentences. Similarly, brevity is an important tool in maintaining the pace of writing. All unnecessary explanations are reduced and only the essential words are used. This not only reduces the number of words but the problem is clearly stated and the solution/evidence is provided without any distractions. After the paragraphs are written, they have to be revised before the final draft is ready. This will greatly reduce the words and make the contents brief.

13.10.8 Citation of Sources/References

Any academic paper or thesis contains a list of references towards the end of the paper. This is because, when we use some other author's ideas without giving their name and project it as our idea it becomes theft. The copying of others' ideas is called plagiarism. The references give credit to the ideas and opinions taken from other writers. Monippally & Pawar (2010) opine that referencing is the central characteristic of academic enquiry. For instance, the book on 'Scientific Management' was written by Frederick W. Taylor. When the word 'scientific management' or any other ideas related to it is used, it has to be credited to Taylor as the term was coined by him.

Importance of References:

- It gives credit to other writers for their ideas by acknowledging them;

- It makes the writer's content reliable and authentic;
- It helps in preventing plagiarism.

Citations are mainly used to support and provide evidence to one's ideas from another relevant research. They provide background information on the chosen topic while writing the literature review. Referencing is key for the credibility of the study as it addresses the gap/continuity of the research in the past and present. There are several styles of referencing like the American Psychological Association (APA), Modern Language Association (MLA), Harvard style, Chicago manual of styles, etc. The graduate students should follow their respective university guidelines for using a particular style of writing.

Example:

Sentence Style 1: The development of workers is one of the main principles of scientific management (Taylor, F.W., 1911)

Sentence Style 2: Taylor, F.W. (1911) has written that one of the main principles of scientific management is the development of the workers.

The above sentences (Sentence Style 1 and 2) credit the author 'F.W. Taylor' for his opinion on scientific management. The year is given right next to the author's name and the book that is referred to is given at the end section of the book. Taylor, F.W. (1911) is the in-text citation while the complete reference is written as follows: Taylor, F.W. (1911). Scientific Management. New York: Harper.

The above reference is in the American Psychological Association (APA) style. It shows how the authors' name, their initials, year of the book, the book name, editions, publishers name and place of publication are to be mentioned. This unit and the references written at the end of the unit, are all written in the APA style of referencing. The style guide to referencing gives clear instructions for citing books, journals, websites and other sources in detail.

13.10.9 Language Components

Whatever style and format theses are written in, the grammatical components are important for the contents to be understood in the right manner. Some key aspects of language used in thesis writing are grammar, vocabulary, spelling, and punctuation. Grammar is a set of rules that help in the framing of sentences, phrases, and words. Hence, proper use of grammar is crucial for the clarity of the contents. The readers may misunderstand and sometimes be annoyed at the wrong use of grammatical structures.

Sentence Types

There are different types of sentences based on purpose, kinds of clauses, etc. Based on the kinds of clauses they can be classified as simple, compound,

complex, and compound-complex. Based on purpose, a sentence can be classified as a statement, a question, an exclamation, and a command. The researcher may have to use all these types, though simple sentence types are rare in thesis writing, due to the in-depth analysis involved. A basic understanding of grammar is sufficient to help write the sentences clearly and correctly.

Paragraph

A paragraph is a section that deals with a single theme and are connected by several sentences related to the theme. Each section of the thesis consists of several structured paragraphs that are well connected. Paragraphs need to be clear, concise and use logic in expressing ideas.

Some of the ways of developing paragraphs are:

1. Defining the idea/concept/problem;
2. Explanation;
3. Giving examples for clear understanding;
4. Comparing and contrasting two concepts;
5. Listing the ideas one by one; and
6. Analysis

The variety in expressing the ideas holds the interest of the examiners as well as readers in the topic.

Vocabulary, Spelling and Punctuation

Theses writing makes use of academic vocabulary to explain the research related to the subject. Some of the general academic vocabularies are the scope of research, aim, statement etc., which are used in all types of theses. Similarly, some technical vocabularies can be contextually understood only by professionals and are specific to the subjects. For example, the terms like species and classification are used in biology. Likewise, programming languages and testing are used in computer sciences.

Research writing is a complex set of ideas put forth simply. One needs to balance the complex technical terms with simple interpretation in the end chapters to make it easily understandable for the layperson. Similarly, spelling and punctuation marks in the right places go a long way in making the writing interesting. The students should go beyond the MS Word spell check feature and other apps and should check word by word to ensure there is accuracy in the spelling, punctuation and whether the words convey the right meaning that is to be conveyed.

13.10.10 Editing and Proofreading

After the final draft is ready, the next step is editing, followed by the proofreading of the document. Editing is the cautious review of the written document. The focus is on editing the structure of the theses, for instance, checking whether the structural guidelines/orders are followed in the document, the tables and charts are according to the flow, captions are used in the tables and charts, the page layout, in-text citations/references are clear, etc. Once the structure is aligned, the grammatical components have to be looked into and checked for spelling, capitalisations, grammatical errors, abbreviations and numbering.

After editing and checking for accuracy and completeness of the theses, the next step is proofreading. Proofreading is the last step of the almost final document in which final reading is given to the theses as a whole, right from the structure, layout and language components of the document. The thesis is now organised and ready for submission.

Check Your Progress 2

- Note:** i) Use the space given below for your answers.
ii) Check your answers with those given at the end of the unit.

1. Justify the need for analysis against data dumping in thesis writing.

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2. What is the rationale behind the writing style in academic writing?

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3. Explain the relevance of citations in thesis writing.

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13.11 LET US SUM UP

From ancient times, communication has played a major role in the sharing of knowledge through various modes. Written communication specifically academic reports are formal and provides a sense of authority when endorsed by formal institutions. These reports/theses have a wider scope to build academic and scientific knowledge apart from providing specific solutions to the problems faced by society and institutions. Depending on the problem, the graduates may have to choose the type of theses to be written and use logic and reasoning to create an academic document specific to their needs be it for a graduate degree or a doctoral degree. This creates the need for specific structures and layouts that are used by academic institutions. The structure and layout provide a set of guidelines for the writers, which makes it easy for effective evaluation and communication. While organizing a thesis, importance is given to the way the writing style is put forth. Apart from several components, analysis and interpretation are emphasized as they bring out the originality of the research that is unique to the researcher.

The next in importance is the references section which brings more relevance to the research and its application in the present-day scenario. Apart from the style components, the grammatical components increase the simplicity and understanding of the research study and help in reaching out to the wider section of society. The researcher thus has to ensure his writing is simple and effective without errors and at the same time use appropriate tools including the use of graphs and charts to enhance the presentation.

13.12 KEY WORDS

Report: It is a formal communication written for a specific purpose; it includes a description of procedures followed for the collection and analysis of data, their significance, the conclusions are drawn from them, and recommendations, if required.

13.13 SUGGESTED FURTHER READING / REFERENCES

Centers for Disease Control and Prevention. (2022, January 4). *COVID-19 Vaccine Reporting Systems*. Centers for Disease Control and Prevention. Retrieved January 6, 2022, from <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/reporting-systems.html>

Forsyth, P. (2013). *How to Write Reports and Proposals*. London: Kogan Page

Harper, D. (n.d.). *The etymology of report*. Online Etymology Dictionary.

Retrieved December 17, 2021, from <https://www.etymonline.com/word/report>

Klein, L. R. (1965). Writing problems in the Social Sciences. *Journal of Business Communication*, 2(1), 1–9. <https://doi.org/10.1177/002194366500200101>

Kothari, C. R. (2004). *Research Methodology: Methods and techniques* (2nd Ed.). New Delhi: New Age International (P) Limited.

Merriam-Webster. (n.d.). *Thesis*. In *Merriam-Webster.com dictionary*. Retrieved December 27, 2021, from <https://www.merriam-webster.com/dictionary/thesis>

Monippally, M. M., & Pawar, B. S. (2010). *Academic writing: A guide for management students and researchers*. New Delhi: Sage Response.

Parija, S. C., & Kate, V. (2018). *Thesis writing for masters and Ph.d. program*. Springer.

Rogers, P. S., & Rymer, J. (1995). What is the relevance of the GMAT Analytical Writing Assessment for Management Education? *Management Communication Quarterly*, 8(3), 347–367. <https://doi.org/10.1177/0893318995008003004>

Sharma, R. C., & Mohan, K. (2017). *Business correspondence and report writing: A practical approach to business & technical communication*. 5th Ed. New Delhi: Tata McGraw-Hill

The University of Nebraska at Kearney. (2008). *Guidelines for the Preparation of Your Master's Thesis*. Retrieved from <https://www.unk.edu/academics/gradstudies/admissions/grad-files/Grad%20Files/ThesisGdlnsFinal08.pdf>

13.14 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

- 1) Your answer should include the following points:
 - (i) It is a piece of information about an event or situation.
 - (ii) It is a formal communication written for a specific purpose and includes collection and analysis of data, their significance, conclusions and recommendations.
 - (iii) It comprises formal reports like minutes of meetings, letters and emails and informal reports like newspaper reports.
- 2) Your answer should include the following points:
 - (i) The need for reports in organizations in general and as given by Forsyth (2013).
 - (ii) Examples: Covid vaccination reports.
- 3) Your answer should include the following points:
 - (i) The details are included in interpretive reports.
 - (ii) The examples of interpretive reports used on a day-to-day basis.

Check Your Progress 2

- 1) Your answer should include the following points:
 - (i) Analysis and its importance in research writing.
 - (ii) How data dumping distracts the readers while steps in the analysis are structured helps in the organisation of ideas.
- 2) Your answer should include the following points:
 - (i) It brings in formality and simplicity.
 - (ii) It calls for focus on the research rather than a distraction.
- 3) Your answer should include the following points:
 - (i) It provides credibility.
 - (ii) How citation avoids copying of ideas.



UNIT 14 RESEARCH PAPER

Structure

- 14.1 Introduction
- 14.2 Objectives
- 14.3 Reasons for writing a research paper
- 14.4 Writing Process
- 14.5 Format of the research paper for scientific journals
 - 14.5.1 Introduction
 - 14.5.2 Body
 - 14.5.3 Conclusion
- 14.6 Plagiarism
- 14.7 Peer review
- 14.8 Let Us Sum Up
- 14.9 Key Words
- 14.10 Suggested Further Reading/References
- 14.11 Answer to Check Your Progress

14.1 INTRODUCTION

It is pertinent to communicate the research findings, describe the details of the methodology, and explain the process of conducting the research to the fellow scientific community. Publishing the research findings and the entire research process in the scientific research journal in a written form is the final step in conducting the research. Researchers prepare a research design to conduct the research. Research design comprises the topic of the research, objectives of the research, sampling and methodology. Researchers regularly document the findings and may prepare the report to circulate among their colleagues in their organizations. The purpose of conducting the research is to find an answer to a specific problem in a structured manner. Once we find an answer to the specific problem, it needs to be communicated to the scientific community for information and the benefit of society. You have already read about research design, sampling and literature review in the previous units of this course. The present unit will discuss the outline of the research paper, the significance of writing a scientific paper, and the peer review process in a detailed manner.

14.2 OBJECTIVES

After studying this unit, you should be able to

- examine the reasons for writing a research paper;

- explain the writing process;
- outline the structure of the research paper; and
- describe the process and types of peer review.

14.3 REASONS FOR WRITING A RESEARCH PAPER

The final and significant phase of completing the research is to write a research report and publish a research result as a research paper in a scientific journal for reading. In this unit, we are discussing the content and structure of the scientific research paper. As we learned, writing a research paper is to communicate the research findings to the academic community and other interested general readers. Research is a process. Once we formulate the research questions and finalize the research topic, we must prepare a research proposal. The research proposal is a blueprint for doing research. They start documenting the entire research process once we get approval to carry out research from a supervisor or head of the department or funding agency, or parent institution. They must record everyday activities of research and results obtained from the experiments irrespective of whether they are doing natural or social science research carefully. The researcher will prepare the final research paper based on the report prepared by the researcher daily for the entire research process. The learner must recognize the difference between preparing a research report and a scientific paper. The research report contains the need for starting the research, research findings, a detailed description of the research process, steps in doing research, presentation of data, inference, interpretation of data, findings, conclusion, appendix and references. Unlike a research report, the scientific paper has an introduction, body of the paper and conclusion apart from the abstract and references. The research report may be circulated to a limited audience, the institute, and funding agencies. Unlike a research report, a research paper is meant for a wider audience. The research paper tells the audience what the researcher did (process and methodology) and what the researcher found through experiments or data. The research paper plays a significant role in binding the scientific community. It is a way of addressing the scientific community regarding specific problems and the scientific findings to address the problem. Communicating the results of the research study is the primary objective of doing the research. It is the final stage after completing the research study.

14.4 WRITING PROCESS

Before we look into the research paper's outline or structure, let us briefly learn about the writing process. Researchers write a scientific research paper for a specific audience. Thus, communication should be clear, specific, accurate, authentic and well organized. The researcher must logically arrange

the entire research paper. The language should be straightforward, and there is no need to explain the scientific terms and concepts used in the research paper except for the concept specifically used to interpret the data or as part of the theory. The researcher must provide references when they define the concepts, and the researcher must expressly point out whether the explanation of the concept is borrowed or explained by the researcher. Unlike explaining the concepts, the researcher must explain the existing theory briefly and explain how far they could advance the existing theory in the present research. A detailed description of the methodology is essential. If it is experimental research, the procedure to carry out the research needs to be explained in detail. Unlike experimental research, if the researcher carries out the research by collecting data from the field and secondary sources, the researcher must explain the data collection methods, measured variables and data analysis. The data analysis and discussion should be written extensively. Some research scholars might have prepared extensive tables based on laboratory results and primary data. The researcher should present a single master table with comprehensive data. The rest of the tables may keep in the annexures. When you write the results and discussion, the scholar should not overgeneralize the data.

The writing style must be simple, and we must write the sentence in an active voice. It should be formal and professional. We must inform the intended audience of the results and research process, not advocate one's position. The research paper should be accurate and clear. The details should be checked and rechecked clearly. The citations should be mentioned clearly, and accurately and the page number of the cited references should be given if the specific journal asked the researcher to mention them. If there is a mistake in the research paper, it may lead to questioning the entire research as well as the validity of the research. The researcher must understand that the writing does not happen immediately after taking pen and paper to write or immediately after opening the computer to type in a word file. One must organize their thoughts before writing a research paper. Developing an outline before starting writing a research paper will facilitate the researchers to focus on specific aspects. The outline may help the researchers to organize the entire research paper. The researcher may bring similar ideas in the same paragraph. Good writing may emerge from the complete outline by organizing thoughts in a proper direction (Neuman 2015).

After preparing the outline, the researcher starts writing a final research paper. The preparation of the outline will stimulate the researcher to develop new ideas, and it helps identify new connections, provide ideas to interpret data, and develop a new sequence. Writing a final research paper may make researchers search for new reviews on similar topics. Writing a research paper based on their study certainly makes the researcher bring new ideas to the research world. Novelists and columnists may develop lengthy sentences with complex words to express their thoughts. This is not required for scientific writing.

14.5 FORMAT OF THE RESEARCH PAPER FOR SCIENTIFIC JOURNALS

The following outline shows a basic format for most academic papers. The length of the research paper differs in different journals. The editorial board of every journal decide to keep the word limit for a scientific paper. No matter what length the paper needs to be, it should still follow the format of having an introduction, body, and conclusion. In this section, we will discuss the content of each section. Let's see what typically goes on in each section of the paper. You can keep this section as a reference point to prepare your research paper.

The research paper contains the title of the research paper, name(s) of the author(s) and their affiliation with contact details, abstract, introduction, body, conclusion, and references. Some researchers may keep tables and required information in the annexures. Annexures may not be required for the research papers. The title of the research paper plays a significant role in communicating the research. The title should be attractive and must communicate the complete research process.

Before we start discussing the contents in the introduction, Let's talk about an abstract that is necessary for each research paper. The length of the abstract should be fifty to 100 words. All scholarly research papers (journal articles) place the abstract on the article's first page. The abstract should contain the information on the topic, research problem, methodology, essential findings and any specific significant scientific experiment, data collection and research design. Abstract plays a significant role in all scientific research papers. After looking at the research topic, interested readers first look at the abstract and read before reading the entire research paper. A notable percentage of journals make abstracts available for open access. The introduction of the research paper follows after the abstract.

14.5.1 Introduction

The introduction should have some of the following elements, depending on the type of research paper. It starts with introducing the topic of the research paper with examples, historical contexts and statistics. It must provide a rationale for writing the research paper. The introduction covers an overview of particular issues involved with the subject and contains the definition of terminologies and concepts used in the research paper. If it is an argumentative paper, it tries to bring an antithesis of the chosen issue and various arguments of the experts. Paraphrasing the arguments of the experts is a significant step. The paraphrased sentence or paragraph should contain proper references. It discusses the background of the research paper and provides a hint to the readers about the direction in which the present paper would like to take to discuss the chosen research problem. The introduction

must end with a statement in one to two sentences in length to talk about the focus of the paper. The introduction also briefly outlines the main points in the paper. After the introduction, the main body of the paper comes. The main body of the paper will have various sections and subsections.

14.5.2 Body

We can divide the body of the research paper into many sections and subsections depending upon the topic of the research paper and methodology. This section can start by explaining the research problem briefly. After that, we can write a specific review of the literature by discussing the existing research on the chosen topic. Once you briefly complete the literature review on the chosen topic, it is significant to state the research gap based on the review and the rationale for doing the present research by justifying that it may fulfil the existing research gap. The research question (s), hypothesis and chosen variables need to be stated in this section.

The author may give a separate sub-section for methodology within the body of the research paper. This section may be titled methodology. In this section, we need to include the type of study (experiment or survey) and method of data collection, including data collection tools, background analysis and theoretical understanding. This section also includes how variables are measured and sampling techniques. In the body of the research paper, the sub-section relates to results, and a discussion follows after the methodology. The author(s) will present the data through tables in this section. The authors might have collected lots of data for a particular study. The raw data or result of the experimentation might have been converted into univariate, bivariate or multivariate tables. The number of tables varies depending on the study. It does not require adding all the tables in the main body of the research paper (results and discussion section). The researcher can take minimum tables and charts to inform the readers about the entire study. The remaining tables can be kept in the annexure of the research paper. The researcher needs to provide discussion on the data with concise, unambiguous interpretation without expressing biases on data. Grosf and Sardy (1985) warned, “The argument of your presentation should reflect a strict separation between data (the record of your observation) and their summary and analysis, on the one hand, your interpretation, conclusion and comment on the other”.

The following points need to be remembered concerning the body of the research paper.

1. There should be clarity in which a research paper argues based on the research.
2. The researcher may provide examples, details, and explanations to support each main point through existing research by including references.

3. If it is a purely theoretical paper with secondary data to argue specific issues by bringing conclusions based on facts, both arguments and counterarguments of the experts with references need to be stated clearly. This will apply to policy research papers also.
4. If a research paper uses strong evidence from sources, it should contain paraphrases, summaries, and quotations that support the main points.

14.5.3 Conclusion

In conclusion, the researcher must introduce the research problem again with the research question(s). The main findings of the research need to be summarised in a few points, which may be explained elaborately in the body. In the argumentative paper, the researcher may provide certain conclusions based on facts without taking a strong position on the issue. The arguments may not provide a definite answer. An argumentative research paper is not about providing concrete solutions. It may provide specific directions to examine issues through facts and existing research. The conclusion may end with an appropriate, meaningful final sentence that ties the whole point of the paper together (may refer back to the attention grabber). The section after the conclusion is references and an appendix. The reference section contains only the sources you have referred to for the particular research paper. If you want to give more tables to the reader, which you feel necessary, then you can keep the remaining tables in the appendix instead of the main text.

Apart from the above significant points, the researcher may remember the following points while writing the research paper.

1. It is essential to finalize the entire research paper and main points before starting writing the paper.
2. The main body of the paper can be completed first, and then go back and figure out how to introduce the research paper and conclude the paper in the best possible manner for large sections of the scientific community.
3. The researcher may try transiting between main points and examples within the main points if they can find appropriate examples and arguments from previous research.
4. The researcher needs to keep their research paper in your mind while writing.

In the case of qualitative field research, there is a change in the format of the research paper. Unlike experimental research in natural sciences and quantitative research in natural and social sciences, separating data from

theory is problematic. In-depth data will be converted either as case studies or field observations. It will be presented along with the theory. The researcher may develop a case or multiple cases in the qualitative research. It is not necessary to put all cases in the body of the research paper. Instead, the researcher must explain the theory by drawing arguments from the developed cases in the field. The researcher may add knowledge to the existing theory, or they may critique the existing theory by showing a way to build a new theory based on qualitative data. Researchers need to address theoretical generalization with field observations and case studies. The qualitative research paper looks more subjective than the presentation of objective data. The main body of the research paper may contain a detailed explanation from field observation with theoretical understanding and interpretation of data. There won't be any set standards for qualitative research. The researcher may use less than 5 per cent of the data in the qualitative research. Generalization may intertwine with evidence collected in the field. The field observation will be explained in detail with the samples' quotes. The methodology will be explained separately in the qualitative research too.

Box 14.1 Structure of the policy research paper

Dulal and co-workers (2013) authored a research paper titled “Renewable energy diffusion in Asia: Can it happen without government support?”. Let us discuss the structure of this policy research paper. The authors perceive this policy paper to address the issues related to the need to increase renewable energy penetration in Asian countries. The “introduction” of the paper discusses the population projection in India and China and whether the governments in Asia could be able to meet the demand for renewable energy with the rapid increase in population? To address this question, the research paper starts with population projection data. The dramatic increase in population necessitates the Asian countries to increase the accessibility of renewable energy sources to meet the lower emission pathways. However, several factors, including socio-economic, market, institutional and socio-culture, and financial resources, play a significant role in making renewable energy sources available to the masses in Asian countries. To discuss these issues, the paper has been written using secondary data. The paper has structured in the following way. The paper starts with an introduction. The introduction covers the population data and energy consumption data in India and China. After discussing population and energy consumption data, the authors concluded in the last paragraph of the introduction that “the Asian region is therefore at risk of becoming “locked-in” to a higher emission pathway as countries seek to meet their surging energy demands (Unruh, 2006).” The authors also wrote that renewable energy is one of the best available options under low energy pathways. To go to low emission pathways, government intervention is much needed. The authors concluded the introduction by saying that the present paper provides an overview of the present and future energy outlook in Asia and the paper discussed the necessity of removing the structural barriers and formulating appropriate policies to shift to low emission pathways. Thus, the authors provide options

to pursue low emission pathways and steer the economy towards the low emission pathways. After the introduction, the authors discussed energy demand and supply. They have also projected energy demand and supply through pie and bar diagrams. The third heading is “Meeting the increasing demand for fossil fuels”. In that section, the authors depicted sources of electricity in Asia -Pacific region through a bar diagram. They have discussed barriers to renewable energy penetration through the diagram. The fourth section discussed how to meet the increased energy demand through renewable sources. The fifth section talked about barriers to renewable energy diffusion. The sixth section discusses government support. The seventh section discusses the various government models for strategic intervention. In the seventh section, the authors provided various models, including fiscal incentives for renewable energy, institutional strengthening, institutional investments, renewable energy certificates and cross-subsidization. The final section is the conclusion. You must remember the importance of writing an elaborate conclusion as far as a research paper is concerned. The conclusion section covers fossil fuel dependence by Asian countries. It discusses the low diffusion of renewable energy in Asian countries—the efforts of the government to increase the presence of renewable energy sources. Lastly, the authors discuss the necessary efforts to improve renewable energy diffusion in Asia.

Source: Dulal, H., Shah, K., Sapkota, C., Uma, G., & Kandel, B. (2013). Renewable energy diffusion in Asia: Can it happen without government support?. *Energy Policy*, 59, 301-311. doi: 10.1016/j.enpol.2013.03.040

CHECK YOUR PROGRESS 1

- Note: i) Use the space given below for your answers.
- ii) Check your answers with those given at the end of the unit.

1. Outline the essential points to be remembered while writing the research paper.

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2. Briefly explain the need to develop an outline before writing a research paper.

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14.6 PLAGIARISM

You all must be aware of the term “Plagiarism”. Plagiarism is a “theft of another person’s ideas by using their exact words and ideas without documenting the source”. Plagiarism is a serious offence. If the researcher does not acknowledge another person’s ideas by not citing the source or if the researcher copies the exact words from someone's work is a severe offence. If a researcher plagiarises the content of a scientific article, the entire scholarly scientific community treats the plagiarised scholar as if they committed a serious offence. When you start working on a review of literature, it is significant to note the exact sources of phrases and ideas to avoid unintentional plagiarism. When citing the exact words, it is essential to cite the location of the research paper with the page number. In plagiarism, another critical issue that needs to be remembered is paraphrasing. “Paraphrasing does not use another’s exact words, but restate other ideas in your own words while condensing”. We read a lot and regularly imbibe other scholars’ ideas, and we try to express other scholars' ideas in our ideas without realizing that we have borrowed their ideas. It is important to note whenever we read new books or articles, the ideas of the particular book or research paper must be noted along with proper citation so that we can provide proper credit to others' ideas. Libraries in the Universities subscribe to software to check the research article to know whether the author(s) correctly acknowledged the fellow researchers' work and the percentage of material plagiarized from other sources. The research journals accept the research paper for publication if the research paper is adequately checked by the existing plagiarism software.

14.7 PEER REVIEW

In this section, we will discuss the history of peer review and the entire peer-review process. The peer-review process exists before the existence of scholarly journals in the field of the medical profession. In ancient Greece, it was used to evaluate written works (Elsevier Publication guidelines, 2014). In the medical field, a physician named Ishaq bin Ali al-Rahwi of Syria, in his book *Ethics of the Physician*, stated that the physician must note the conditions of the patients during their every visit. The local medical council scrutinizes the physicians' notes after the treatment, and the council assesses whether the physician has followed the set of medical standards to treat the patients. If they deviate from the set standards, they may face lawsuits (Elsevier Publication guidelines, 2014). The invention of the printing press in 1453 realized the significance of providing quality material to the readers. The work of Francis Bacon in 1620 paved the way for assessing new science. He described the method of assessing new science in his book *Novum Organum* (Spier 2002).

In 1665, the French *Journal des sçavans* and the English *Philosophical Transactions of the Royal Society* were the first scientific journals to systematically publish research results of the scientific experiment.

Philosophical Transactions of the Royal Society was the first journal to formalize the peer review process in 1665 (Liumbruno et al. 2012). In the initial days, the peer review process helped the editors decide on finalizing the article to publish in their journal. Initially, the peer review process didn't give validity to the research. Over a period, the peer review process evolved and is intended to authenticate the integrity of the scientific research before publishing.

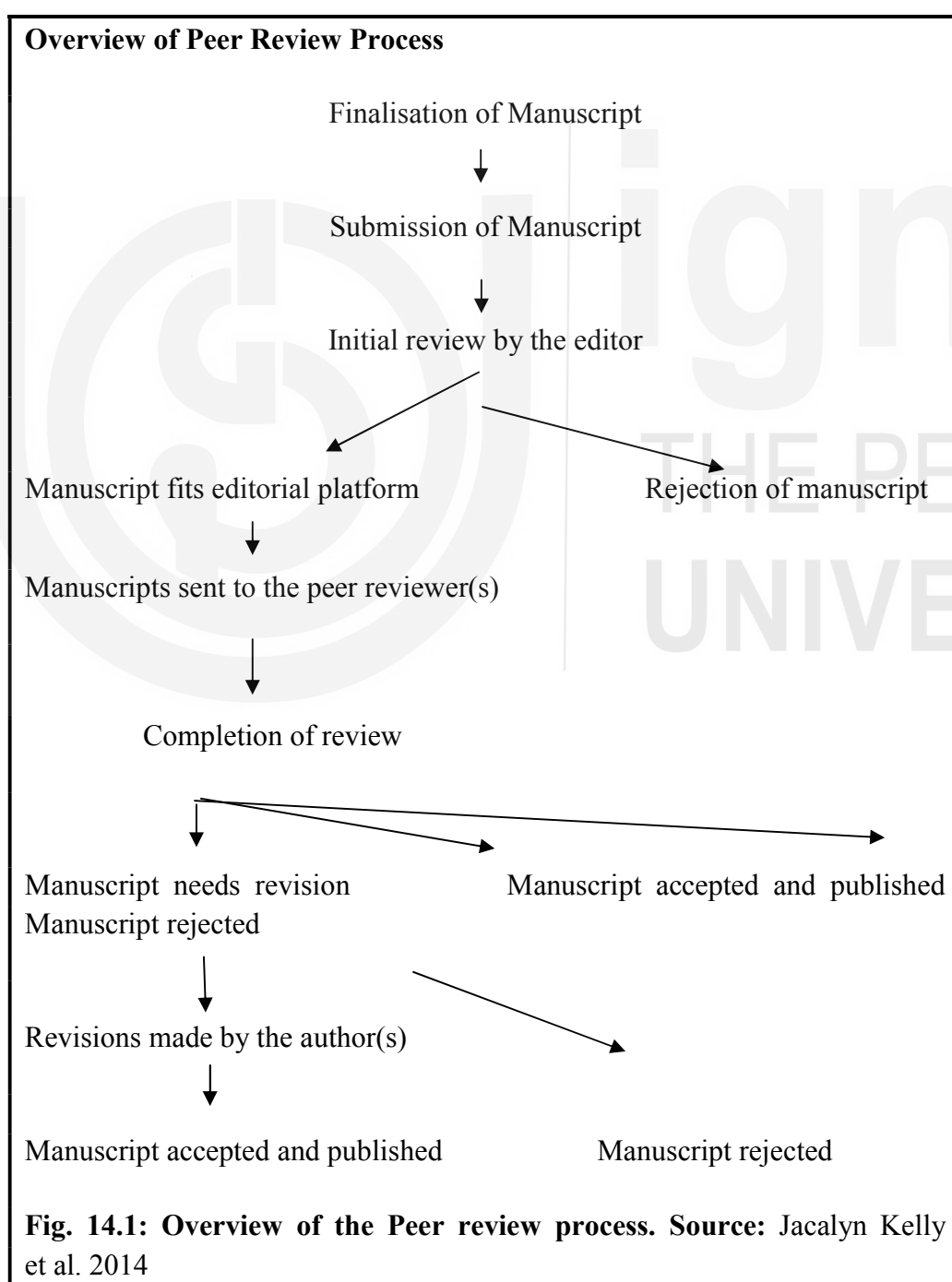
The Royal Society of Edinburgh adhered to the following peer review process, published in their Medical Essays and Observations in 1731: "Memoirs sent by correspondence are distributed according to the subject matter to those members who are most versed in these matters. The report of their identity is not known to the author" (Ware 2008). The Royal Society of London adopted this review procedure in 1752 and developed the "Committee on Papers" to review manuscripts before they were published in Philosophical Transactions (Fitzpatrick 2009). The second world war and the subsequent scientific and philosophical knowledge production paved the way to establish a systematized and institutionalized form of peer-review process (Ware 2008).

Now, Let's start with defining peer review. According to an Elsevier publication, "Peer review is a method of research validation". It is further defined as "a process of subjecting an author's scholarly work, research or ideas to the scrutiny of others who are experts in the same field" (<https://www.elsevier.com/reviewers/what-is-peer-review>). It plays a significant role in publishing research articles in an established journal. According to BMC part of Springer Nature, Peer review is "the system used to assess the quality of a manuscript before it is published. Independent researchers in the relevant research area assess submitted manuscripts for originality, validity and significance to help editors determine whether a manuscript should be published in their journal" (<https://www.elsevier.com/reviewers/what-is-peer-review>).

There are two purposes of peer review. Firstly, the peer review process ensures the best high-quality academic research paper is developed based on a quality research process for publication in hi-index reputed journals by determining the study's validity, significance and originality. Secondly, it ensures the quality of manuscripts deemed suitable for publication. Peer reviewers provide suggestions to authors on how to improve the quality of their manuscripts and also identify any errors that need correction before publication.

Now let's understand the process of peer review. The peer-review process starts with the author's submission of a research paper. The author(s) submit their research article to the appropriate journal based on the theme of their research article. Author(s) chooses the journals based on their research work and specialization. Once they choose the journal, they submit their research work. Before author(s) submit their research work, the authors follow the submission instructions provided in the journal. Based on the submission

instructions, the authors format their research article. They follow the reference style given in the instruction of the journal. Each journal follows a specific reference style. Once they submit the manuscript, the editorial board acknowledges its receipt, and they assess whether the submitted manuscript is suitable for their journal or not? If it is suitable for their journal, they assign the manuscript to the field experts to review it. The editorial board set the time limit to review the manuscripts. The reviewers carefully go through the manuscripts and provide suggestions to the authors to improve or revise the manuscripts for publication. The editorial board always keep the anonymity of the reviewer. The anonymity of reviewers ensures that the author(s) won't influence the review process. The editorial board also ensures that the authors' name(s) won't be revealed to the reviewers to avoid unnecessary personal comments.



Peer Review Process

Single-blind Peer Review: In this process, the reviewers know the authors' names, but the authors do not know who reviewed their manuscript unless the reviewer chooses to sign their report.

Double-blind Peer Review: the reviewers do not know the authors' names, and the authors do not know who reviewed their manuscript.

Open Peer Review: In this process, authors know who the reviewers are, and the reviewers know who the authors are. If the manuscript is accepted, reviewer reports along with the reviewer's name and author's response to the reviewer's comments will be published alongside the research paper.

Transparent Peer Review: The reviewers know the authors' names, but the authors do not know the names of the reviewers who reviewed their manuscript unless the reviewer chooses to sign their report. If the manuscript is accepted, the anonymous reviewer reports and the author's response to the reviewer's report will be published along with the research article.

Various review modes exist to review the research paper. According to the British Medical Journal (BMJ), four main peer review types exist. These are single-blind, double-blind, open peer and transparent peer. The journals will adopt any peer-review processes depending upon the editorial policy. The following are peer review processes to review the manuscript (<https://authorservices.taylorandfrancis.com/publishing-your-research/peer-review/>).

1. Single Anonymized Review

In this type of review, the names of the reviewers are hidden from the author. This is the traditional method of reviewing and is the most common type by far. There are few advantages to the single anonymized peer review.

The anonymous review without knowing the reviewer may facilitate the journal to take an impartial decision to publish a research paper. Both author(s) and reviewer get the freedom to do their activities independently, and they don't get influenced by each other. Journals may request reviewers to complete the entire review process within the stipulated period. Thus, authors need not worry about delays in the review process.

2. Double Anonymized Review

In this process, anonymity is maintained, and both reviewers and authors do not become aware of each other. There are advantages to this review process.

Reviewers do not know the authors. Thus, they get the freedom to review impartially. Due to anonymity, various structural biases like location, gender, class, caste and institutional affiliation can be avoided. The content of the paper decides whether the particular paper is worth publishing. The entire review process would be carried out with anonymity. Still, reviewers could assume the authors of the particular research paper if they are aware of the earlier works of the particular author.

3. Triple Anonymized Review

In this process, too, both reviewers and authors are anonymous to each other. Anonymity will be maintained from submission till the completion of review work. As we mentioned earlier, the reviewers may be able to identify the author(s) through writing style, subject specialization, and area of work.

4. Open Review

Both reviewers and author(s) know each other in the open review process. The names of the reviewers will appear on the research article page.

Apart from the review processes mentioned above, other types of open peer review are as follows:

- a. Publishing the name (s) of the reviewers along with the research paper.
- b. Publishing peer review reports irrespective of their status (signed or anonymous) along with research papers.
- c. Publishing both peer review reports, editors, and author's response (signed or anonymous peer review) along with the research paper.
- d. Opening of discussion for fellow researchers after the publication of the research paper.

Two governance factors play a significant role in the peer-review process. Those governance aspects are transparency and accountability. The entire peer review process will be carried out transparently, even though reviewers' and authors' names will be kept anonymous. Both reviewers and authors are accountable for the research papers. As an expert in a particular field, reviewers take utmost conscious of commenting on the research paper. They always try to comment about bringing a good scientific paper to benefit the entire society. However, some reviewers may give harsh comments, leading to rejection of the research paper.

Different journals use different types of peer review. You can find out which peer-review system a particular journal uses on the journal's 'About' page. Each system has its advantages and disadvantages. Whatever the review

processes, it is pertinent to keep transparency in the entire review process. In case of questions regarding the peer review process adopted by the specific journal, the scientific community needs to contact the journal’s editorial team for clarifications.

In general, transparency is the key to trust in peer review. Many Elsevier journals publish the name of the article’s handling editor on the published paper on ScienceDirect. Some journals also provide details about the number of reviewers who reviewed the article before acceptance. Furthermore, to provide reviewers with updates and feedback, most Elsevier journals inform reviewers about the editor’s decision and their peers’ recommendations. A reviewer's input into the editorial process is invaluable. There are established procedures to recognize reviewers. Reviewers can claim their academic reviewing activities. Each journal adopts its method to recognize the reviewer. A few journals adopted the following methods to recognize reviewers.

- The reviewer list appeared in the particular year's first and last issue. In this way, they get recognized.
- Receiving complimentary online access to the journal, or package of journals, for a specific period
- Getting a letter or certificate of contribution from the journal editor

As far as Wiley journals are concerned, reviewers can get profiles strengthened through Publons. Publons records the reviewer’s activity as measurable research output and ensures that you get credit each time you complete a peer review. Reviewers can open the account in ORCID id and link it to your Publons account. You can opt-in to have Publons automatically export your review history to your ORCID profile.

CHECK YOUR PROGRESS 2

- Note: i) Use the space given below for your answers.
- ii) Check your answers with those given at the end of the unit.

1. Discuss the peer review process.

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14.8 LET US SUM UP

Communicating research findings in a structured manner to the scientific community is a significant step in doing the research. Research is the process of finding an answer to problems. In this unit, we discussed the reasons for writing a research paper. Once the researcher completes the research, they need to document the entire research process along with findings to communicate to the scientific community. Further, we discussed the process of writing a research paper and the outline of the research paper. Lastly, we discussed the issue of plagiarism and also peer review process.

14.9 KEY WORDS

Plagiarism: Plagiarism is a theft of another person's ideas by using their exact words and ideas without documenting the source.

14.10 SUGGESTED FURTHER READING/ REFERENCES

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Web Links

https://www.elsevier.com/___data/assets/pdf_file/0003/93675/PerspPubl2.pdf

<https://www.elsevier.com/reviewers/what-is-peer-review>

<https://authorservices.wiley.com/Reviewers/journal-reviewers/what-is-peer-review/index.htm>

14.11 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1. Please refer to section 14.5.3
2. Please refer to section 14.4

Check Your Progress 2

1. Please refer to section 14.7
2. Please refer to section 14.7

UNIT 15 ETHICS AND INTELLECTUAL PROPERTY RIGHTS

Structure

- 15.1 Introduction
- 15.2 Objectives
- 15.3 Requisite for Ethics in Research
- 15.4 Ethical Issues Related to Confidentiality
 - 15.4.1 Confidentiality
 - 15.4.2 Anonymity
 - 15.4.3 Challenges in Confidentiality
- 15.5 Ethical Issues Related to Publication, Reproducibility and Accountability
 - 15.5.1 Publication
 - 15.5.2 Authorship
 - 15.5.3 Peer Review
 - 15.5.4 Plagiarism and Self-Plagiarism
 - 15.5.5 Citation and Acknowledgement
 - 15.5.6 Reproducibility and Accountability
- 15.6 Copyright and Related Rights
- 15.7 Royalty
- 15.8 Reproduction of Published Material
- 15.9 UGC- Consortium for Academic Research and Ethics
- 15.10 Intellectual Property Rights (IPR)
- 15.11 TRIPS -Trade-Related Aspects of Intellectual Property Rights
- 15.12 Let Us Sum Up
- 15.13 Key Words
- 15.14 Suggested Further Reading/References
- 15.15 Answers to Check Your Progress

15.1 INTRODUCTION

The researcher is fully responsible for the ethical conduct and publishing of their research. Research ethics refers to the application of basic ethical principles to scientific research (Thomas, 2017). Research ethics is defined as the norms or set of principles for the conduct of research that differentiate acceptable and unacceptable behaviour. This set of principles helps the researchers to guide their research designs and practices. The Chief Justice of the U.S. Supreme Court, Justice Potter Stewart quoted that ethics is understanding how to differentiate between the right of doing and doing right. The researcher should familiarize themselves with the ethical principles

involved in research planning to the publication process. This helps the researcher to strictly follow necessary precautions to avoid any type of misconduct during research and in publication. This unit has been aimed at discussing the importance of ethics in research and publication. The unit also focuses on various ethical issues related to confidentiality, publishing, plagiarism, citation, reproducibility, copyright and intellectual property rights.

15.2 OBJECTIVES

After studying this unit, you should be able to:

- explain the significance of ethics in research;
- explain ethical issues in research conduct and publication process; and
- explain the legal initiatives to protect intellectual property rights.

15.3 REQUISITE FOR ETHICS IN RESEARCH

The public considers the findings published by the researchers in various research communications are completely correct and unique. So, it is the responsibility of each researcher to follow certain ethics in their work fields. The maintenance of integrity in academics and quality in research lies with ethics. The researcher should follow and spread the ethical values involved in the conduct and publishing of research (Flick, 2014; Patwardhan et al., 2020). The Second World War has become a landmark in research ethics with the formation of the Nuremberg code against the conduct of medical research at concentration camps. The Nuremberg trials led to the formulation of the Nuremberg code, in 1947 to prevent abuse of human participants in research (NIH, 2008). Motivated by this code, World Medical Association (WMA) adopted the Declaration of Helsinki in June 1994 which provided direction to those involved in research on human subjects. Many revisions were subsequently made to govern the ethical aspects of human research.

The scientists and researchers must consider and follow the ethics in research and should adhere to the code of conduct during their research work execution. The responsible conduct of research (Shamoo and Resnik, 2015) lies with the following points:

- Honesty and integrity
- Protection of human subjects
- Care of lab animals
- Respecting Intellectual Property Rights
- Objectivity
- Data Management
- Responsible publishing

- Confidentiality
- Avoid plagiarism
- Openness
- Avoid scientific misconduct

Intellectual honesty is an inevitable factor in good research practice. It is also involved with the prevention of misconduct in research by following publication ethics. The proper research planning and research design had an integral role in conducting good research. Apart from the study design and ethical approval, the other issues related to research ethics are confidentiality issues, inappropriate data (fabrication and falsification) and improper analysis of data, reproducibility, inappropriate authorship, overlapping publications, and various types of plagiarisms, improper citations and acknowledgements.

15.4 ETHICAL ISSUES RELATED TO CONFIDENTIALITY

The human subjects in research completely need privacy and dignity. Privacy refers to the individual right to prevent accessibility of others to personal details, thoughts and health-related information (McCabe, 2004).

15.4.1 Confidentiality

Confidentiality refers to removing all the information related to the identification of participants from the research report, even though the participants and their details are very much known to the researcher. The identifying information is being hidden from everyone to prevent the personal data of participants to be used by other researchers. This will help to build up trust between the respondent and the researcher, maintaining dignity and providing respect to the respondent.

The steps taken to protect data privacy and maintain confidentiality are:

- Storage of research records securely and with limited access
 - o to signed consent files in a locked file drawer. This will prevent the threat to data open to all.
 - o Password protection to all files with survey data. This will make sure the data access only by those approved researchers.
- Eliminating or giving codes for the identifying information of respondents
- Dissemination of research results without any personal details of respondent
- Informed consent from participants for publicizing the research findings involved personal information

Confidentiality should be secured in all probable means if the researcher cannot follow anonymity in data collection. The general guidelines for exceptions to maintain confidentiality are consent from the respondent, court order, continued treatment of a patient, compliance with the law and communication of a threat (Merideth, 2007).

15.4.2 Anonymity

In the case of anonymity, the personal information details of participants are not collected and the participants are non-identifiable in future. The respondent of the research subject will be continued to be unidentified throughout the research and after the completion of the research process. Although the anonymity standard confirms the confidentiality of the personal identity, maintaining anonymity is not an easy task. The participants involved with the research need to be studied multiple times, more chance of personal exposure and hence revealing anonymity is higher. There is a need for adequate care and a high requirement for the proper anonymity of human subjects.

15.4.3 Challenges in Confidentiality

The protection of the respondents from their identification based on their beliefs, diseases and habits used in research is the responsibility of the researchers. Privacy protection starts with the framing of research work, continues throughout the research and extends also to publication and dataset sharing. Confidentiality and anonymity play a significant role in safeguarding the privacy of human subjects or respondents in the research.

The right to privacy is an important right of all the participants. The need is there to maintain the confidentiality of collected respondent data throughout the research period. The personal data of the participants should be protected for a long time during its storage and usage is very much essential. The information of the respondent has not been shared with anyone at any point in time. The researcher should give special care to the respondents of the vulnerable population involved in research related to HIV/AIDS, genetic disorders, and physical and mental diseases.

Focus group discussion is an issue in research ethics with confidentiality and anonymity of respondents. The risks are involved in complete guaranteeing confidentiality. This research design is not favourable to confidentiality. All the respondents in the group should agree to keep the discussion confidential and respect each other's privacy through an informed consent process. So, at the beginning itself, the participants are informed about this by the researcher who also informs them of the need for their support to assure confidentiality or anonymity.

The researcher has to make attempts to reduce and inform the participant about the risk involved is mandatory. The privacy protection of respondents is the duty of all associated with the research- researcher, respondents, support staff and those involved in publishing research. The breach of confidentiality is not accepted at any cost.

CHECK YOUR PROGRESS 1

Note: i) Use the space given below for your answers.

ii) Check your answers with those given at the end of the unit.

1. Enlist the basic principles of responsible conduct of research?

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15.5 ETHICAL ISSUES RELATED TO PUBLICATION, REPRODUCIBILITY AND ACCOUNTABILITY

Research ethics is not only related to research conduct, data collection and analysis but also related to the publishing process. The preparation of publication includes ethical issues such as fraudulent publication, authorship credit, plagiarism and citations (Malone, 1998).

15.5.1 Publication

The fraud publication can be intentional (if it is aimed at any form of gains) or unintentional (publishing incorrect data due to negligence or carelessness). Sometimes the researcher intentionally publishes the research work having overlaps in the publications. The duplicate or redundant publication refers to those overlapping publication which was already published and not referred to the first one (Mutch, 2011). Salami publication refers to those publications which are part of a single research process just to increase the volume of publications (Abraham 2000). Another important issue is predatory journals that publish most of the submitted articles without proper reviewing based only on payment (Patwardhan and Desiraju, 2020).

15.5.2 Authorship

An author of a research publication is the person who is actively involved in conceptualising and designing the research, conduct of research, data analysis, and interpreting and writing the research paper (Council of Science Editors (CSE), 2012). The author contributes intellectually to scientific content and moulds the research in a presentable and understandable form (Winston, 1985).

Sometimes, the authorship is credited to those persons who have not even contributed to research in any way. The disputes on academic integrity are avoided if, at the beginning of the research project itself, a clear idea of credits given to the authors, contributors and persons to be acknowledged is

finalized. The persons involved in mere data collection, grammar and language editing and formatting are not eligible for authorship. So, care should be taken to implicit the guidelines to authors given in the journal. Academic career advancement lies with publications and driving forces like publish or perish, respect and fame stimulate authorship determination (Anderson and Boden, 2008; Mandal and Parija, 2013).

The ethical issues related to authorship are multiple authorship, authorship misconduct, and inappropriate authorship (Kempers, 2001)

15.5.2.1 Multiple Authorship: Nowadays, most papers are written by multiple authors. It is also known as co-authorship or shared authorship. Multiple authorship is defined as publication by two or more named persons (Macfarlane, 2017). The first author is the one who has contributed much to research work and writing papers, and who is supposed to receive more credit. The corresponding author is also given equal importance as his or her contribution is also significant. The co-authors are given the order of authorship as per their contribution, alphabetical or any other criteria (Tscharntke et al., 2007).

In the case of multiple authors, only one person is given the first or principal authorship and sometimes co-authors have given the positions either in terms of seniority or alphabetical order without considering their actual contributions. The multiple authorships may lead to the issue in the order of sequence of their authorship that reflects their contribution (Regaldo, 1995).

15.5.2.2 Authorship Misconduct: The misconduct and misbehaviour related to authorship conflicts are presenting the idea or work of friends or colleagues as our own, causing harm intentionally to other's research, and projecting our own fabricated and fraudulent research as more efficient (Smith et al., 2020)

15.5.2.4 Inappropriate Authorship: Inappropriate authorship is an unethical behaviour related to the publishing of research papers. The common inappropriate authorships are guest and honorary authorships.

Honorary Authorship: It is also known as gift authorship. It refers to naming someone as an author without any type of contribution to research and he or she has not been eligible to meet any criteria for being an author. He has nothing contributed to credit for his public responsibility (Rennie and, Flanagan, 1994; Wislar et al. 2011; Zaki, 2011,). It is giving credit to those not qualifying for authorship. In other words, giving undue credit to a person as an author who has contributed nothing to the research. Guest authorship is another unethical matter with authorship in research ethics. The researchers are forced to add the name of a person with no contribution, just for future funding, grants or any other gains (Bavdekar 2012).

15.5.2.4 Ghost Authorship: It refers to not giving credit to those persons who have *actually* contributed a lot to the research work and purposefully

ignored during the listing of authors. It is the opposite of honorary authorship.

15.5.3 Peer Review

15.5.3.1 Types of Peer Review

Peer review is the system that evaluates the quality of a manuscript before publication. The editors take the help of reviewers who are independent researchers for checking the originality, validity and significance of the manuscript. The different types of peer review are:

- Single-blind peer review process: The identity of the authors is known to the reviewers but authors may not know the reviewer(s) identity.
- Double-blind peer review where both the reviewer and author identities are hidden.
- Open peer review where both the reviewer and author identity are known to each other
- Transparent peer review

Besides these common peer review types, there are other styles such as triple-blind, transparent, collaborative and post-publication peer reviews. The selection of peer reviewers by the editors is crucial in getting high-quality review reports on the manuscript for publication in a journal (Black et al., 1998).

15.5.3.2 Ethical Issues related to Peer Review

The ethical issues associated with the peer review process (Rockwell, 2014) are

- The manuscripts under review are completely confidential and are mandatory for the reviewers to maintain the confidentiality of data and avoid its use for their research publication.
- The expertise of the reviewer, time spent on review and reviewers affect the quality of the review process.
- The reviewers may have a real or apparent conflict of interest by being co-author, same institutional affiliation, collaborator or have acknowledged for their help in the manuscript.
- Editors also face a conflict of interest from institutional affiliations and collaborations and personal relationships.
- Financial conflicts of interest are also considered research misconduct.

15.5.4 Plagiarism and Self-Plagiarism

15.5.4.1 Plagiarism

Plagiarism is one of the common and widely seen ethical challenges faced by different academic and research organizations that have been committed by

students, teachers or scientists in the communication of research (Debnath, 2016; Thomas, 2017). Plagiarism means using the intellectual work of others as our own and consists of stealing an idea, interpretations, opinions, or paragraphs and sentences in books and papers, without proper acknowledgement (Jenn, 2006; Sinha et al., 2009). Sometimes that is unintentional, but copying any work of others with no credits to the correct owner comes under stealing as it causes harm to those researchers (Traniello and Bakker, 2016). The 'cut and paste' from internet sources, changing the order of words, not acknowledging others' work and taking up the credit by own are also examples of plagiarism.

Types of Plagiarism

Burg et al. (2007) categorised plagiarism into wholesale plagiarism and mosaic plagiarism.

Wholesale Plagiarism: Wholesale plagiarism where stealing the complete material owned by someone and submitting it in their name. This practice is mostly seen among students for submitting assignments. It is a 'blatant' type of plagiarism students commit to gain grades or marks.

Mosaic Plagiarism: It has three subtypes- verbatim, conceptual and structural plagiarism.

- **Verbatim Plagiarism:** The words or phrases are copied from the source without any quotations (Burg et al., 2007). It refers to copying word for word or unacknowledged direct quotation (Worthington, 2014).
- **Conceptual Plagiarism:** The person steals the concept in terms of ideas or facts from a source without citation (Meo and Talha, 2019). It is the plagiarism of ideas.
- **Structural Plagiarism:** This type of plagiarism refers to paraphrasing by changing the words or phrases in a sentence without any citation of the source (Weber-Wulff, 2014).

The other types of plagiarism are plagiarism of secondary sources when the data was taken from a secondary source and plagiarism of authorship when a researcher puts his or her name as author in place of the original author (Meo and Talha, 2019).

Debnath (2016) reported the major reasons for plagiarism are ease in information accessibility, publication pressure for career advancement, low confidence, poor writing skills, rapid manuscript preparation to achieve the target and lack of awareness.

15.5.4.2 Self-plagiarism

This is another ethical issue associated with someone republishing or re-submit his or her own already published paper without proper citation of

original work (Bretag and Mahmud, 2009). The researcher is benefited from the presentation of ideas as new one though it has already been published earlier (Bruton, 2014). Duplicate publication is the most common type of self-plagiarism. It also includes redundant publication, augmented publication and salami fragmented publication (Roig, 2010). It may lead to infringement or piracy of copyright of the earlier publisher and ethical code violation. The violating ethical code is extreme when a researcher duplicates the complete set of data, treatments, or even the paper. This is noticeable from papers of different years of publication, but with a common author. Sometimes these papers have different outcomes.

15.5.4.3 Plagiarism Detection Tools

In the present scenario, there are many ways to check plagiarism and control the copying of others' work using plagiarism detection software (Meo and Talha, 2019). The plagiarism checking software is either paid or free-of cost (Naik et al., 2015).

Some of the paid plagiarism detection software are

- iThenticate (<http://www.ithenticate.com>)
- Turnitin (<https://turnitin.com>)
- Ephorus (<http://www.ephorus.com>)
- Urkund (<http://www.urkund.com>)
- Plagiarism Scanner (<http://www.plagiarismscanner.com>)

Some examples of free online software are

- Duplichecker Checker (<http://www.duplichecker.com>)
- Viper (<http://www.scanmyessay.com>)
- Plagium (<http://www.plagium.com>)
- Plagiarism Checker (<http://www.plagiarismchecker.com>)

CHECK YOUR PROGRESS 2

Note: i) Use the space given below for your answers.

ii) Check your answers with those given at the end of the unit.

1. How gift authorship differs from ghost authorship?

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2. “Duplicate publication is a type of self-plagiarism”. Discuss.

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15.5.5 Citation and Acknowledgement

15.5.5.1 Citation

The citation refers to the practice of providing notations in the text of a paper which helps to identify the proofs or sources of what we claim and are helpful for further research (<https://ori.hhs.gov/ethically-questionable-citation-practices>).It is documentation of a particular source that had an impact on the research work.The citation itself is an acknowledgement of the researcher for the source in a particular context that provides a summary of data about an article, journal, book or website for easy accessibility to any other researcher (<https://lib.dmu.edu/su/ethicaldoc/whaticite>). The citation is represented either as numbers in parentheses or superscript as per American Medical Association style or a single author’s last name or first author’s last name or last name of two authors subsequently followed by a year as per American Psychological Association. The citation is normally seen as an in-text citation, as footnotes or as endnotes.

A detailed reference list was given at the end of the paper with a list of authors, year of publication, the title of - the article, book chapter, book, technical report,journal title, volume and issue number, page numbers and publisher. In case of online related references have additional information like DOI (Digital Object Identifier) and URL (Uniform Resource Locator) at the end of the reference.

Ethical Issues related to Citations

The ethical issues related to citations are

- Fail to cite the original author- because of the journal's limitation in citing many references in an article
- Authors' tendency to manipulate references in an improper manner
 - Irrelevant citation of big leaders (Patwardhan and Desiraju, 2020)
 - to back up his results with only supporting references
 - citation stuffing with own work without any relevance
 - to improve the impact factor of journals and own article citations
 - Journal editors force the authors to add articles from their journal
 - Coercive self-citation (Wilhite & Fong, 2012)

15.5.5.2 Acknowledgement

The content of acknowledgements may include pre-formulated financial disclosure statements, gratitude to persons for technical help, editing and reviewing (Paul-Hus and Desrochers, 2019; McCain, 1991; Weber and Thomer, 2014). Mostly in the acknowledgement section the author thanks non-author contributors or collaborators related to research work and paper writing for expertise and assistance. There is no established format for acknowledgement. Sometimes the acknowledgements had exaggerations and overemphasis on a particular person, facilities or institutes (Hollander 2001). The issues related to acknowledgement include the personal touch covering up the actual contributions, spelling mistakes of persons, and funding agencies (Jeschin et al., 1995; Rigby 2011).

15.5.6 Reproducibility and Accountability

15.5.6.1 Reproducibility

Reproducibility is an important part of good science that ensures the ability of the researcher to reproduce the same results with repetition of experiments multiple times (Popper 1959; Resnik and Shamoo, 2017; Essawy et al. 2020). Reproducibility refers to the accurateness and consistency of results over time and researchers (Segers et al., 2010). It is a part of precision testing with the ability to recalculate a figure from data, parameters and programs (Schwab et al., 2000; Lister, 2005). The benefits of reproducible research (Alston and Rick, 2021) are

- Researchers can explain clearly the experimental procedure and the reason for the experimental performance.
- It helps researchers to be rapid and modify analyses and figures if required, which saves time.
- It enables researchers well prepared for their next research work and quick reconfiguration of previously conducted research tasks for another research work.
- It provides confidence and trust among fellow researchers and peer reviewers.
- It also brings high paper citations.

Ethical Issues with Reproducibility

The deviation in reproducibility in research is due to some lacuna in experimental design, variation in experimental materials, quality and integrity of data, data fabrication or falsification, and error in statistical data analysis (Landis et al 2012, Shamoo and Resnik 2015, Shammo, 2016). The scientific misconduct results in retractions of the publications (Fang et al., 2012). The reproducibility is also limited by complexity, changes in technology, manual errors, instrumental errors and publishing rapidly the novel research results to protect intellectual property rights.

15.5.6.2 Accountability

Accountability refers to the obligations of the researcher or organization who are responsible for the decisions and actions based on the performance and behaviour to explain judgements of different stakeholders in research (Beu and Buckley, 2001; Saeed, 2020). It gives assurance of readiness and preparedness for the evaluation of an individual by the audience (www.pagecentertraining.psu.edu). It is the responsibility of the researcher to avoid biases, design the wrong research methodology, and report incorrect data and unsuitable use of information (Yip et al., 2016). The fabrication and falsification of data are serious fraud in research and publication (Scott-Lichter, 2012).

15.6 COPYRIGHT AND RELATED RIGHTS

The copyright refers to the legal rights that artists hold over their literary and creative works (copyright.gov.in; WIPO, 2016; Maurya, 2021). Copyright is one of the important aspects of intellectual property rights. The two types of rights are protected by Copyright - economic rights (owned by the author to get the financial rewards from users of his or her work) and moral rights (let the creator take actions to protect their link with the work) (WIPO, 2016).

The following are protected by copyright- Books, music, paintings, sculptures, films, computer programs, databases, advertisements, maps, and technical drawings (Thomas, 2017; Maurya, 2021). The copyright is hence meant for artistic work, cinematographic work and original literary work (Rao, 2021). The Copyright Act, 1957 and Copyright Rules, 2013 (amended in 2016) play a significant role in the protection of the work such as original literary, dramatic, musical and artistic works and cinematograph films and sound recordings from unauthorized uses in India (WIPO, 2016; copyright.gov.in). The primary objective of copyright laws is to protect the author's work and to encourage and remunerate original and creative contributors (Monika and Malik, 2022). The copyright law gives the right solely to the content creator. The law aimed to have a balance between the interest of the creator and the public (WIPO, www.wipo.int). The copyright law prevents others from stealing, copy-pasting, creating another work from others' work or simply claiming others' work as their own (Thomas, 2017). Creativity is essential for the progress of sustainable development of society and innovations and creativity need to be protected (copyright.gov.in).

The duration of copyright protection in India as per the Copyright Act, 1957 is 60 years. The five amendments were made to Copyright Act, 1957 during 1983, 1984, 1992, 1994, 1999 and 2012 after its implementation in 1958 (Copyright Office, GoI). The Copyright (Amendment) Rules, 2021 were recently notified by the Ministry of Commerce and Industry (Department for Promotion of Industry and Internal Trade), GoI Notification, 2021.

In the open access journals, there is free online access and permission to use the information for any responsible use with citation. The authors can choose from the following towards copyright (Hoornand and van der Graaf, 2006)

- Retain it - an early Open Access copyright model where the author keeps the copyright
- Share it - with a Creative Commons licence where the author shares the copyright
- Transfer it (partly) - traditional journals that go Open Access where the author transfers only the commercial exploitation rights to the journal publishers

The violation or infringement of copyright law can be minimized or prevented by fair use or by taking copyright permissions from the author (Joseph et al., 1996; Freund, 2016). The exemptions to copyright law to use the work without any permission from the owner of copyright includes use for research, study, criticism, review and news reporting, in library and schools and the legislatures (copyright.gov.in).

15.7 ROYALTY

The royalty refers to earning income by the creator or author for the copyrighted work from the licensee (Watt, 2006; Mohammadi, 2011; Johnson, 2015). The royalty owned by the holder of copyrighted material helps him or her to earn the best remuneration accessible in the market from the licensee who wishes to use it for financial gains (Watt, 2006).

The mutual agreement between the copyright holder and the licensee leads to legal binding in terms of royalty contracts by confirming a specific rate of payment towards royalty. The 'running royalty' term was usually used to denote the earnings by licensor throughout the life as a per cent of sales or as a fixed amount (Sung, 2006). The rate of royalty payment to the author differs and up to 10% is the benchmark offered to the author by most publishers. The chances for an increase in royalty rate are also high once the sale has increased, as initially, the publisher's effort is to cover up the expenditure incurred for publishing the work (WIPO) and so the author earns less initially.

15.8 REPRODUCTION OF PUBLISHED MATERIAL

The understanding of which published materials are to be acquired permissions and which do not need any permissions is very important. The copyrighted publications in any form or any part have not been able to reproduce without any written permission or consent (Scharle and Szabó, 2000). But no permission is needed for reproducing published material which does not have any copyright.

Nowadays the publisher makes it mandatory for authors to seek written permission before reproducing any copyrighted material in their article for submission. The permission request form is available under the 'Permission and Reprints' page on websites of many publishers like Elsevier, Springer, Science, etc. Permission is very much required to use the matter from copyrighted materials such as figures, images and tables from articles in journals, newspapers and magazines, books as such or chapters in books, websites, photographs, and any artworks, logos, and advertisements (George, 2017).

The confirmation in the form of written permission or consent should be obtained from the copyright holder to avoid copyright infringement. The due credit should be given to the original author if we are using the earlier published work by mentioning his or her name or name of the organization with the published year in the text and detailed bibliographic data in the references. The facts and information which is known by many people and are possible to verify from different locations come under common knowledge and they do not require citations. The examples are as follows: your observation and experience, historical events, folklore etc. It would be better to cite the sources or give a list of reference sources from which the common knowledge was found to avoid any ethical issues. The copyrighted material can be used by following fair use or in the public domain or Creative Commons licenses are applied to them.

The public can follow the principle of fair use of copyrighted material without written permission for criticism, comments, teaching, etc. (Pappalardo and Fitzgerald, 2015). Creative Commons (CC) licenses are considered a good solution for copyright protection in the digital era (Kim, 2007). The CC licenses free distribution and non-commercial use of copyrighted material by retaining copyright (<https://creativecommons.org/licenses/>). The six major CC licenses (Source:<https://creativecommons.org/licenses/>; Courtney and Slater, 2018) are:

- i) Attribution (CC BY)- allows the free use and even for commercial purposes with citation of original work.
- ii) Attribution-ShareAlike (CC BY-SA)- allows the free use and even for commercial purpose with citation of original work and have the same license applicable for the new work.
- iii) Attribution-NoDerivs (CC BY-ND)- allows the free use and even for commercial purpose with citation of original work but restrict sharing
- iv) Attribution-NonCommercial (CC BY-NC)- allows the use but not for commercial purpose with citation of original work

- v) Attribution-NonCommercial-ShareAlike (CC BY-NC-SA)- allows the use but for non-commercial purposes with citation of original work and can have a similar license for the new creations.
- vi) Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)- allows only downloading and sharing with citation without any change or commercial use

15.9 UGC-Consortium for Academic Research and Ethics

To ensure and promote the quality and integrity of research and following publication ethics in Indian Universities, University Grants Commission has established Consortium for Academic Research and Ethics(CARE).It aimed at improving the research ethics in the conduct and publication (Patwardhan and Thakur, 2019; Patwardhan and Desiraju, 2020;https://www.ugc.ac.in/e-book/Academic%20and%20Research%20Book_WEB.pdf). The list of quality journals in different disciplines was monitored continuously and updated. The new journals are analysed and included only after following the validated procedures by the UGC Cell established at Savitribai Phule Pune University, Pune (Patwardhan and Thakur, 2019).

15.10 Intellectual Property Rights (IPR)

Intellectual property (IP) refers to ideas, inventions, and creativity of mind that has given the readiness of the public to grant the status of the property (Saha and Bhattacharya, 2011; Inda, 2021). World Intellectual Property Organization (WIPO) defined Intellectual property as creations of the mind, such as inventions, literary and artistic works, designs, symbols, names and images used in commerce (WIPO, <https://www.wipo.int/about-ip/en/>). Intellectual Property Rights (IPR) provide the right to the author for their creativity (Shukla et al., 2022). Copyright is one of the significant parts of intellectual property rights (Monika and Malik, 2022). The major types of intellectual properties (Saha and Bhattacharya, 2011) are:

- **Patents:** It is an exclusive right granted to an invention which is a product or a process that provides, in general, a new way of doing something, or offers a new technical solution to a problem (WIPO, <https://www.wipo.int/patents/en/>)
- **Industrial Designs:** Features of any shape, configuration, surface pattern, the composition of lines and colours applied to an article (www.copyright.gov.in/Documents/handbook.html)
- **Trademarks:** It is a sign capable of distinguishing the goods or services of one enterprise from those of other enterprises by any mark, name, or logo (WIPO, <https://www.wipo.int/trademarks/en/>)

- **Copyright:** Expression of ideas in material form and includes literary, musical, dramatic, artistic, cinematography work, audio tapes, and computer software (www.copyright.gov.in)
- **Geographical Indications:** It is a sign used on products that have a specific geographical origin and possesses qualities or a reputation that are due to that origin (WIPO, https://www.wipo.int/geo_indications/en/)

IP is protected by law which enables people to receive recognition and get financial benefits from what they have invented or created.

15.11 TRIPS - Trade-Related Aspects of Intellectual Property Rights

World Trade Organization (WTO) played an integral role in the protection of intellectual property rights with the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement. TRIPS agreement was signed on 15th April 1994 and it came into effect on January 1st, 1995. It is a multilateral agreement on intellectual property (IP) between WTO members on trade-related aspects. TRIPS combined conventions of WIPO namely the Paris Convention for the Protection of Industrial Property and the Berne Convention for the Protection of Literary and Artistic Works for setting up standards for the protection of IPR. The other characteristics of the TRIPS agreement are enforcement of IPR and resolution of disputes related to trade among the members (Source: WTO, https://www.wto.org/english/tratop_e/trips_e/intel2_e.htm). The TRIPS agreement has taken care of the protection of all types of intellectual property such as copyright, trademarks, patents, industrial designs, trade secrets, geographical indications and exclusionary rights over plant varieties. (Thomas, 2017; <https://www.wto.org/>).

CHECK YOUR PROGRESS 3

Note: i) Use the space given below for your answers.

ii) Check your answers with those given at the end of the unit.

1. What are the common ways to represent citations in an article in a journal?

.....

.....

.....

.....

2. Is it mandatory to obtain written permission for all copyrighted materials?

15.12 LET US SUM UP

The scientific community and the public need to condemn the practice of violation of ethics, fraud and wilful conduct for the advancement of sciences. The policies to address the ethical issues mainly related to plagiarism, fabrication, and conflicts of interest have already been present at academic and governmental institutions like an ethical committee or an institutional review board. Research ethics can be easily achieved if scientists follow good research practices, and maintain proper records, accountability, reproducibility, citations, acknowledgements and appropriate authorships, publication and peer review. The creation of the mind in terms of literary work, artistic work and cinematographic works comes under intellectual properties. The intellectual property is safeguarded under IPR by copyright and related rights, trademarks, patents and industrial designing. TRIPS play an integral role in the protection of IPR associated with knowledge and creativity.

15.13 KEY WORDS

- Research Ethics** : Research ethics is defined as the norms or set of principles for the conduct of research that differentiate acceptable and unacceptable behaviour.
- Confidentiality** : It refers to removing all the information related to the identification of participants from the research report, even though the participants and their details are very much known to the researcher.
- Plagiarism** : Plagiarism means using the intellectual work of others as our own and consists of stealing ideas, interpretations, opinions, or paragraphs and sentences in books and papers, without proper acknowledgement.
- Verbatim Plagiarism** : The plagiarism in which words or phrases are copied from a source without any quotations.
- Self-plagiarism** : The plagiarism type in which someone republishes or re-submits his or her own already published paper without proper citation of original work.
- Citation** : It refers to the practice of providing notations in the text of a paper which helps to identify the proofs or sources of what we claim and is helpful for further research.

Reproducibility : Reproducibility refers to the accurateness and consistency of results over time and researchers.

Accountability : Accountability refers to the obligations of the researcher or organization who are responsible for the decisions and actions based on the performance and behaviour to explain judgements of different stakeholders in research.

Intellectual : It provides the right to authors for their creativity.

Property Rights
(IPR)

15.14 SUGGESTED FURTHER READING/ REFERENCES

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- Copyright.gov.in. A Hand Book of Copyright Law. Government of India, Department for Promotion of Industry and Internal Trade, Ministry of Commerce and Industry.

<https://copyright.gov.in/documents/handbook.html#:~:text=The%20Copy%20right%20Act%2C%201957%20protects,no%20copyright%20in%20an%20idea.>

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Web Links:

- <https://copyright.gov.in/documents/copyrightrules1957.pdf>
- <https://creativecommons.org/licenses/>
- <https://lib.dmu.edu/su/ethicaldoc/whetcite>
- <https://ori.hhs.gov/ethically-questionable-citation-practices>
- <https://www.pagecentertraining.psu.edu/public-relations-ethics/ethics-in-crisis-management/lesson-1-prominent-ethical-issues-in-crisis-situations/ethical-principles-of-responsibility-and-accountability/>
- https://www.ugc.ac.in/e-book/Academic%20and%20Research%20Book_WEB.pdf
- <https://www.wipo.int/about-ip/en/>
- <https://www.wipo.int/copyright/en/>

Check Your Progress 1

1. The principles of responsible conduct of research are honesty and integrity, protection of human subjects, care of lab animals, respecting Intellectual Property Rights, objectivity, data management, responsible publishing, confidentiality, avoiding plagiarism, openness and avoiding scientific misconduct.

Check Your Progress 2

1. Gift authorship or guest authorship or honorary authorship refers to authorship to someone who has *not contributed* to research in any form or does not qualify for authorship. But ghost authorship defines purposeful ignorance as not giving authorship to an author who had contributed to research work.
2. The duplicate publication is publishing the same article twice. This is possible by submitting the same article to different journals at the same time. It is scientific misconduct as well as self-plagiarism. It comes under self-plagiarism as the author is submitting the same article by all means and without mentioning the earlier publication.

Check Your Progress 3

1. The citation is represented either as numbers in parentheses or superscript as per American Medical Association style or as the last name of the author or authors with published year as per American Psychological Association. The citation is normally seen as an in-text citation, as footnotes or as endnotes.
2. The principle of fair use or public domain had not needed written consent from the copyright holder. The exemptions to copyright law to use the work without any permission from the owner of the copyright includes use for research, study, teaching, criticism, comments, review and news reporting, in library and schools and legislatures. Creative Commons (CC) licenses are considered a good solution for copyright protection.