

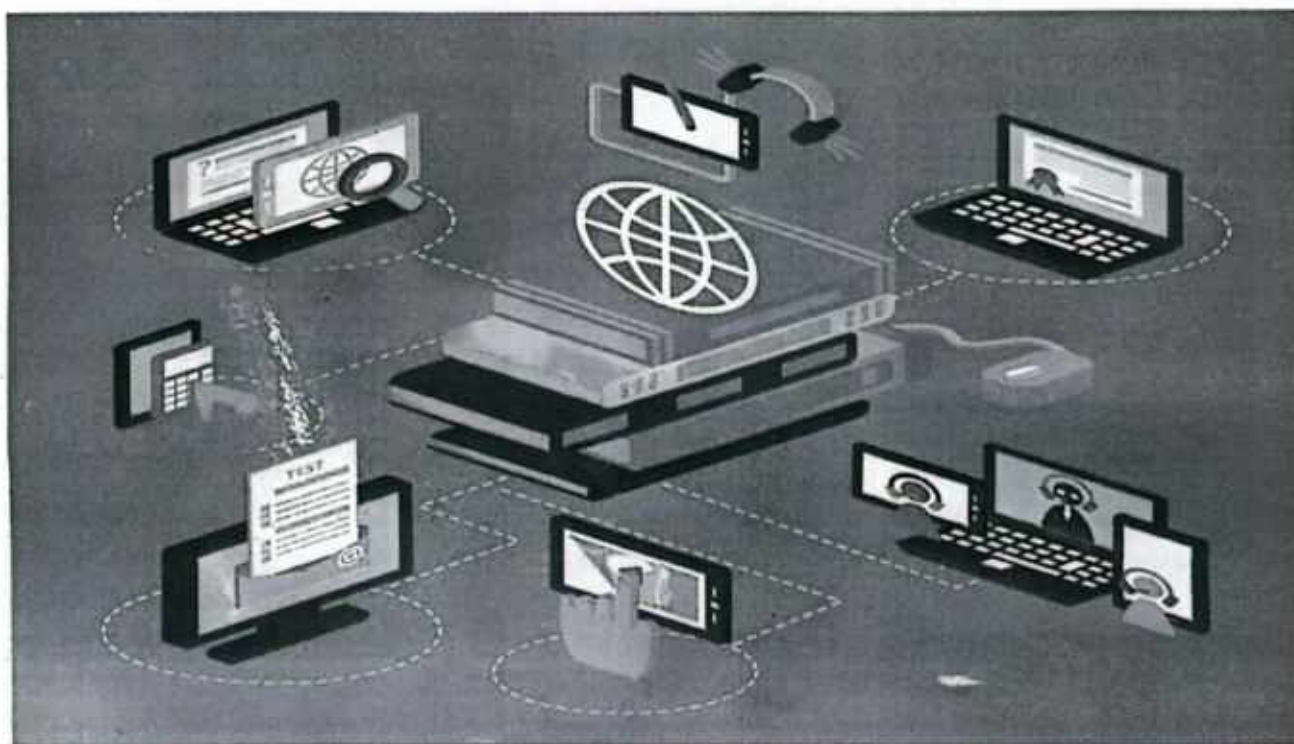
Unit 07

Digital Literacy



After completing this lesson, you will be able to:

- Perform advanced searches to locate information and/or design a data-collection approach to gather original data (e.g., qualitative interviews, simulations, prototypes, surveys)



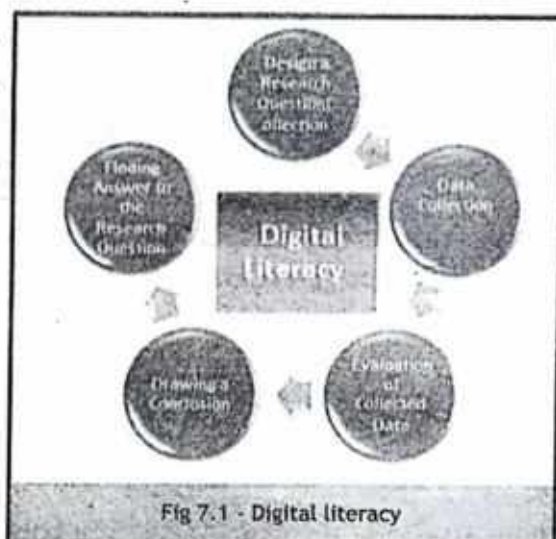
UNIT INTRODUCTION

Digital literacy is the ability to find, create, evaluate, communicate, and share digital contents. It involves interaction with digital technologies like cell phones, social media platforms, smart devices, and the Internet. Digital literacy is the key to formulate research questions, based on accurate data collection or creation.

A research question is the goal or objective to achieve after collecting data, evaluating it, and come to the conclusion. This conclusion provides the ultimate answer to that research question. Usually, a research question focuses on research, decide or develop the methodology and set a hypothesis.

Data collection is the method of collecting data by using various data collection techniques. It is further evaluated and converted into meaningful information. The outcome of this activity becomes the answer to our research question for which the entire procedures have been designed and followed.

Accurate data collection plays a vital role in making informed business decisions, maintaining research integrity, and ensure quality. During data collection, the researchers must identify the data types, the sources of data, and what methods are being used. There are different data collection methods. Accurate and suitable have a pivotal role for reliable research.



While deciding which data collection method or strategy is to be used, following are some key points to remember:

- The purpose or objective of the research/research question.
- The type of data to be collected:
- The methods and procedures to collect, store, and process the data.



Teacher's Guide

To explore more about qualitative interviews and surveys following are some useful links:

<https://deakin.libguides.com/qualitative-study-designs/surveys>

<https://freeonlinesurveys.com/survey-research/qualitative-data-collection>

7.1 Data Collection Strategies

Before discussing the data collection strategies, we will learn about the difference between the word method and strategy. Some data collection methods have been discussed in Unit No. 04. Therefore, first we will identify the difference between them. A method is a process, steps, or procedure to perform a task or implement some idea. On the other hand, the strategy is a goal, objective or set of actions to achieve some aim. In other words, we can say that a strategy is how to select a goal, while the method is how to achieve that goal. For example, a company that

regularly markets very expensive products is using a “high end” strategy. Therefore, it will use various methods to reach potential customers, as well as maintain the quality of their products to meet the customers’ needs. In simple terms, a strategy is a plan of action, which is designed to achieve a long-term goal or objective.

A data collection strategy is the collection of methods that will be utilized to get accurate and reliable data. For example, if you want to collect data about the usage of paid cloud service for smart phones users, you will first collect data about available cloud services for smart phones. Following are some advanced data collection tools or strategies:

7.1.1 Qualitative Interviews

Qualitative interviews are usually an informal research method, in which open ended questions are asked from the participants to gain in-depth insight about the research question. These interviews can be formal as well in which the interview is strictly technical and ask the questions in a controlled manner. In qualitative interviews a semi structured approach is used to get participant centered knowledge based on his/her social, cultural, and contextual factors. However, these interviews can be unstructured and structured too. The interviewer uses probing techniques to delve deeper into



Fig 7.2 - Qualitative Interviews

participant's responses, to get clarity, additional information and uncover underlying meaning. As qualitative interviews are participant centered, therefore, they are aimed at understanding the participants' viewpoint. They are often conducted with small numbers of participants. The emphasis is on the quality of in-depth analysis rather than quantity of information and generalization.

Conducting a qualitative interview involves several key requirements to ensure a robust and insightful research process. It requires careful planning and implementation. The good outcome of a successful qualitative interview is meaningful and rich data, which provides better answers to our research questions. Some important steps to conduct a better qualitative interview are as follows:

i. Define your research question or objective:

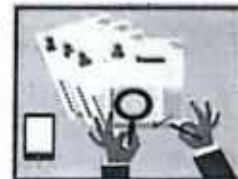
Clearly define the research question or objective for which the qualitative interview is required. Well defined research questions provide the foundation of qualitative interviews. The research question should be well explained to help focus on relevant aspects of the participants' perspectives. To develop a research question, you should be focused on the problem/issue about which research is required. Start from a broader perspective and narrow down your research question towards the topic of interest. For example, you have to write an essay about earthquakes. The broad topic is that you make a research question as “Impact of earthquake on human mind”. After



that you will narrow down your research topic and set clear boundaries that which topic/matter you will address in your research and which part will you keep aside for future research. In this example you can keep your research question specific to certain community or group of people and your research question will become "Impact of earthquake in hilly areas of Pakistan". This research question clearly set the boundaries for the research.

ii. Participants Selection:

Choosing the right participants is crucial for obtaining diverse and relevant answers to the research questions. Researchers should establish inclusion criteria based on the characteristics that align with the research question. Purposeful sampling allows for the selection of participants who can provide valuable insights, ensuring the richness and depth of the data.



iii. Obtain informed consent:

Before commencing interviews, researchers must obtain informed consent from participants. This involves clearly explaining the purpose of research/study, procedures, and potential risks and benefits. Participants should understand that their involvement is voluntary, and they have the right to withdraw at any time. The informed consent process ensures ethical conduct and respect for participants' autonomy.

iv. Develop an interview guideline:

Developing a comprehensive interview guide is essential. The guide comprises a set of open-ended questions designed to obtain detailed responses from participants. It should be flexible enough to allow for spontaneous exploration of topics raised by participants, advancing a natural and conversational flow. The interview guide ensures consistency across interviews while allowing for adaptability based on participant responses.



v. Interviewer Training:

Interviewers play a key role in qualitative research. Therefore, proper training of the interviewers should be conducted. It is crucial to equip interviewers with the necessary skills, including active listening, probing, and creating a comfortable environment for participants. Training helps interviewers maintain neutrality, minimize biases, and adhere to the study's objectives and ethical standards. Training should include how the interviewer can obtain fair information from the participants even if it is clashing with his/her own point of view.

vi. Recording equipment:

It is important to record the interviews properly. In the current age of technology, recording by writing is less effective than recording by using some audio or video recorders. The recorded interview can be played repeatedly to get true insight into the information provided by the participant. Sometimes



by changing the state of mind of the interviewer the obtained information might be different. Such recordings provide the repetition of the answers in its original form rather than re reading it from the paper. Therefore, it provides true insight into the participants' viewpoint.

vii. Comfortable environment:

Select a suitable place for the interview where both interviewer and the participant feel comfortable and free from distractions. The environment should provide complete privacy as well. Choose a relaxed and neutral environment to help participants feel at ease and encourage open communication for qualitative interviewing. There should be trust level between the interviewer and the participant. The interviewer should introduce him/herself, explain the purpose of conducting interviews, and keenly listen to the participants' responses.

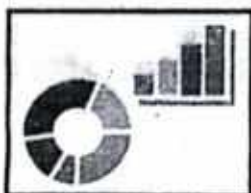


viii. Conduct the interview:

The interviewer should start the interview by introducing him/herself, it will create a friendly and comfortable environment between the interviewer and participant. The interviewer should be flexible and responsive to participants' answers. The participant should have the liberty to speak freely and provide the answers according to his/her comfort. The interviewer can use probing techniques to get in-depth knowledge regarding research questions. The participants' perspective should be given respect regardless of the interviewer's personal likes and dislikes. Seek participants' consent to record the responses. The data should be clearly recorded and saved for future use.

ix. Respect participants' perspectives:

The interviewer should show respect for the participants' responses, even if they differ from his/her own opinion. There should be no judgments making or imposing the interviewer's own thinkings/responses during the interview. To get the honest and true response of the participants is directly dependent on skill of interviewer.



x. Transcribe and analyze the data:

Accurate transcription of interview recordings is essential to complete the entire process successfully. The interviewer can promptly record the data after each interview before the facts disappear gradually due to passage of time. The interviewer should analyze the qualitative data. He/she can use suitable methods to keep the data accurate and private. The entire process of planning and conducting the interview should be according to the ethical guidelines. No privacy should be breached through the interview.

To develop the skill to conduct a qualitative interview, an example case study about qualitative interview is designed. Following are the brief guidelines to conduct qualitative interview to find the viewpoints of parents having children aged 4 to 5 years regarding the use of digital games/gadgets.:

i. Define your research question or objective:

The research question in this case study is to find the viewpoints of parents having children aged 4 to 5 years regarding the use of digital games/gadgets. The digital games involved in this case study are online games, videos played on smartphones and tablets.

ii. Participants Selection:

The participants should be the parents having the children aged 4-5 years. The other condition for a potential participant is that their children would be using digital gadgets.

iii. Obtain informed consent:

After identifying such a group of parents, the interviewer can seek permission from them to involve them in his/her research. Only those participants should be selected who are willing to share information without any hesitation. Those who don't want to be part of research should not be forced.

iv. Develop an interview guideline:

The guideline will contain open-ended questions. Sample questions would be as following:

- i. Does your child play any digital games?
- ii. Which digital game does your child prefer?
- iii. For how long does your child use a smartphone/tablet?
- iv. Do you think the use of digital content is affecting the cognitive level of your child positively?
- v. Do you think the use of digital gadgets is necessary for your child?
- vi. Does the use of digital gadgets affect the social development of your child?

Above are some sample research questions, the number and nature of questions may vary depending upon the nature of research. The questions will be adapted based on participants' response.

v. Interviewer Training:

The interviewer shall be trained that how he/she is going to interact with the selected group of participants, parents in this case.

vi. Recording equipment:

The recording equipment will be decided according to suitable options available. For example, digital audio and video recording of the interview can be arranged in this case.

vii. Comfortable environment:

To conduct the interview a suitable and comfortable place/environment will be arranged.

viii. Conduct the interview:

The interview will be conducted at the selected place. The interviewer will ask the questions and record the response given by the parents.

ix. Respect participants' perspectives:

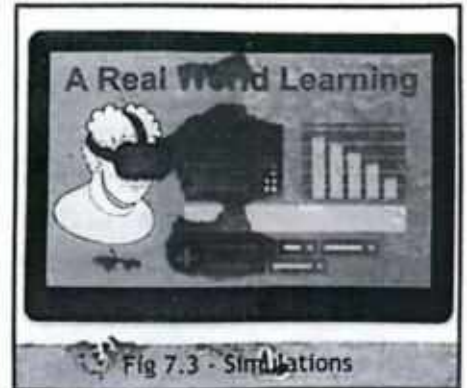
If some participants share information which does not match with the interviewer's thinking, it should not affect any step of the process. The true and genuine responses of the parents should be recorded to achieve meaningful research data.

x. Transcribe and analyze the data:

All the answers provided to the interviewer should be transcribed and analyzed to get clear results. The results can be shared with relevant people.

7.1.2 Simulations

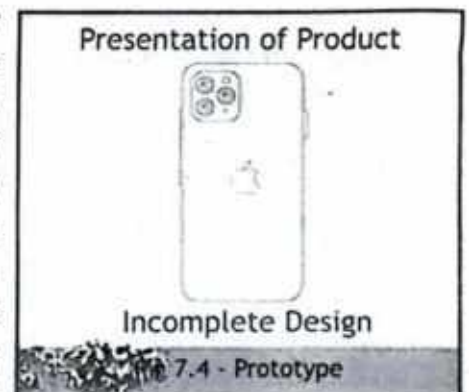
Simulation is an indirect method of **data** collection, in which the data for the research question is generated or created rather than collected directly by interview, surveys or questionnaires. It allows the researcher to observe the behavior of analytical models fitted to mock data. This synthetic or fake data is an imitation of real-world data. The process of creating such data is known as data simulation. The accuracy of simulation relies on the precision of underlying model. Simulated data is usually generated in huge amounts, where direct data collection from the real world is either difficult or unreliable.



In data simulation the desired attributes and characteristics can be incorporated into synthetic data, which ~~are seen in~~ real world. Such data provides the pattern and distribution of real world while being under a controlled environment. It enables the researchers to explore complex theories, and gain better insight, which might be challenging to obtain from the real-world data. Therefore, simulation method helps to get insight about complex system. It is not primarily a traditional data collection method. A real-world example of simulation is a pilot learning to fly in an aircraft simulator.

7.1.3 Prototypes

In context of data collection, a **prototype** refers to preliminary version of data collection tools or methods. Prototypes serve as a sample for the final data or a scale down product/conclusion before the full-scale implementation of the concept. The primary goals of prototyping are to identify and address design flaws, assess user experience, and ensure that the final product aligns with intended objectives. Prototypes are integral to the development cycle, minimizing risks, improving efficiency, and enhancing the overall quality of the final product or system. A few examples of prototypes in data collection are as follows:



Survey Prototypes: It is a small-scale version of a survey before its general distribution. A survey prototype helps to identify ambiguities and get clarity of questions to be asked during a survey.

Questionnaire Prototypes: It is a draft version of questionnaire to be used for data collection. In this version, all the problems are identified and corrected.

Data Collection Tool Prototypes: It is the prototype of data collection tool to be used. In the prototype the key working of the tool is evaluated and improved if some problems are found.

Interview Prototypes: It is mock interviews which are conducted to check the performance of the tool. The interviewer conducts mock interviews to test the effectiveness of interview protocols. It helps in refining the questions, ensuring they generate meaningful responses, and improving the overall interview process.

Data Visualization Prototypes: It gives some glimpses of data visuals, how would they be if implemented in current situation. Design of early versions of data visualizations or dashboards provides clarity and effectiveness in conveying information. This can help refine the visual representation of data before final implementation.

In general, prototype method in data collection helps the researchers and organizations to identify potential problems to be occurred at some later stages. After handling those problems, the final product becomes more reliable and meaningful. It is an effective and robust strategy.

7.1.4 Surveys

A survey is a systematic or structured tool designed for data collection from a group of individuals. Usually, surveys are conducted through printed questionnaires, online forms, interviews, etc. Like the qualitative interviews, surveys also contain a collection of questions to be asked from the target participants, but surveys are more formal and structured than qualitative interviews. Surveys are also used to collect feedback, reviews, and opinions from the targeted participants. In surveys, researchers use multiple methods of data collection, which may include printed questionnaires, online google forms, telephonic surveys, and face to face surveys. Since there are multiple ways of data collection, the suitable method is used/preferred to collect data depending upon the targeted audience. The information obtained by surveys becomes available for statistical analysis. Analyzing results requires statistical techniques, interpretation skills, ensuring that the collected data is reliable and valuable for drawing meaningful conclusions. In summary, surveys serve as invaluable instruments for understanding and quantifying the perspectives of a chosen population on a given set of issues.



Fig 7.5 - Surveys

To develop a skill of conducting survey you can design google form for the following example. to create a google form the following are the steps:

- i) Type "docs.google.com/forms" in your web browser
- ii) Click on Blank form option to create a new form.
- iii) Click on the term "Untitled form" and type the name of the form. A blank question will be available in the form. By default and multiple choice question format is provided, however,

- you can change the nature of the question by clicking on it.
- iv) In the text box click on “Untitled Question” and type your question.
 - v) In the options section give your options one by one. You can assign score to each question if you want.
 - vi) After adding all the questions you will click on three dots in the top right corner of the form window and you can share the link with the participants. (Note: google form is saved automatically)

We will take the example to collect information about “the impact of usage of digital games and gadgets”, using survey method, the sample form could be as follows:

Impact of usage of digital games/gadgets among the children aged 4-5 years

This questionnaire is designed to get opinion from the parents about the impact of digital games/gadgets on their children.

Table 7.1 Questionnaire For Parent's Feedback				
Question/statement	Strongly agreed	Agreed	Not Agreed	Neutral
The children at the age of 4-5 years should have access to digital games/gadgets.	☐	☐	☐	☐
Now a days access to digital gadgets is compulsory for children.	☐	☐	☐	☐
To use a smartphone/tablet by children is much better than playing outside with their peers.	☐	☐	☐	☐
Use of digital content is affecting the cognitive level of your child positively.	☐	☐	☐	☐
There is no harm in using digital games/gadgets for long hours e.g. 5-6 hours daily.	☐	☐	☐	☐
Use of digital gadgets have negative impact on the social development of your child.	☐	☐	☐	☐
What is the behavior of your child if you don't give him/her digital gadget?	 			

This survey form can get information from various targeted audiences. You can compare the questions asked in this survey, with the question asked in qualitative interviews. In surveys you can get analytic questions' answers as well, but they provide less details as compared to qualitative interview, however it is a good and commonly used method to collect data from various sources.

7.2 Data presentation for research question...

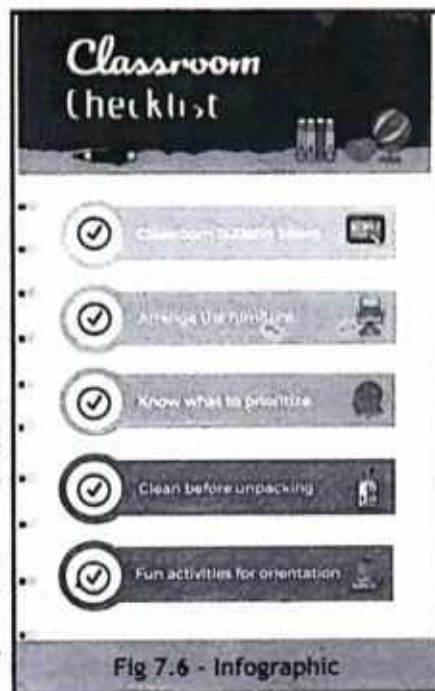
Data presentation is the process of showing the relationship between two or more datasets with the help of visual tools or aids. After data collection and analysis, the results or insight should be presented in a meaningful manner which may lead to an informed decision. It is very important to present the data in an effective and efficient way. This process follows data analysis and leads towards organization of data and information by visualization of data in a better understandable format. It uses various graphical formats and methods to keep the data representation more appealing and comprehensible. With the advancement of technology, better data visualization methods and tools have been developed. These tools can be in tabular form or graphical form. Some enhanced data representation tools are as follows:

- Infographics
- Presentations
- Reports

Infographics

It is the combination of two words information and graphics. Infographics are the combination of text, images, and design elements. Infographics are used to represent findings after data collection and analysis. The complex information/concepts can be easily represented in infographics. Infographics simplify the complex data and results can be comprehend quickly by visual information. It is a powerful tool for communication because complex concepts or information can be easily conveyed with the help of related visuals or graphics.

Infographics transform intricate and voluminous data into visually appealing formats. Therefore, it serves as a facilitator for effective communication and enhances the impact of presented information. Infographics may contain graphs, charts, icons/symbols, illustrations/diagrams, and text. A good infographic should ensure accuracy, audience understandability, crisp information without unnecessary details, and visually appealing. It should also fulfil social and ethical constraints. A sample infographic is shown in Fig. 7. 6.



Presentations

Presentations with the context of data collection/visualization refers to the act of showcasing the information in an attractive and meaningful way to the audience. Presentation is a collection of multimedia elements such as text, images, audio, and video data etc. A good presentation helps in better understanding, interpretation and right conclusion or outcome of



data collection and analysis. An accurate, clear, visually appealing, audience centered presentation helps in better understanding. Presentations may include interactive elements as well to keep the audience engaged. A presentation should be effective, understandable, and actionable to a wide range of audience. An effective presentation enables the audience to draw correct and clear understanding about the research for which a presentation is designed.

Reports

Reports helps to present data in a summarized form. They serve as a tool to communicate complex information in a clear and understandable manner. Effective reports helps the stakeholder/businessman to make informed decisions after getting true insight about the collected data and its analysis. A reports transforms the raw data into actionable insight. Reports are used to visualize or present the data in a structured and organized format. The data included in the reports might be brief, but it conveys the true understanding of the research question and its outcome. The structured format ensures the information to be expressed in a logical manner.



Summary

- Digital literacy is the ability to find, create, evaluate, communicate, and share digital contents.
- A research question is the goal or objective to achieve after collecting data, evaluating it, and finding the conclusion.
- The outcome of data collection becomes the answer to our research question for which the entire procedures have been designed and followed.
- A method is a process, steps, or procedure to perform a task or implement some idea.
- A strategy is a goal, objective or set of actions to achieve some aim. In other words, we can say that a strategy is how to select a goal, while the method is how to achieve that goal.
- A data collection strategy is the collection of methods that will be utilized to get accurate and reliable data.
- Qualitative interviews are an informal research method, in which open ended questions are asked from the participants to gain in-depth insight about the research question.
- Choosing the right participants is crucial for obtaining diverse and relevant answers to the research questions.
- Before commencing interviews, researchers must obtain informed consent from participants.
- Developing a comprehensive interview guide is essential. The guide comprises a set of open-ended questions designed to obtain detailed responses from participants.
- A survey is a systematic or structured tool designed for data collection from a group of individuals.
- Prototypes serve as a sample for the final data or a scale down product/conclusion before the full-scale implementation of the concept.
- Simulation is an indirect method of data collection, in which the data for the research question is generated or created rather than collected directly by interview, surveys or questionnaires.
- Infographics transform intricate and voluminous data into visually appealing formats. Therefore, it serves as a facilitator for effective communication and enhances the impact of presented information.
- Presentations with the context of data collection/visualization refers to the act of showcasing the information in an attractive and meaningful way to the audience.
- Reports help to present data in a summarized form. They serve as a tool to communicate complex information in a clear and understandable manner.

Exercise



Select the best answer for the following Multiple-Choice Questions (MCQs).

1. _____ is a key requirement for conducting a qualitative interview.
a) Planning and implementation b) Survey
c) Talking with interviewee d) Data analysis
2. _____ software can be used to create eye-catching Infographics.
a) MS-Word b) MS-PowerPoint
c) MS-Excel d) MS-Access
3. _____ is the process of representing model in terms of time and space.
a) Communication b) Simulation
c) Control System d) Radar
4. _____ refers to basic version of a product, system, or design that is created for the purpose of testing, evaluation, and feedback.
a) Survey b) Questionnaire
c) Prototype d) Chart
5. The process of creating synthetic or fake data that resembles real-world data is referred to as _____.
a) Presentation b) Simulation
c) Primary data d) Secondary data
6. _____ are graphics and images describing information and data in a visual way.
a) Visual Text b) Worksheets
c) Infographics d) Secondary data
7. _____ is defined as the process of using various graphical formats to visually represent the relationship between two or more data sets.
a) Primary data b) Secondary data
c) Presentation d) Survey



Give short answers to the following Short Response Questions (SRQs).

1. Define digital literacy and its significance.
2. Differentiate between simulations and prototypes.
3. Write steps to design a google form to conduct a survey.

4. Write a short note on Data simulation.
5. How reports are a good tool of data presentation?



Give long answers to the following Extended Response Questions (ERQs).

1. Argue about any two advanced data collection strategies in detail.
2. Debate about the important aspects to consider for conducting a better qualitative interview?
3. If you have to conduct a qualitative interview, which five steps would you necessarily follow? Give reasons for your selection.
4. Imagine you want to track plant growth over time. How would you design a system to collect data on this?
5. Determine ways via which you will ensure that the information you collect is accurate and unbiased?



Activity 1

- Divide the class into groups of 2 to 3 students each, assign them to formulate a research questions from real world.



Activity 2

- Design a survey form to get collect data about the topic "how economic conditions of various countries is affected by the COVID-19?"



Activity 3

- Divide the students into groups of two to three students. Assign them to conduct a qualitative interview about the topic given in Activity 2.



Activity 4

- Design an infographic in your favorite graphic designing tool, about the "Fun Fair" event to be held in your school.