Q.1 what is a scientific method? Specify the role of teacher in this method.

Students, and sometimes even teachers, often think scientists only use the scientific method to answer science-related questions. In fact, you can apply the scientific method to almost any problem. The key is to use the elements (steps) to reduce bias and help come to a solution to the problem.

The scientific method consists of a number of different steps, but the order in which we apply the steps can vary. Rather than focus on the order of the steps, students should see the scientific method as a tool that consists of elements they can use to solve problems and answer questions. While you can reorder the steps of the scientific method, it is important to apply all the steps to reduce the impact of personal bias. This is really the key function of scientific method. The scientific method lays out a process that helps scientists come to a conclusion, but that conclusion is made more valid by virtue of the process scientists used to reach their conclusion. One of the real strengths of the scientific method is that its steps helps users reduce the chance for error and personal bias, making the results of their experiments more trustworthy.

A quick Web search yields several different versions of the scientific method. Some have more steps, others have fewer steps. This can confuse students and teachers. Which one is correct? The short answer is most of them are correct.

The steps of the scientific method, no matter what sequence they are in (e.g., prediction before test, test before predictions) helps organize the thought processes and logic of resolving a problem or answering a question. But no matter which version of the scientific method someone uses, there will be some common steps:

- The search for alternative explanations
- Constant pressure to disprove even currently accepted hypotheses
- Capacity to modify or even drop a "favorite" hypothesis when too many exceptions become apparent (truth is relative to the available data)
- The scientific method also serves as an important template for communicating results and the logic behind them. This step is perhaps the most important step in the scientific method, yet it is often a step that is left out of models of the scientific method. If scientists don't share their results or talk about the processes they used to get those results, those results can't become part of our understanding of the world around us. It is, therefore, critical that "communicating results" is part of students' vision of the scientific method.

Being involved in science and using the scientific method are not necessarily the same thing. It is possible to be involved in science without applying all the processes of the scientific method. The citizen science movement, which is a very powerful part of the science community, is a great example of this. Citizen scientists are ordinary folks who are involved with pieces of the scientific method, such as data collection.

For example, in the Monarch Monitoring Project, citizen scientists help count migrating monarch butterflies. Each year thousands of people from around the country spend time collecting critical butterfly census data. The Great Backyard Bird Count (GBBC) is another large citizen science project that relies on the help of people from around the country to collect bird data.

Collecting data is one part of the scientific method, and citizen scientists clearly "do science," but they have not applied all the parts of the scientific method. Students should understand that the scientific method is a process that results in a conclusion. Simply gathering data does not result in a conclusion; other steps are necessary.

Science Detectives Training Room is a fun way to teach students from elementary level to college about the scientific method. It is also a great way to build problem solving skills. Based on a popular "room escape" genre of online games, players enter a dark room and must work through a set of problems to escape.

Once the player escapes from the first room, they encounter a summary of the steps they took to escape and how those steps match the steps of the scientific method. At the end of the game the player can print out the results of their training room exercise for review. If used as an assignment, students can submit the printout to their instructor to show how they performed in the activity.

The game then connects to a follow-up game, The Case of the Mystery Images, which allows students to practice their new detective skills. They are shown a series of images that they have to make hypotheses about in order to progress through the game. They can also print out their work in this game.

Concept 1: Observations, Questions, and Hypotheses

- PO 1. (5) Formulate a relevant question through observations that can be tested by an investigation.
- PO 1. (6) Differentiate among a question, hypothesis, and prediction.
- PO 1. (7) Formulate questions based on observations that lead to the development of a hypothesis.
- PO 1. (8) Formulate questions based on observations that lead to the development of a hypothesis.
- PO 2. (5) Formulate predictions in the realm of science based on observed cause and effect relationships.
- PO 3. (7) Explain the role of a hypothesis in a scientific inquiry.

Concept 2: Analysis and Conclusions

- PO 2. (3) Construct reasonable interpretations of the collected data based on formulated questions.

Q.2 what is a guided discussion method. Explain the structure of guard discussion method.

Discussions are a type of active learning that allows students to work through skills and concepts from course content by formulating ideas in their own words. Guiding questions can encourage higher-order levels of thinking that can result in deeper richer discussions with their peers and the instructor. Discussions can occur asynchronously or synchronously so that learners can clarify understanding, organize their ideas, debate topics, and practice skills.

This method contrasts the Lecture method discussed in the last article, by relying on the students to interact by discussing their ideas, experiences, and opinions about the information being covered. It is extremely useful in the classroom and on the range or track once a student can relate to the topic being covered either by gained

knowledge, previous experience, or a similar model to resource. The guided discussion method is essentially the opposite of the lecture method. The goal is for the Coach to extract, from the students, **their** knowledge in such a way as to "guide" their ideas in the proper direction instead of "telling them" what they should know. This is a departure from a typical pedagogy into coaching and more importantly into education where a long-term and much broader idea of creating a mental model and value systems are accomplished as discussed by Stolovitch and Keeps (2002).

The more intense the discussion and the more participation by the students, the greater the effectiveness of learning in the process. Key to this teacher/learner transaction is ensuring that all the students are following the discussion and that everyone is treated in an impartial manner. Questions must be encouraged by the coach to foster the desire of inquiry, sometimes exercising patience and tact, but always allowing appropriate responses and comment. With this method, a coach should be open enough to accept where the conversation goes, guide it back to where it needs to be, and manage the discussion to eliminate sarcasm and ridicule that would otherwise be a barrier to free flowing ideas.

In a guided discussion, questions are used to evoke thought, foster inquiry, and meet the intent of learning the topic at hand. Skillful questions by the coach can direct the conversation, emphasizing where the focus should be, or find the root information or reason for beliefs and values of the students to reinforce the positive ones and divert away from those which are questionable. Most discussions are started with an over-arching question that opens the topic for discussion with a purpose of gaining student attention and focusing the dialog. This is sometimes called the "lead-off" question which implies its main function. After the discussion begins, students have ownership of the conversation (conceivably) until the learning outcome has been reached or the coach interjects to follow-up or guide the discussion.

Because there are a plethora of reasons for a coach to interject, it should be done judiciously. A pointed reasons to do so would be to have a student explain something more thoroughly, or bring the discussion back to the topic from which the discussion strayed in a tactful manner. Questioning methods could be considered rhetorical, overhead, direct, reverse, and or relay. Rhetorical questions are good for encouraging group thought, overhead questions are good for starting a new conversation, direct questions are used to gain a student's specific response. Reverse questions are used as a response to student questions. allowing deeper thought by the student without exposing an answer, and a relay question can divert a question back to the discussion group instead of the individual, preventing the easy option of the coach "telling" the group an answer.

Regardless of the type of question used, the reason for using a question is to enhance discovery learning which is known to be more effective than lecturing students. Important when using the guided discussion is the useful and skilled employment of questions. The questions used should 1) have a specific purpose; 2) be clear and understandable to the individual and group; 3) have a single idea in mind; 4) be thought provoking; 5) have a definite answer; 6) relate to previous covered information or mental models known by the students; and lastly 7) be within the realm of knowledge of the coach unless expressed otherwise.

Planning for a guided discussion is similar to planning for a lecture; however, a coach must be prepared for more contingencies and have the ability and skill to account for whatever direction the discussion may go. To that end, the topics selected for discussion should seek the desired learning outcomes and students should have enough base knowledge to willfully exchange in the conversation on the topic. Through discussion, students develop an understanding by collectively sharing knowledge, experiences, and backgrounds with each other. The objective should be discussed and understood up front and any outcomes should stem from and be related to the objective. It cannot be emphasized enough that a coach must be thoroughly familiar and researched on the topic being discussed. Through preparation and deep knowledge coaches can tailor a lesson based on the interactions between members of the group. Pre-discussions and pre-assignments can lay the groundwork for more effective interactions during guided discussions and shows an interest by the coach in the student. Research conducted by the coach can be used as supporting documents if understood and organized well for student use, as long as it pertains to the subject and based on the fundamentals identified in the curriculum. Walton and Gallimore (2006) identify passion and deep knowledge of the subject as a characteristic of what special teachers have in common, and this includes not only the subject matter but also the students themselves. As with a lecture, a guided discussion should have an introduction, the experience development, and a conclusion. In the guided discussion, it is important that the introduction catches the attention of the student providing motivation to discuss and engage in the topic. The coach gives information that enhances the discussion up front but also gives an overarching reason for the questions to come, always providing the learning objective as the guiding beacon that will be returned to. Likewise, the sequence of the main points should build on previous topics to support the final objective, using familiar questions and common phrases for understanding. Ultimately the conclusion should be reached by the students through discussion which have been reinforced consistently and confirmed by a final question from the coach to the students seeking confirmation of the objective. In preparing questions for students, even on the fly during the discussion, the coach must remember that the intent of questioning is to foster a deeper dialog and conversation while seeking the answer. Learner-centered questions allow this to happen by avoiding an answer that is more content based or even a shorter categorical answer like "yes" or "no." Learner-centered questions should invoke deeper thought on topics and require the student to do some mental analysis before presenting an answer. Content-centered questions do not allow for deeper thinking only the requirement for rote memorization of the content. When facilitating a guided discussion, it is important that an engaging discussion happens to invigorate thinking and mental connections within every participant.

Q.3 What are teaching skills? Describe the components of presentation skills.

Teaching skills are crucial when working as an educator. These skills are what help a teacher keep their classroom engaged and interested in learning. Knowing the most desirable teaching skills, as well as how you can highlight them can help you find a teaching job that you enjoy. It can also be helpful to learn how to highlight your teaching skills in your cover letter and resume, as well as during the interview.

Teaching skills are the hard and soft skills that help a teacher keep students engaged. These skills can also help teachers position themselves as an educator, earning the attention and respect of their students. Some teaching skills come naturally to some, whereas others may require development with practice. Developing teaching skills is only one part of becoming a good teacher. It can also be helpful to learn how to highlight these skills on your resume and during your teaching interview.

Communication

Communication is important as a teacher, whether you are transferring information to a student, or learning how you can better meet the needs of your students. Teachers will often use both verbal and nonverbal communication skills to understand school policies, as well as to communicate the progress of students to their parents. Teachers may need to read body language to understand students who are struggling or when the classroom is not understanding a lesson.

Project management

Teachers will often work on multiple projects at one time. This might include creating lesson plans, working one-on-one with students, or grading assignments. Additionally, teachers are often required to meet certain goals before the end of the school year. Teachers will need good project management skills to stay organized and timely and to meet these year-end goals.

Problem-solving

Problem-solving or conflict resolution skills can also be helpful in the educational environment. Teachers may need to manage conflict between students, other teachers, or even during parent-teacher meetings. Problem-solving skills allow teachers to come up with unique solutions to conflict, identifying ways that meet the needs of everyone involved.

Creativity

Different students learn differently, making creativity an important teaching skill. Some lessons can also be more difficult to teach and creativity can help students maintain interest in the lesson. Teachers who are creative tend to hold the interest of their students longer, allowing them to teach difficult topics and subjects.

Leadership

Leadership skills can also be helpful in the classroom. Teachers will need to lead their classrooms, keeping their students engaged and interested. Leadership skills can help with managing the classroom and highlighting the importance of upcoming due dates or project goals.

Patience

Patience is crucial when working as a teacher. In addition to being a role model to teach patience to students, being patient can help teachers meet their students where they're at academically. Students will gather information at different paces and being patient can help create an environment of acceptance while also promoting learning.

Technical

In today's technical times, having some comfort with using computers is important. Many lessons are taught using computers or videos and having the ability to troubleshoot and run these programs is useful. Younger students may also need assistance with running or updating programs and will turn to the teacher for help doing so. Some teachers may also choose to assign work or tests online.

Good teachers are continually improving upon their skills. You can improve your teaching skills with the following steps:

1. **First, recognize your strengths:** It can be helpful to first know your strengths in relation to your teaching skills. You may be able to use these strengths to help with developing areas that you would like to improve.

2. **Second, create a list of teacher skills needed you would like to improve:** Now, create a list of skills for teachers that you would like to further develop. These may be skills that you have had less experience with or ones that you find the most difficult to implement in the classroom.

3. **Then, identify specific ways to improve these skills:** For each teaching skill listed, consider specific ways you can improve them. For example, if you want to be more organized, you might try to improve your organization in other areas of your life. If you want to be a better leader, then you might volunteer for a leadership position in an after-school group.

4. **Determine how you will measure the development of skills:** Good goals are SMART goals, which are goals that are specific, measurable, actionable, realistic, and timely. Determine how you will measure the development of each skill, as well as a timeline of how long you can expect to realistically complete each one.

Improving skills takes time and practice. That is why it is so important to continue monitoring your progress toward the development of certain skills.

You can improve your skills in the workplace with the following tips:

- **Use SMART goals:** Setting goals that are S.M.A.R.T. can help you track progress toward the development of your skills.

- **Continue working on your skills:** Teaching skills can be continually improved. Continue to track your progress toward these goals and find new opportunities to improve as you meet your goals.

- **Practice your teaching skills in your daily life:** Certain skills, like organization and patience, can be harder to develop. But, trying to be more organized in your home life, or more patient in your personal relationships can help you develop these skills.

- **Get creative:** Finding unique ways to develop your classroom skills can also help with developing your creative skills. For example, you might try mindfulness to improve patience. You might join an art class to find new ways to express creativity in the classroom.

- **Drop-in on other teachers' classrooms:** Sometimes, it can be helpful to monitor how other teachers lead their classes. It can also be helpful to accept and give feedback, allowing you and your coworkers to work in a collaborative way to improve your skills.

- Developing your teaching skills may take some creativity. But, in doing so, you can develop the skills that will help you in the classroom, while also improving your creativity skills.

Presenting information clearly and effectively is a key skill in getting your message across. Today, presentation skills are required in almost every field, and most of us are required to give presentations on occasions. While some people take this in their stride, others find it much more challenging.

Many people feel terrified when asked to talk in public, especially to bigger groups. However, these fears can be reduced by good preparation, which will also lay the groundwork for making an effective presentation.

They do not, however, all require the same approach. You would not, for example, use PowerPoint to thank a colleague who was leaving. It would be unusual (though it has been done) to use it in a speech at a wedding. However, a conference audience would be somewhat surprised NOT to see slides projected onto a screen.

It follows, therefore, that there is no single set of rules that apply to all presentations. There are, however, some things that every presentation opportunity has in common. These include:

- **You will present better if you have prepared effectively**. This does NOT necessarily mean that you have written out your speech verbatim and rehearsed it until you know it off by heart—although that might work for some people. It does, however, mean that you have to be confident that you are saying the right thing, in the right way, to the right people.

- **You need to be clear about your audience and your message**. Every presentation will be better if you have clearly considered the message that you want or need to convey, and how best to convey it to your audience. These two pieces of information drive your style, structure, content, and use of visual aids.

- **You must never overrun your allocated time**. In other words, don't outstay your welcome. Almost every speech or presentation is better if it is shorter. Nobody minds going for coffee early or finishing before they expected to do so. Everybody minds being held up.

- **Generally speaking, your audience starts on your side.** As a rule, your audience is there (more or less) voluntarily. They have chosen to listen to you, and they want to enjoy your presentation. The occasion is yours to lose.

When you present, you are in charge of the room. The audience has effectively handed you control and is sitting back waiting for you to do something. You may have prepared a specific talk, but if you see that isn't working, you can always change it. You are, after all, the expert.

You can, for example:

- Skip through some slides to a section that they may find more interesting;

- Ask your audience whether there is particular information that they were expecting that you are not providing;

- Suggest that everyone looks a bit sleepy, and maybe it would be better to start questions early, or have a discussion; or

- Ask the audience at the start of the presentation what they are expecting and what they want you to cover. That way, you can tailor the presentation to fit their expectations.

- Just as when you are facilitating, you want to help your audience get the most out of your presentation. The best way to do that is to accept feedback—which may include smiles, nods of interest, or people getting their phones out.

Q.4 Describe the purpose of teaching tools and how many types of teaching tools are used in the classrooms?

Learning is more powerful and dynamic with tools that are already right in front of you – and it's up to educators to impress this on students in the classroom.

When you bring real things and authentic daily- life situations into the classroom, listening becomes discovering, interest becomes wonder, and passive learning becomes active exploration. Lessons come to life with touch, motion, and sound.

A teaching aid is a tool used by the teacher as a facilitator to the process of teaching and learning inside the classroom. It is one of the means by which we, as teachers bring life into the theoretical texts by bringing environment inside the classroom indirectly.

Also, it is a means of personification to the concrete texts in the students' books. The final purpose remains as a means of relating teaching with the environment that students live in and communicate with.

A teaching aid is a means of bringing environment into class to give life to theoretical learning. It is a means to involve learners physically, mentally, emotionally and environmentally.

A teaching aid can involve the learners physically through using his senses and acting, mentally through using his mind and thinking, emotionally through his excitement and environmentally through looking at pictures that express the daily life we live. Have you wondered what a teacher is? He is an audio-visual aid of teaching.

1) Motivation

Teaching aids motivate the students so that they can learn better.

2) Clarification

Through teaching aids , the teacher clarify the subject matter more easily.

3) Discouragement of Cramming

Teaching aids can facilitate the proper understanding to the students which discourage the act of cramming.

4) Increase the Vocabulary

Teaching aids helps to increase the vocabulary of the students more effectively.

5) Saves Time and Money

Teaching through using aids takes a shorter time than traditional teaching that depends on lecturing and more repetition from the side of the teacher.

There will be no need to re-explain the lesson once more, as the learners have learnt the content through using all their senses and emotion. Here, money is saved.

6) Classroom Live and active

Teaching aids make the classroom live and active.

7) Avoids Dullness

Teaching aids make the lesson interesting and the learners more interested. Learners see the set-book text pictures and photographs speaking and acting.

Active Teaching Aids:

In active learning, both the teacher and the learners can use

electronic learning programs like The Sage program,

The Hot Potatoes program, The lingoes program,

The Celestia program, Jing program, Free-Mid map

program , Chemistry crocodile program and the

electronic lesson plan for the teacher.

Kinds of active teaching aids:

. Visual Aids

. Audio Aids

. Audio - Visual Aids

1) **Visual Aids**

The aids which use sense of vision are called Visual aids.

For example :- actual objects, models, pictures, charts, maps, flash cards, flannel board, bulletin board, chalkboard, overhead projector, slides etc. Out of these black board and chalk are the commonest ones.

2) **Audio Aids**

The aids that involve the sense of hearing are called Audio aids. For example :- radio, tape recorder, gramophone etc.

3) **Audio - Visual Aids**

The aids which involve the sense of vision as well as hearing are called Audio- Visual aids. For example :- television, film projector, film strips,.

Q.5 Write down the advantages and disadvantages of using multimedia.

According to Burton. **These are sensory objectives and images which stimulate and emphasis on learning process**. Carter V. Good. It is a trainable (motivation, classification and stimulation) process of learning.

Objectives of Teaching Aids

1. To enhance teachers skills which help to make teaching-learning process effective
2. Make learners active in the classroom
3. Communicate them according to their capabilities
4. Develop lesson plan and build interest
5. To make students good observer
6. Develop easy and understandable learning material
7. Follow child cornered learning process
8. Involve intimation in objectives
9. To create interest in different groups
10. To make teaching process more effective

Types

It can be classified simply on the bases of sensory experience. Because human beings derive their experiences mainly through direct sensory contact. Keeping this in view, it can be classified in to three main groups:

1. **Audio Aids** examples are Radio, Tape-recorder, Gramophone, Linguaphone, Audio cassette player, Language laboratory
2. **Visual Aids** examples are Chart, Black and while board, Maps, Pictures, Models, Text-books, Slide projector, Transparency, Flash-cards, Print materials etc.
3. **Audiovisual Aids** examples are LCD project, Film projector, TV, Computer, VCD player, Virtual Classroom, Multimedia etc.

Advantages

1. Its helps to make learning process more effective and conceptual.
2. Its helps to grab the attention of students
3. It builds interest and motivation teaching students learning process
4. It enhance the energy level of teaching and students
5. It is even better for over burden classrooms
6. It provides students a realistic approach and experience

Disadvantages

1. Technical Problems
2. Students Distractions
3. Expensive
4. Time consuming
5. Need Space
6. Convenience

Characteristics

1. Relevancy
2. Useful and purposeful teaching
3. Accuracy
4. Interest
5. Minimize verbalism
6. Comprehensibility
7. Motivation
8. Realism

Who can take benefit from Visual Aids

Though every children can take benefit while using visual aids for learning. But it is more helpful for those students:

- Having Language Disorder
- Autism Spectrum Disorder
- Down Syndrome
- Those who have Learning Disabilities
- Student who have English as a secondary Language
- Those having Oppositional Defiant Disorder
- Personality Development Delay
- Have the problem of Hearing Impairment
- Have the symptoms of Attention Deficit Hyperactivity Disorder ADHD

References:

1. Bloom B. S., Engelhart M. D., Furst E. J., Hill W. H., Krathwohl D. R. (1956). Taxonomy of educational objectives: The classification of educational goals. New York, NY: David McKay.
2. Brown, A.H., & Green T.D., (2015). The essentials of instructional design: Connecting fundamental principles with process and practice. Routledge.
3. McIver, D., Fitzsimmons, S., Flanagan, D. (2016). A Knowledge-in-practice approach to choosing instructional methods. Journal of Management Education Vol 40 Issue 1.
4. Nilson, L. (2016). Teaching at its best: A research-based resource for college instructors. Jossey-Bass.
5. Barnes, Louis B., C. Roland Christensen, Abby J. Hansen, Teaching and the Case Method: Text, Cases, and Readings Boston: Harvard Business School Press; 3rd edition, 1994