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THE EFFECTIVE TEACHING TECHNIQUE OF SCIENCE SUBJECTS

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Abstract

Multiple researches have proven that teachers have a profound impact on student gaining knowledge. After multivariate, longitudinal analyses of colleges, class sizes, instructors, and different results, Wright et al. (1997) concluded ‘‘variations in teacher effectiveness were located to be the dominant aspect affecting scholar academic benefit’’ (p. 66). Figuring out and separating the unique characteristics that affect teacher effectiveness and thereby pupil success is difficult. If strategies hired by means of effective instructors may be remoted, however, after which taught to less effective teachers, student gaining knowledge of need to enhance. The simple goal of coaching any concern is to bring about desired alternate in conduct. The exchange in behavior of infant could be indicated via youngsters’ capability to learn correctly. That is only possible by using adopting diverse techniques of coaching. Some broadly used techniques of science coaching have mentioned in this text.

Keywords: ***Methods, Effectiveness, Principles, Moderator, group cum-discussion.***

1. INTRODUCTION

Teaching is an artwork and there are born instructors. However, there are most of teachers, who can enhance upon by using enjoy of practice and use of different strategies of teaching technology. The teacher can't use only one approach to all form of students in any type of classes. He/She has to select and undertake the proper approach of teaching retaining in mind the capability of the students and the curriculum. As a consequence, technique in a manner of presentation of the content within the study room. But it is however very important to remember the fact that a method isn't always a lead to itself but is used to acquire the set objectives of coaching(Sree, 2010). You must also take into account that, identical approach has to no longer be used always however there have to be flexibility in the use of it as for as situations circumstances, and situation in a selected case [2]. You must use numerous strategies relying upon call for of the scenario(Güneş, Dilek, Çelikoğlu, Demir, & Sciences, 2011). The technique which in a selected class under a specific circumstance, may be a complete failure for any other instructor. But some set standards for deciding on of a way of coaching might be discussed in addition inside the following paragraphs. Blended learning, a new approach in educational planning, is defined as an applying more than one method, strategy, technique or media in education techniques (Sadeghi, Sedaghat, Ahmadi, & professionalism, 2014).

Principles for choosing a technique: -

It is not necessary that the education will be given in the same way it was given earlier. Making improvement in the education system and using new techniques is the need of the hour. New techniques can be implemented into the teaching system which suggests the need of the hour(Parikh, 2016).

There are some guiding ideas for figuring out teaching techniques. They may be as follows: -

1. Principle of experience of fulfillment through interest and cause.

2. Precept of energetic cooperation.

3. Principle of capability of college students of particular elegance.

Four. Precept of recognition of that means of schooling i.e., "I bring up", "I nourish", "Drawing art".

5. Psychological principle i.e., need, interest, of college students.

6. Principle of individual distinction i.e., different prospects of college students(Mohan, 2019).

1.0 Techniques for Teaching general science: -

All the strategies of teaching science can be divided into two categories: -

(i) Teacher-focused and (ii) Student- focused

(i) Teacher-focused methods: -

This kind of teaching techniques specializes in telling, memorizing, recalling information(Dr. Chandana Pattnaik, 2007). The pupil's participation is very limited wherein they best ask questions or answered questions. Most of the time the students are passive listeners and get hold of the expertise. The instructor is center of method that is going on inside the lecture room(Weinstein, Madan, Sumeracki, & implications, 2018).

(ii) Students -focused methods: -

This process emphasizes on need, requirement, hobby and capability of students. The scholars are lively participants where their capabilities and abilities are developed. The climate in the lecture room is conducive and versatility in there. Teacher and students at the same time discover the one-of-a-kind factors of trouble. The role of the trainer in to create a complex state of affairs, have substances and resources available to the students, and help them perceive issues, state hypotheses, make clear and test hypotheses and draw conclusions.

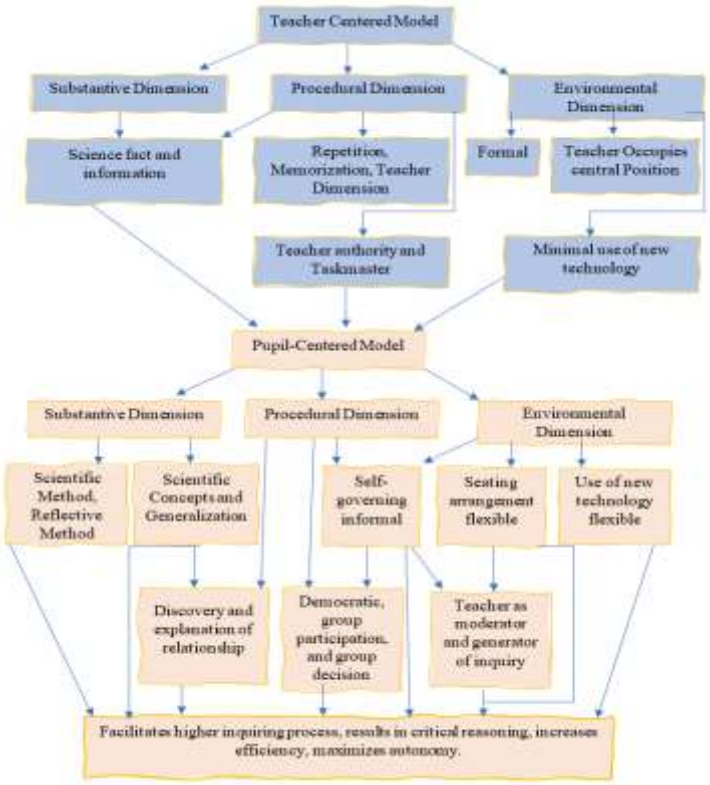

Fig.1. Diagrammatic representation of techniques for teaching general science.

1.1 Lecture-CUM-dialogue technique: -

This technique is a mixture of lecture approach and discussion technique. This is very helpful in constructing an active verbal interplay among the lecturer and pupils. The lecturer grants the lecture and affords a while (10 minutes) after the lecture for discussion between the pupils and lecturer in the school room (Knight & Wood, 2005). The pupil's perspectives, feedback reviews, problems, problems in information any point or part of the lecture come to instructor's understanding and lecturer replies, and clarifies the doubts. It is a crucial strategy in stimulating the pupils' pastimes and assess their information of the concept. It is a technique wherein interaction is going on in among teacher and students, where in query and answer are asked and given via each the teacher and students making the manner interactive, and effective. The basic purpose of this method is to disseminate information and gain academic goals with the aid of getting to know. The dialogue inside the class is intended to be a give and take among lecturer and students. This approach enables students to use critical questioning energy in numerous conditions. Higher learning talents like studying, synthesizing, generalizing is given more consideration. Focus group discussion consists of four major steps as shown in These include (1) research design, (2) data collection, (3) analysis and (4) reporting of results(O. Nyumba, Wilson, Derrick, Mukherjee, & evolution, 2018).

Concepts of lecture-CUM-dialogue method: -

The concepts are as follows: -

1. The instructor need to be aware of student's needs.

2. The instructor ought to influence interest of the topic and maintain within the mind of pupils.

3. Instructor should use visible aids and use ICT.

4. The instructor should take sufficient time to build intellectual pictures, with new concepts, previous information, shifting from easy to tough thoughts, for better conceptual development.

Responsibilities of instructor

The instructor has to perform following roles: -

1. Inspire students to participate in dialogue.

2. Make sure pupil's attention span is maintained.

3. Pre plan and prepare nicely for dialogue and help thoughts with accurate proof and examples.

4. Encourage pupil taking than instructor speaking.

5. If possible, deliver time before hand in order that, the dialogue will become productive.

6. Do no longer dominate as a substitute get the dialogue started out set dreams, summarize, mediate and clarify (Dr. Chandana Pattnaik, 2007).

Benefit of lecture-CUM-dialogue technique: -

1. It creates freedom surroundings in the class.

2. Develops and improves conversation abilities of learners.

3. It brings approximate behavioral changes among students.

4. It helps in assessing the actual education of the students.

Limitation of lecture-CUM-discussion technique: -

1. It's far useful for adult students.

2. If it is not well used, then the principle of "studying with the aid of collaborating" isn't always performed.

3. If teacher does not take care of students successfully then the learners can be in disciplined instead of participation.

4. If no longer managed well, it's going to not help to all students within the class.

5. Instructor should manipulate his emotions else this could result in incorrect output.

Recommendation for improvement: -

1. The instructor must keep suitable eye contact with learners with a purpose to make the procedure significant.

2. The instructor have to actively engage students.

3. The instructor needs to educate simply.

4. Should keep the dialogue focused on the task.

5. Instructor have to use suitable time management techniques and examine students as they study in the class.

6. Instructor have to not study substantially from lecture notes or textual content books.

7. Instructor have to not forget about player's comments and feedback.

1.2 Laboratory technique: -

This technique in typically concept of as a hand on and minds on technique to educate science knowledge in which learners have the possibility to advantage some experience with phenomena related to their route of study. On this technique either student participate alone or in small groups. They produce or manage numerous variables which are under exploration(Sakliressy, Sunarno, & Nurosyid, 2021; Sanders, 2012). The point to which pupil has manage over exploration can vary over an extensive variety. Right here the students examine through real doing instead of by using gazing the experiments. As younger children do it by way of themselves, the revel in is inspired more firmly of their minds. Hence, this approach in psychologically sound because it satisfies the herbal urge for interest. This technique broadens interest of the students. They study many virtues thru laboratory interest. The revel in in a laboratory could be very wealthy in non-public pride as they advantage it firsthand. The experience of exhilaration and mission assist them to attain a few tangibles him (Sanders, 2012).

Concepts of laboratory technique: -

1. It follows the basics of knowledge by doing.
2. It follows psychological principle, where learners age and interest are taken into consideration.
3. The task must be already organized and selected.
4. Instructor must see that; learners are allowed to work by themselves without more interference.
5. The Instructor have to keep in mind that apparatus and equipment should be checked pair hand.
6. The Instructor have to control that learner are known to follow information and write their observation properly (Sanders, 2012).

Responsibilities of Instructor

1.Trainer have to be a facilitator of the process of doing experiments by way of students.

2. Instructor need to test the apparatus previously, in order that it goes on smoothly.

3. The practical should be already arranged and selected.

4. The skills of handling equipment, drawing, diagrams, careful observations taking vital precautions, ought to be developed amongst students.

5. The Instructor have to know that; the scholar is doing test nicely through following right process (Sakliressy et al., 2021),(Li & Klahr, 2006), (Dr. Chandana Pattnaik, 2007).

Benefits of laboratory technique: -

1. This technique follows student-focused technique.
2. It makes learner active and alert.
3. It gives scope for learning through doing and students do a number of thinking themselves.
4. Exclusive competencies are advanced.
5. It paves way for exploration experimentation and verification of scientific records and concepts.
6. It inculcates accurate virtues like, honesty, truthfulness, dignity of hard work and so on.
7. It enables in developing sprit of enquiring.
8. It enables in developing higher order this king capacities like reasoning, reading, synthesizing and so on.

The constraints of this technique are as follows: -

1. It's miles expensive and uneconomical.
2. Its need more time as some experiments is long to reach the conclusion.
3. It expects a lot from learner and instructor.
4. It does no longer guarantee that, students could be similarly green in fixing problems outside laboratory.
5. All students cannot be expected to be skilled people.
6. Most of the learner are either not prepared or unable to undertake authentic work.

Recommendations for improvement: -

1. This technique must not be considered independently but should shape part of the entire science program.
2. The realistic work should be pre-deliberate.
3. It's very important that identical individual laboratory practices should be done by each student.
4. In preference to appearing the experiments started in the book have to be little modified for higher result.
5. Before achieved test the cause needs to be clarified to the learner.

1.3 Observation technique: -

In this technique, the pupil observes and acquires education(Li & Klahr, 2006). Via we cannot call this as a selected approach of science teaching however as a count of truth nearly all science starts with observation the learners have a observe nature, in companies, in lab at college at domestic or in gardens. The end result of this technique facts of an idea of nature which in permanent in thoughts. The schooling of scholars in statement is sincerely robust his thoughts with appropriate reports all thoroughly categorized and digested(Knight & Wood, 2005).

Concepts of observation: -

1. Precept of freedom.
2. Precept of enjoy.
3. Precept of play-manner.
4. Precept of person effort.
5. Precept of hobby.
6. Precept of logical questioning.
7. Precept of cause fullness.

Responsibilities of Instructor: -

1. He should be a professional and provide enough references for further remark.

2. He need to possess interest, practical mind-set, hobby, sprit of research so one can inculcate such qualities among students who in term observe and discover many stuffs.

3. He must make a silent freedom environment with a view to encourage students to make observations.

4. He have to be a manual, a running companion and a friend of students.

5. He must devise and pave different activities consistent with the age, capacity and pursuits of the learner.

Benefits of observation technique: -

1. The teaching of the lecturer becomes interesting.

2. The students see, think, give logic and thoughtful answers.

3. The learner learn the identicalities and dissimilarities of objects truly and effortlessly.

4. The education acquired in permanent.

5. Students develop hobby in topics.

6. The learner become self-dependent, self-reliant and self-confident.

7. The trouble of home-work in solved.

8. The relation among instructor and taught becomes intimate and healthful.

Constraints of observation technique: -

1. It's far an excessive amount of to expect kids examine and hold knowledge. The students are in nature from time to time and their knowledge and thinking power in constrained.

2. It is not suitable for all the topic of science education.

3. This technique is information. The practical part of it stays underdeveloped.

4. It is not low-priced from time point of view.

5. This technique is likewise not reasonably priced because it requires a lot of training and maintenance from education point of view. In which students can study many things (Sakliressy et al., 2021).

Recommendation for improvement:

1. The students have to be given complete freedom in the during observation.

2. Curiosity and interest have to be evolved in students previous to making observations.

3. The instructor must test and take a look at things before practice.

4. The instructor have to placed questions and pinpoint students' remark as and while required.

5. The faculty must have science corner wherein in students' observation and hobby goes on continuously.

6. A science bulletin board, A museum shelf, Aquaria and terraria have to be there in college wherein students develop a constant hobby within the difficulty.

7. A weather station should be setup wherein in students study the weather broaden hobby(Dr. Chandana Pattnaik, 2007).

1.4 Project technique

The project-based learning is a method for imparting students' and pupils' thinking competencies. First reference about project-based learning comes from the beginning of 20th century(Kubiatko, Vaculová, Social, & Studies, 2011). This approach turned into propounded by means of W.H Kilpatrick. This method turned into perfected by using J.A Sternson. The bottom of this approach lies within the

philosophy of pragmatism. This technique emphasizes on constructing a complete unit round an interest which can be executed in school or outdoor. The essence of this technique lies within the truth that a set of students do a useful work. This means the students undertake the activity in a set or in over a time period. It may include some of activity and the end product is inside the shape of written file or a display(Knight & Wood, 2005). Project-based learning is used in science subjects, of course, because designing projects that will be relevant and interesting for the students and giving them an opportunity to become independent learners are not the only arguments in favor of project-based learning incorporation into science teaching to non-science majors(Kubiatko et al., 2011).

"A project is a whole-hearted practical activity intending in social surroundings"- Dr. William Kilpatrick.

"A project is a problematic act carried to completion in its natural setting". – Stevenson.
"A project is a bit of real life that has been imported into school. – Ballard.

Thus, project is a purposeful interest and deliberate activity which is carried out in social, natural conditions created in faculties.

Concepts of project work: -

1. The precept of independence.
2. The precept of aim.
3. The precept of interest.
4. The precept of activity.
5. The principle of application.
6. The principle of correlation.
7. The principle of sociability.
8. The precept of experience.
9. The principle of truth.
10. The principle of learning by doing.

Forms of projects: -

All the projects can be divided into types.

(i) Individual project.

(ii) Group project.

In line with W.H. Kilpatrick projects are of four types(Mohan, 2019).

i) Producer projects
ii) Consumer projects
iii) Problem projects
iv) Drill projects.

Procedure projects: -

Right here the emphasis is on actual creation of a material object or article.

Consumer projects: -

Here the emphasis is gain on obtaining both direct or vicarious experience, which includes studying and studying tales, being attentive to a musical delectation etc.

Problem projects: -

The primary reason is to solve a problem the usage of intellectual procedure, consisting of figuring out the density of a certain liquid.

Drill projects: -

This sort of assignment emphasizes on reaching a certain degree of skill in a response as getting to know a vocabulary.

Steps of project work: -

1. Providing a situation: -

The lecturer gives a situation to the scholars which need to create identical troubles and students have to experience interested to task.

2. Selecting and purposing: -

The pupils are tempted to choose a project. The instructor should stimulate discussion by proposal. while choosing the project the instructor ought to endure in need that it ought to be of real want to students. The cause of task has to be truly described to the scholars. The project ought to be common and appropriate to all. In case of incorrect selecting, teacher must help students tactfully to see that the scholars pick a better project. They need to be asked to write down the motives for selection.

3. Making plans: -

The achievement of the task lies inside the accurate making plans. The scholars must plan out whole task under the guidance of teacher. Each student must be recommended to participate within the discussion and make suggestion. All of the students are motivated to write down the plan neatly and well.

4. Executing: -

Execution of different activity to specific students on the basis of their capacity leads to a hit crowning glory of the project work. It is the longest step and requires meticulous challenge of obligations to different students or groups the teacher have to manual and inspire students. It's far the obligation of the teacher to preserve watch the technique activities and train when requirement.

5. Evaluation: -

That is very vital step as; the scholars review the project and discover errors if any. Self-grievance may be very essential at this point. The students discuss their work and rectify their mistakes and reuse useful information. The instructor sees that the goals of the project were achieved.

6. Recording: -

The scholars keep a complete file of all activity. How they deliberate, discussions have been held, how responsibilities are assigned, how criticism were made, as a way to assist them of their destiny work.

Examples of projects: -

1. Arrangement of science fair.
2. Practice of soap/chalk/candle/ink and so forth.
3. Improvise apparatus.
4. Beautifying campus.
5. Establishing science museum.
6. Setting up physical science laboratory.
7. Painting iron equipment to present it from rusting.

Responsibilities of Teacher: -

1. Teacher must be a chum, guide and operating companion.
2. Teacher should have information of individual student and allot tasks.
3. Allow freedom environment.
4. He must analyze with students and ought to no longer claim to know the whole thing.
5. He should be experienced, initiative and technique tact for creating superb atmosphere.

Benefits of project work: -

1. It promotes Co-operative activity.
2. It arouses and keeps interest of students.
3. It keeps the students on freedom of notion and movement whilst doing the project.
4. It develops scientific mind-set.
5. It widens the mental horizon of scholar.
6. It develops dignity of labor.
7. the scholar's study with the aid of self-interest.
8. It helps all of the legal guidelines of getting to know i.e., regulation of readiness, law of exercise, regulation of effect.
9. The correlation of topics is excellent accompanied in this technique. The subjects are not dealt with as water tight cubicles.
10. that is a mental approach(Kubiatko et al., 2011).

Limitation of project work: -

1. The understanding is not obtained in a sequential manner.
2. There may be a chance of overlapping of subject matter.
3. If no longer deliberate and performed nicely, it can no longer be finished in time.
4. It's far a time-consuming procedure.
5. It may be a luxurious affair where in same objects/things may not be had at instances.
6. There may be overdevelopment of individualism and under development of co-operation and group duty.
7. If they select wrong topic the objective might not be executed.
8. It offers to students a superficial knowledge of notable many stuffs. Consequently, it isn't appropriate for all sorts of students.
9. This method isn't suitable for a mature teacher.
10. The entire syllabus, for higher lessons can't be performed with this approach(Dr. Chandana Pattnaik, 2007).

Conclusion

We've got an extensive types of teaching techniques that need to use at some stage in teaching. Because the understanding stage of students are one-of-a-kind in order that they want to train by means of exclusive strategies and technique. We can't use only one technique for a whole subject topic, as we don't have a single golden method. All the techniques are unique in a few special time and teaching topic. We won't reach to our set goals, and apprehend students one hundred % with only using one or two strategies. All the methods have their own advantages and a few issues. But this is the talent of instructor to use the proper

and fruitful approach associated the concern and the topic he coaching. For science subject's laboratory, lecture- cum dialogue and observation techniques are most important and feature a vital function in expertise of students. Furthermore, it gives capability to scholar to work independently and rise their very own hidden expertise.

Conflicts of interest

- The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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