

The Teaching of Science Subjects in Comprehensive Approach

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Abstract: *Declaring that the science educator needs to collaborate with pupils in cultivating quality group dynamics within a cooperative framework, the author emphasizes that the self-regard of each learner is vital and must be reinforced with sincere praise or acceptance for contributions made.*

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Introduction: Survey approaches in teaching science subjects should be transformed with comprehensive procedures. Survey methods prevent pupils from constructing a solid framework of concepts and generalizations to employ in developing subsequent ideas. Sequential content builds directly upon previously acquired information. Lacunae in achievement obstruct possibilities of continuous growth within the academic discipline of science subjects. As fluidly as possible, pupils must perceive structure in learning. There is greater probability then that learners might also discover purpose in acquiring information which becomes relevant and practical.

Interest, too, is a potent driver in learning which might fade if content becomes meaningless. Individually, cooperatively, and/or the class as a whole, need to be immersed in ongoing activities and experience success due to the interest element. Motivation to succeed tends to emerge from within and needs to be aligned with the targets of instruction currently being emphasized. A motivational strategy must always be embedded in lesson planning. Unmotivated pupils distract peers and appear to be bored and disengaged. Continuous progress is necessary so that the learner is prepared for college or the workplace at the conclusion of the public school years.

To restate, science learning must spark interest, be meaningful, as well as possess clear purpose.

Teaching and Learning: Meaningful learning experiences need to be selected to attain relevant goals of instruction. Science experimentation represents an excellent pathway to stress impact in pupil achievement. Most favour a hands-on method of instruction, provided that the experiments are meticulously chosen. Too frequently, the following trends are observed in science subjects' instruction:

- ◆ covering vast content rapidly and in a non-comprehensive procedure
- ◆ lack of energy invested into lesson planning
- ◆ tedious lessons which turn pupils away
- ◆ excessive lecturing with minimal learner input

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- ◆ “uniformity” emphasized in daily tasks regarding pupil learning
- ◆ reading about science to the complete exclusion of practicing science.

To remedy the above situations, the science subjects’ teachers needs to champion comprehensive learning whereby pupils truly comprehend what is taught. Thus in an experiment, the instructor offers a variety of experiences which assist pupils to assign meaning to each concept and generalization. This stands as the exact opposite of a survey procedure of instruction. The problem in the experiment must be relevant and deeply puzzling so that learners wish to discover a solution. The tentative solution demands research and comprehensive thinking, resulting in a hypothesis to be verified. The testing may need to be replicated, if warranted. A different hypothesis might also emerge with critical thinking being inherent. Once the hypothesis is validated, then pupils may employ the findings in further inquiry-learning exercises. Verification is a crucial concept to employ in science experiments.

Reading science subject matter can be a valuable tool for verification. This also assists in identifying subsequent problems which require experimentation. The science subject teacher must be highly skilled in reading instruction. Pupils, individually, might require guidance in word recognition while reading. The following assistance should be provided:

- identifying new words in context
- supporting learners with initial consonants in word analysis
- additional guidance might be required with subsequent hurdles in phonics
- reading the selection aloud to struggling readers as they follow along in their respective textbooks. In this manner, all pupils in the classroom possess access to the identical content for discussion purposes.

The author also noted when monitoring university student teachers in the public schools how beautifully learners responded in the discussion when library books, exclusively, were utilized for a specific lesson or two. For example, if pupils are analysing a unit on rocks and minerals, each had chosen his/her own library book to read on that theme. The school library here possessed extensive holdings, allowing pupils individually to select a book on their reading level regarding rocks and minerals. The discussion proceeded smoothly with different perspectives on rocks and minerals injected into the dialogue.

Here, pupils:

- ❖ participated in a significant manner with the subject matter presented
- ❖ appeared to be highly enthusiastic utilizing the new approach
- ❖ expanded on ideas advanced by peers
- ❖ raised inquiries to clarify and expand subject matter read
- ❖ engaged in content flowing among participants, not between two pupils exclusively.

The science subject teacher needs to collaborate with pupils in developing quality group dynamics within a collaborative environment. This will be perpetual and needs to be modelled. Thus, pupils must respect each other’s ideas; mocking responses blocks the free flow of thoughts, as well as undermining self-concepts. The self-regard of every learner is vital and must be reinforced with sincere praise/acceptance for contributions made.

Pupils need to think highly of themselves and unlock their utmost talents. Meeting learner esteem desires is critical and a quality incentive system is impactful. Learners need to rely upon themselves and trust their own thinking in a cooperative setting. Behaviours which block group endeavours include rudeness, being aloof, interrupting others in oral communication, as well as animosity for others. Each of these issues requires attention for elimination from the curriculum. The science subject teacher, then, is a promoter of positive feelings and attitudes, alongside pupils attaining vital content goals in ongoing lessons and units of study.

Experimentation and reading are major pathways of learning and both experiences might well involve written communication. That which is discovered may also be encoded and pupils require guidance to perform well in writing effectively:

- crafting summaries and outlines for oral presentations
- composing paragraphs containing core ideas and supporting content
- documenting experiments and their findings
- executing creative writing based on science learnings including diverse forms of poetry (Ratcliff, et. al, 2010).

Engaging in research projects which relate directly to pupil identification of problem areas: The topic to be pursued may relate to what is being analysed within an ongoing unit of study. Clarity in framing the problem area is vital so that relevant answers might be obtained. A variety of reference tools need to be utilized such as the Internet. Many schools provide tablets for pupils on the appropriate grade/instructional level. This makes it convenient and essential for learners in the pursuit of knowledge. The interests of pupils in self-identified challenges with science teacher guidance propel the individual to persevere and achieve. Too frequently, pupils lack endurance and are hindered by feelings of defeat and frustration. Guidance from the educator and assistance from other pupils in collaborative situations helps in completion of the activity or project. Effort put forth by every pupil is necessary in goal attainment. Learners might encourage, offer assistance, and work for the good of problem solution.

There are additional exercises in science subjects which might well provide useful subject matter for pupils to explore, and these include the following:

- related field trips, carefully and safely planned, to add rich experiences to the pupil's repertoire with heavy emphasis upon analytical thinking
- slide presentations in which pupils have ample time for comprehensive dialogue pertaining to each frame
- video recordings which make for increased comprehensive delivery of a concept/generalization
- word displays which enrich, reinforce, and develop new concepts
- creative composition involving poetry which incorporates science content acquired
- pupil-written essays on information gained in a unit of study in science subjects
- pupil-authored selections to cooperatively form and present a reader's theatre.

Conclusion: The science subjects' frameworks consist of subject matter targets for pupils to achieve, alongside attitudinal goals. Both are vital in helping pupils to become science literate. In a complex civilization in which technology is becoming increasingly impactful in the world of science, the curriculum needs to be updated to integrate that which aids learners to excel in school and in society.

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