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DEDUCTION METHOD OF TEACHING EXACT SCIENCES

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Abstract

the study of the exact sciences according to the methodology adopted in world practice is distinguished by a non-systematic approach. The inductive method of teaching them repeats the historically established process of the development of science from simple phenomena to complex processes, from the particular to the general. As a result, the connection between phenomena of varying complexity is lost. For example, the teaching of physics begins with the study of the simplest mechanical form of motion and gradually moves on to the study of more complex phenomena that underlie simple physical processes. Numerous laws of the natural world, despite their common physical nature, are considered independently of each other, only as a result of generalization of empirical data. In this article, on the basis of a systematic approach, a deductive method of studying the exact sciences is considered, with the help of which the world is studied, based on the phenomena and processes common to all its phenomena. This, according to the authors, will improve the quality of education, make students think and make the science they study more attractive to them.

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Deductive Method: This method is just opposite of Inductive method. In•this method, facts are being deduced by application of established formula or experimentation. In this method, one proceed from general to particular principles, from unknown to known and from abstract to concrete facts. Merits of Deductive Method This method has following merits:

a. As students of lower classes are being provided with established scientific principles, thus this method can prove to be effective for them.

b. This method is quite time saving as students •are not required to analyses the universal principles.

c. Teacher's duty or burden gets lessen to some extent by making use of this method as a result of which teachers find themselves in a comfortable and secured position.

d. Through this method, a teacher can cover the lengthy syllabi of class in shortest period of time.

Demerits of Deductive Method This method suffers from following demerits:

a. As the approach of this method is UN-conform and non-explanatory, because of which it is considered to be an unscientific method of teaching.

b. Through this method, it becomes difficult for the teacher to develop scientific attitude among the students.

c. As in this method, students do not get any opportunity to•play active role in learning process, thus, some experts consider it as UN psychological in nature. d. Rote memory is being encouraged by this method among the students as a result of which they do not become self-independent. When to Use: It can be said that on the basis of above discussion that it is not possible make use of these methods in isolation with each other. In reality, both of these methods are incomplete without the other. By combining these methods, education of science can be imparted to students of higher and

Inductive and Deductive Methods of Teaching Science

Inductive Method:

Inductive method is an important procedure to prove a universal law. In this method, this is done by showing that if the law is true in a particular condition, then it will also prove to be true in other similar condition at any place of the world. This method proceeds from concrete to abstract and from a specific example to the universal law.

As all the scientific principles and conclusions are result of induction, thus this method is considered to be one of the most important methods of teaching science.

Merits of Inductive Method

By making use of this method, following merits get accrue to the students as well as to teacher:

a. As this is a scientific method, thus it helps to considerable extent in developing scientific outlook among the students.

b. This method helps to develop scientific attitude among the students.

c. With the help of this method, teacher can develop qualities of critical thinking and habit of keen observation among the students properly and accurately.

d. This is a very logical and psychological kind of teaching science.

e. By this method, students get various opportunities to play an active role in learning process.

Demerits of Inductive Method

This method has certain limitations, some of which are as follows:

a. The results or conclusions drawn from such method are not found to be final in case where the amount of data is very large in number.

b. All the topics of science cannot be dealt with this method properly.

c. This method can only be used when teacher have much time for teaching process.

Deductive Method:

This method is just opposite of Inductive method. In this method, facts are being deduced by application of established formula or experimentation. In this method, one proceed from general to particular principles, from unknown to known and from abstract to concrete facts.

Merits of Deductive Method

This method has following merits:

a. As students of lower classes are being provided with established scientific principles, thus this method can prove to be effective for them.

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Demerits of Deduction Method

This method suffers from following demerits:

a. As the approach of this method is UN-conform and non-explanatory, because of which it is considered to be an unscientific method of teaching.

b. Through this method, it becomes difficult for the teacher to develop scientific attitude among the students.

c. As in this method, students do not get any opportunity to play active role in learning process, thus, some experts consider it as un psychological in nature.

d. Rote memory is being encouraged by this method among the students as a result of which they do not become self-independent.

When to Use:

It can be said that on the basis of above discussion that it is not possible make use of these methods in isolation with each other. In reality, both of these methods are incomplete without the other. By combining these methods, education of science can be imparted to students of higher and secondary levels.

B) The inductive approach – the rule-discovery path

What are the advantages of encouraging learners to work rules out for themselves?

- Rules learners discover for themselves are more likely to fit their existing mental structures than rules they have been presented with. This in turn will make the rules more meaningful, memorable, and serviceable.
- The mental effort involved ensures a greater degree of cognitive depth which, again, ensures greater memorability.
- Students are more actively involved in the learning process, rather than being simply passive recipients: they are therefore likely to be more attentive and more motivated.
- It is an approach which favors pattern-recognition and problem-solving abilities which suggests that it is particularly suitable for learners who like this kind of challenge.
- If the problem-solving is done collaboratively, and in the target language, learners get the opportunity for extra language practice.
- Working things out for themselves prepares students for greater self-reliance and is therefore conducive to learner autonomy.

The disadvantages of an inductive approach include:

- The time and energy spent in working out rules may mislead students into believing that rules are the objective of language learning, rather than a means.
- The time taken to work out a rule may be at the expense of time spent in putting the rule to some sort of productive practice.

- Students may hypothesis the wrong rule, or their version of the rule may be either too broad or too narrow in its application: this is especially a danger where there is no overt testing of their hypotheses, either through practice examples, or by eliciting an explicit statement of the rule.
- It can place heavy demands on teachers in planning a lesson. They need to select and organise the data carefully so as to guide learners to an accurate formulation of the rule, while also ensuring the data is intelligible.
- However carefully organized the data is, many language areas such as aspect and modality resist easy rule formulation.
- An inductive approach frustrates students who, by dint of their personal learning style or their past learning experience (or both), would prefer simply to be told the rule.

Research findings into the relative benefits of deductive and inductive methods have been inconclusive. Short term gains for deductive learning have been found, and there is some evidence to suggest that some kinds of language items are better 'given than 'discovered'. Moreover, when surveyed, most learners tend to prefer deductive presentations of grammar. Nevertheless, once exposed to inductive approaches, there is often less resistance as the learners see the benefits of solving language problems themselves. Finally, the autonomy argument is not easily dismissed: the capacity to discern patterns and regularities in naturally occurring input would seem to be an invaluable tool for self-directed learning and one therefore that might usefully be developed in the classroom.

Natural sciences have passed a difficult path of development. In ancient times, they were considered part of the philosophy that studied nature, and were called natural philosophy [1. C. 602]. As a philosophy in general, natural philosophy was speculative in nature. The ancient thinkers who created it were very distrustful of sensory perceptions, which, as they believed, distort reality. In this regard, they denied the significance of experience in the process of cognition of the world, and considered the logical consistency of judgments and conclusions as the criterion of truth. Despite getting to the heart of things with Nevertheless, they came to a number of ingenious conclusions, which have not lost their relevance to the present time [2. C. 81].

However, already in the Middle Ages, the unproductiveness of the speculative method of cognition manifested itself, both due to its ambiguity and, in particular, due to its isolation from practical activity. It was therefore replaced by the empirical method — a technique based on experiment. The experimental science created by scientists of the Middle Ages used, however, inductive, a non-systemic method of cognition. It was reduced to a theoretical generalization of particular results of observations and to the establishment of general patterns on this basis.

The only criterion of objectivity and truthfulness was recognized in this practice [3. C. 409]. In the late Middle Ages, mathematics became an important part of the natural sciences, which deepened the possibilities of theoretical understanding and generalization of experimental data. At the same time, mathematics over time gave science an abstract character that made it difficult to understand. In addition, due to the limited possibilities of observation and experiment, science it developed from the study of the simplest forms of movement to increasingly complex forms.

Market relations and scientific and technological progress, which have been optimally developed over the past century and a half or two, have led to an unprecedented information boom in the history of mankind, which resulted in the rapid development of education. The undoubted achievements of our time in this regard are the complete elimination of illiteracy and the transition from compulsory primary education to universal secondary education. All this, of course, led to an increase in the level of education of the world's population. Meanwhile, there is every reason to believe that in recent decades this growth has not only stopped, but,on the contrary, has declined [4. C. 808]. This, in particular, is evidenced by the continuously increasing cult of violence in society, the growing influence of racism and Islamic fundamentalism, which pull humanity back to the dark times of the Middle Ages. This should also include the widespread, including

among intellectuals, fascination with the occult sciences and the practice of medicine, the coverage of an increasing part of the population by wild prejudices, the sliding of society to a limited, mundane materialism. This, from our point of view, is also evidenced by the highest level of professionalism of technical specialists and humanitarians, paradoxically getting along with their sometimes dense ignorance. There are many reasons for this. However, the main one is connected with the current system of education and teaching of philosophical sciences, the main one among which was and remains physics. In connection with the above, it is advisable to revise the methodology of teaching physics and mathematics, ensuring that learning becomes an internal need of students, and not a heavy duty, so that it leads to the formation of an independent-minded personality. This, from our point of view, is possible only with the transition to a deductive, systematic method of teaching exact sciences, which activates the creative participation of students in the educational process, their independent comprehension and rethinking of the studied reality. This trend, despite the changed ideological situation, persists, in our opinion, in the educational system of many countries to the present time. As a result, teachers of physics and mathematics, freed from ideological supervision, often show helplessness, not understanding how to combine the facts of the purposeful development of the Universe established by modern science with the materialistic concepts still prevailing here. The situation is aggravated where, along with secular disciplines, the study of religious subjects has been introduced. With another On the other hand, in the general secondary school programs of many Western countries, the study of natural sciences is optional or extremely simplified, separated from ideological ideas. We hope that the new methodology and the textbooks presenting it will find the support of the scientific and pedagogical community and that textbooks on physics and mathematics for secondary and special schools will be revised according to the same principle.

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