



MODERN METHODS OF TEACHING COMPUTER SCIENCE

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ABSTRACT

Modern Teaching Techniques have been spread all over the world, which is useful and easy for teachers. Modern Teaching Techniques educate children well and make them understand clearly. In this era, there is an increased usage of the internet in educational applications; this could mean that students and teachers will increasingly make use of technology within open and flexible learning systems. Technology plays an important role in enhancing and developing our learning system. Intended outcomes as well as unintended results of using Modern Teaching Techniques for teacher professional development need to be explored. Certain skills and capabilities of using different Modern Teaching Technologies are necessary for students as well as teachers. Therefore, it is necessary to prepare them for the age of Modern Teaching Technology.

Education is a light that shows the mankind the right direction to surge. The purpose of education is not just making a student literate but adds rationale thinking, knowledgeable and self sufficiency. When there is a willingness to change, there is hope for progress in any field. Creativity can be developed and innovation benefits both students and teachers. The traditional or innovative methods of teaching are critically examined, evaluated and some modifications in the delivery of knowledge is suggested. As such, the strengths and weaknesses of each teaching methodology are identified and probable modifications that can be included in traditional methods are suggested. Students can be asked to post notes on class blog. You can analyze, evaluate and create the material. Blogging causes you to reflect. Teachers naturally think back on what has happened in their classroom, and often wonder what they could have done better. Blogging can help with this process, enabling teachers to keep an ongoing personal record of their actions, decisions, though processes, successes and failures, and issues they have to deal with. Blogging can crystallize your thinking. As we write, we invest a part of ourselves into the medium. The provisionally of the medium makes blogging conducive to drafting and redrafting. The act of composing and recomposing ideas can enable abstract thoughts to become more concrete. Your ideas are now on the screen in



front of you; they can be stored, retrieved and reconstructed as your ideas become clearer. You don't have to publish if you want to keep those thoughts private.

A general model for monitoring the effects of a learning stimulus on the knowledge of a person. Even though one is generally interested in the development in the left half of the diagram (i.e. the real person), only the right half is accessible to research. The transfers in form of an externalization and the analysis of the stimulus are in general not loss-less and are subject to many influences.

Participatory techniques are certainly not new to educators. Socrates was perhaps the original teacher employing participatory methods and we sometimes refer to his style of teaching as Socratic.

John Dewey, American philosopher and educational theorist, carefully laid out a theory of experiential learning in education early in the twentieth century. Research in the 70's, first by Carroll and later by Newstrom, on the relative effectiveness of training methods showed that case studies, business games, and

role playing techniques were far superior to lectures and films when the aim is teaching problem solving skills. And yet, didactic teaching seems to be most prominent, perhaps because it is easier for which to prepare, to write textbooks, and to do. Although participatory techniques are more likely to be found in use by those teaching humanities, there has been some interest expressed recently for using such techniques in the sciences.

In teaching the Computers and Society course at Graceland College it became clear to me that topics such as freedom of information vs. privacy, computer ethics, and the impact of computers on society could best be taught in such a manner so I turned to the psychology, history, speech, and education faculty at the college who were successfully using various participatory methods. I owe much to them for getting me started. I began experimenting in the Computers and society classes and later in the upper division Compiler Design, Computer Architecture and Operating Systems classes. After several years of introducing participatory methods in my classes I have observed that the students are more interested and engaged in the material, give higher ratings to the classes on evaluations, and write more meaningful responses to essay questions on tests. Although most of my teaching is still in a lecture format I will continue to move toward more participatory classes.

Brainstorming . In a brainstorming session a problem or concern is presented to the class and then all are invited to freely think about solutions or possible answers and call them out so that they can be listed for all to see. It is a fast paced, spontaneous session in which a mass of ideas are collected without the merit of any being considered when first given. Students are encouraged to piggyback on other ideas and not to think of any idea as their own. Afterwards the ideas can be organized and evaluated in class. I have used brainstorming in Computers and Society to have the class list the possible effects, good and bad, that computers will have on crime, transportation, cities, family life, etc. I have had the class try to list all the purposes that they can think of for a computer and then organize those ideas into central themes such as speed, memory, and so on, prior to a discussion of what



makes the computer such an important tool. Brainstorming has been useful prior to assigning a class paper or prior to preparation by students for class debates and panel discussions. Having the students

list possible future inventions using embedded microprocessors can provide a foundation for a summary lecture on microprocessors, their limits and their strengths. In Operating Systems I have had the class list the possible objectives that an operating systems designer could have when designing an operating system and then organize them according to what audience such an objective appeals to (users, programmers, systems engineers, administrators, etc). A discussion of which objectives are in conflict with each other followed to underscore trade-off issues. In Computer Architecture I have students list all possible categories for classifying a computer (word length, bus widths, hardware technology, speed, etc). Following that they are presented with Flynn's, Shore's and other taxonomies, their strengths and weaknesses. In an A.I. class students could list possible expert system projects with instruction to follow on problems suitable for expert systems. Numerous upper division possibilities exist for brainstorming sessions.

Directed Dialogues . A directed dialogue is a goal directed session where the instructor directs the class toward a particular solution to a problem. A problem is presented and class members respond with what are usually partially correct answers. The instructor continues by presenting the overlooked dimensions of the problem and the students further refine their answers. Such a class dialogue continues until the goal is reached. It is as if the instructor is constantly placing roadblocks before the students in order to keep them on a single path. The students will know they are being manipulated so only certain topics will work otherwise they will quietly wait out the instructor to give the answer. Similarly, overuse of the technique will render it ineffective. Perhaps the best subjects are those in which there was an actual historical trend in solving some problem from poor to better to best solution, a trend that can be recaptured in class. The students must feel that the solutions that pop into their heads are just what the instructor is looking for or they will not share it. The atmosphere created is similar to one where a puzzle or brain teaser is given to a group to consider.

The most effective demonstration of this technique was one that I witnessed in an Algorithms course in which the instructor preceded a lecture on sorting algorithms with a directed dialogue that began with the question "if you had a million papers sort how would you do it?" and finished with the class discovering on its own some divide and conquer approaches, not unlike Quick Sort. The instructor's "roadblocks" kept the class on the path of common sense and way from programmer logic ("would you really do it that way?"). I have often

felt that Diestel's development of the various algorithms for mutual exclusion primitives leading up to Dekker's algorithm is a promising topic for this technique. In Computers and Society I lead a directed dialogue having students construct and refine a definition for computer. I do a similar session for the definition of operating system in my Operating Systems class. In both cases the students give responses which are usually incomplete and in need of refinement. The lectures enjoy giving most seem more like



directed dialogues that I have with myself where I present a problem, give a possible solution, identify problems with that, and so on until I give the final solution. I am reconsidering those lectures to see if they can be more effective with student interaction.

Small Group Discussions. The dividing of a class into small discussion groups seems almost too obvious to list. However, it is perhaps the easiest of the methods to use with success and it requires very little planning or preparation. I have frequently used the method in a spontaneous way when I wanted the students to consider some question that had several possible answers. I simply tell the class to divide in groups of 4 or 5 and to choose a spokesperson who will record the group's response to a particular question and then report back to the class. Normally, when such questions are given to the class as a whole only a few assertive students

participate in the discussion with the rest taking notes (or naps). Small groups force more students to engage themselves in the subject and to take on leadership roles in the discussion. Since each group

feels a certain ownership for its answer due to the time invested in coming up with it, there are stronger feelings and a greater willingness to debate the merits of the various answers. In a Computer Architecture course teams could be given pieces of information about a machine (for instance, several assembly language instructions and their respective execution time formulas) and then called

on to infer all they can about the underlying machine's design, making logical assumptions if necessary. Several teams could then be joined to negotiate a single response to the question by

discarding the least likely ideas.

To sum up, we can make out that the Information and communication technology has made many innovations in the field of teaching and also made a drastic change from the old paradigm of teaching and learning. In the new paradigm of learning, the role of student is more important than teachers. The concepts of paperless and penless classroom are emerging as an alternative to the old teaching learning method. Nowadays there is democratization of knowledge and the role of the teacher is changing to that of facilitator. We need to have interactive teaching and this changing role of education is inevitable with the introduction of multimedia technology and the spawning of a technologically-savvy generation of youths.

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