

The Benefit of Integrating Technology into the Classroom

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Abstract

This article discusses a study of technology rich learning approach to promote mathematics teaching. Research suggests that technology used inappropriately have a significant effect in teaching and learning. Integrating technology into the classroom is an approach to develop better understanding of basic concepts provided it is applied appropriately. Based on the research of literatures cited in this article, we have explored some specific techniques using instructional techniques and strategies that we believe may be useful to promote meaningful learning in mathematics. Our thought is to apply the appropriate technology along with analytical query to accompany learning via analytical, graphical and visual approaches.

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1. Introduction

Part of the responsibility of educators, both at the high school and college level, is to prepare students for entering the job market. Thus, educators must learn all they can to help their students be a success in the twenty-first century. One piece of that preparation involves the use of all possible types of technology as a teaching tool in the classroom to empower their students as they develop the critical thinking skills necessary to solve the problems they encounter. Since all high school students must have experience in using technology in order to be on a level playing field when they enter college, today's young teachers, especially those recently graduating from college, are quite aware of the need for technology training in the classroom. However, the teachers who have been in the classroom fifteen years or more can have a difficult time accepting this.

Earle [1] discussed two types of reasons this difficulty can occur. The first relates to extrinsic items such as online access, time for planning, support, resources, and training in order to have the necessary skills. The second involves intrinsic items such as attitudes, beliefs, and practices about traditional teaching methods. In addition, administrators have the responsibility of helping teachers understand the technology by providing professional development which can be offered through "mini lessons" during the school year. Thus, teachers can easily recognize the benefits and technology can be used in planning the curriculum.

Kleinman [3] discussed the Apple Classroom of Tomorrow (ACOT) project, which determined five stages that teachers typically follow as they integrate technology into the classroom. Initially, there is anxiety, excitement, and doubt about its effectiveness. Second, they begin to use the technology for small assignments without making major changes to the curriculum. In the third stage, technology is integrated into the traditional curriculum; students begin to learn more and teachers see the benefits. In the fourth stage, teachers use technology easily and are no longer intimidated by it. Finally, in the fifth stage, teachers are comfortable with it and readily develop new instructional approaches using technology.

Since teachers who have recently graduated from college are often more comfortable using technology in the classroom than those who have been teaching for a number of years and have the experience of using manual techniques, the two groups can often work together, planning lessons that use the strengths of both.

Yet another factor in teachers' resistance revolves around the controversy as to whether technology teaches students how to think; it is often seen as a prop rather than a problem-solving tool. However, computers can function as tutors via

computer based instruction (CBI), Integrated Learning Systems (ILS), and intelligent learning systems (ILS) which increase students' basic skills and knowledge.

Computers can also be excellent resource tools for teaching problem solving and critical thinking skills. They provide a way to visually represent numerous real-world situations and identify patterns in data; therefore, they enhance problem solving skills in the learning process [4].

The teacher's purpose is to help students understand that the technology does not think for them, and the machine is only as smart as its operator. Technology can never replace the human mind, but it can help expand it. Thus, teachers have a critical role – teaching students how to use technology as a tool to help, rather than hinder, their learning.

In addition to teachers' negative beliefs and attitudes, schools must cope with budget issues around technology in the classroom. First, there is the expense of acquiring the technology and then there is the expense of maintaining it. Since most schools cannot afford to have a computer for each student in each classroom, they must determine other means to provide their students with up-to-date technology. Rather than having computers in each classroom, a computer lab, which can be shared, provides a less expensive alternative. In addition, grants, which require a resource who can write a proposal describing how the money will benefit the school's technology needs, are available from a variety of sources, including the community and the government. The issue of maintenance can be addressed by having the technology instructor teach a class for the singular purpose of maintaining the technology equipment, which is a growing field in the work world.

Too often in education we have failed to find the right blend of technologies. The benefit of technology is not simply its potential to replicate existing educational practice, but its ability to combine idea and product technologies to encourage students to engage in deeper cognitive activity.

Although instruction has traditionally focused on learning specific content, much of contemporary curriculum development focuses on solving problems that require learners to develop ever evolving networks of facts, principles, and procedures. The National Council of Teachers of Mathematics (1989), for example, suggested that greater emphasis be placed on solving open-ended "real world" problems in small groups, connecting mathematics with other content areas, and using computer-based tools to allow students to speculate and explore interrelationships among concepts rather than spending time on time-consuming calculations. To achieve such goals, learning should take place in environments that emphasize the interconnectedness of ideas across content domains and help learners to develop flexible networks of propositions and productions [2].

A number of studies have been conducted which show using technology in the classroom to be beneficial to academic achievement. A vital component of this involves exposing students to the variety of technical uses of technology as opposed to using the computer merely as a typewriter, calculator, or project maker. "Teachers

are more likely to embrace technologies if they can see the connection between their work and the tools” [4].

Technologies can give visual representation to higher-order concepts, use graphics and simulations to link mathematical concepts to real-world applications, provide tools for data analysis which can reveal subtle patterns in data, and supply contextual information through interactive dictionaries, encyclopedias, and similar resources.

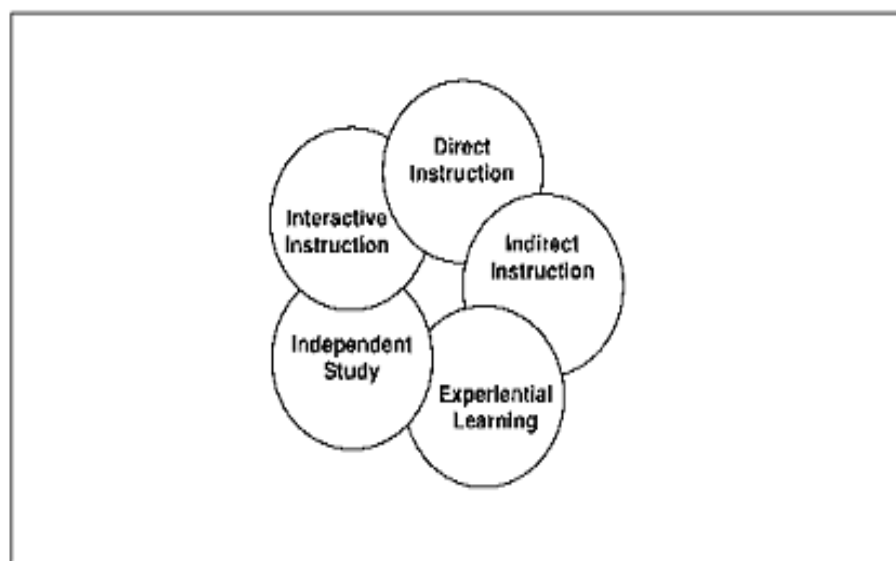
One of the most powerful uses of technology in education is to tailor instruction to students’ individual learning needs. Technology can provide the means for students with special needs to communicate via email and use the Internet for research, and can also help teachers accommodate students’ varying learning styles. Gifted students can work at their own pace and explore subjects in more depth than the basic curriculum [6].

Integrating technology into the classroom begins with the teacher preparing lessons that use technology in meaningful and relevant ways, using technology to support curriculum rather than dominate it. Technology should assist the teacher in creating a collaborative learning environment and help the teacher transition from the role of facilitator to that of a learner [6]. A major goal is to allow students to use technology, experiment with real world problems and manipulate them to see what different scenarios will do to the problem. Thus, students are able to think about possible outcomes if the variable is changed. So when teachers are trying to integrate technology into their classroom lessons, they can teach the basic concepts and then have the student work with the computer or other technology [6].

Finally, everyone can gain from using technology if teachers are taught how to successfully integrate it into the classroom. The belief that technology will hinder students learning has been proven wrong as long as students are taught to use it as a tool.

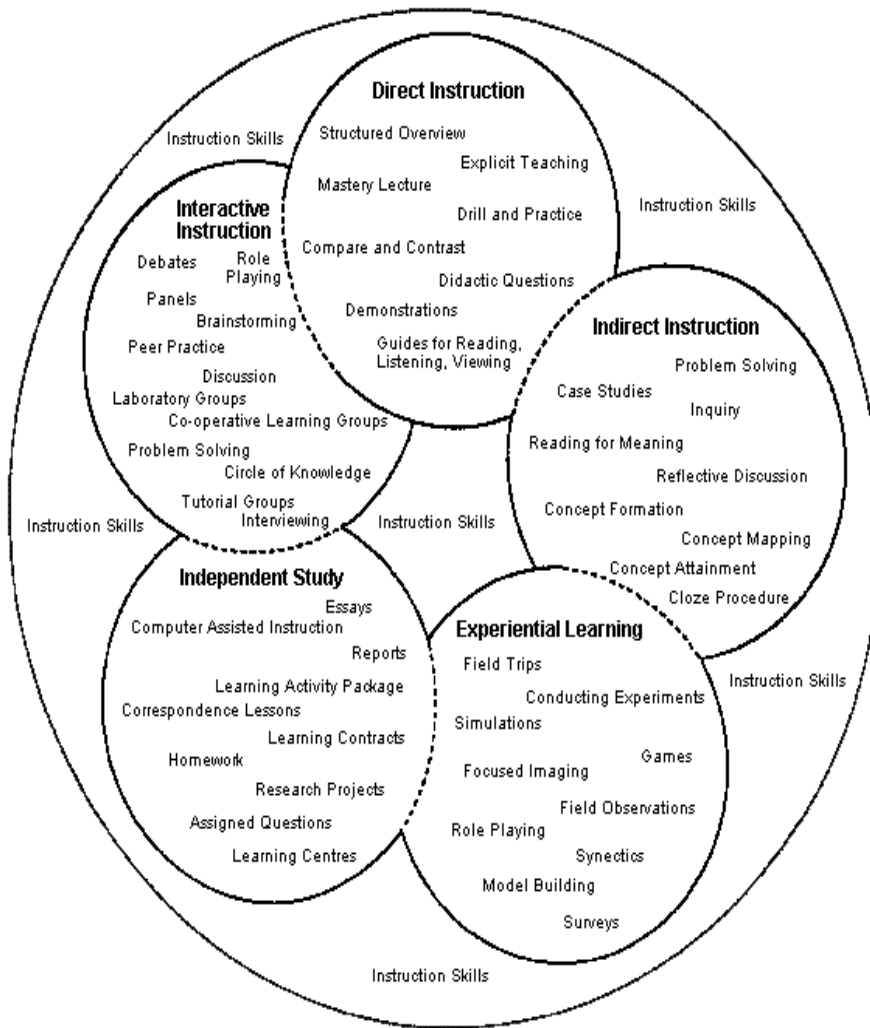
2. Instructional Strategies

To make a decision regarding instructional strategies requires teachers to focus on curriculum, the prior experiences and knowledge of students, interest of the students, student learning styles, and the developmental levels of the learners [5]. Such decision making relies on ongoing student assessment that is focused on learning objectives and other classroom processes and geographies. Classifications of instructional strategies are outlined in the following Venn diagram.



3. Instructional Methods

After deciding on appropriate instructional strategies, a teacher must make decisions regarding instructional methods. As is the case with strategies, the distinction between methods are not always clear cut although they are categorized for the purposes illustration of possible computer applications under each instructional strategy. Following Venn diagram illustrates how various methods relate to the five strategies presented under the instructional strategies. It should be noted that the methods appearing in the diagram are examples only, and are not intended to be inclusive of all instructional methods.



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