THE COMPLEXITY OF TEACHING IN THE INFORMATION AGE SCHOOL

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Teaching is a highly complex task. Many educators and curriculum leaders suggest that technology can help teachers with that complex task. This article examines the complexity of teaching and suggests that in many ways technology does not necessarily make the task easier, but rather more difficult. The additional considerations a teacher must engage in when thinking about using technology as both teaching and learning tools are explored in the three stages of teaching: pre-active (planning); interactive (classroom events) and post-active (evaluation).

Teaching is a complex act. A good teacher needs to be able to make split second decisions while analyzing students' actions, reactions, responses and questions quickly and accurately. A good teacher needs to plan effective lessons for the variety of students found in a typical classroom culture. A good teacher is a good problem solver, a person who can identify the essence of a problematic situation, pose possible solutions, think through the consequences of the possible solutions and select the path that meets the need or needs of the time. A good teacher must be a creative teacher, one who can find ways to motivate poor students to want to learn, encourage able students to take on new challenges, help students with diverse learning needs to be successful, and to guide all students, regardless of ability, in their academic pursuits.

To add to this already complex act, school administrators, parents, students, and teachers are determined to take advantage of the new technologies to enhance the activities of the classroom. Through the advances of technology, information is rapidly increasing. Harnessing that information and making it available for students is a new task for teachers. Although the management of content information has always been a large part of the teacher's job, the information glut that exists today as a result of new technologies has added a new dimension to the teacher's task. The

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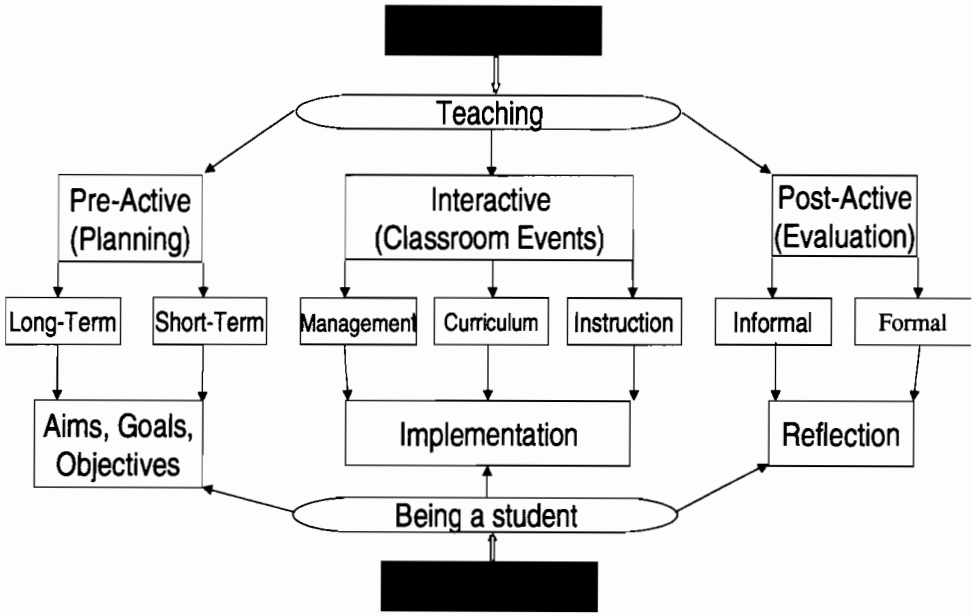

FIGURE 1
The Complexity of Teaching

teacher now has to wade through the endless stream of information that is available through computerized programs and the Internet and go on to categorize, analyze, synthesize, evaluate, and finally use the processed information within the context of lessons being taught. Thus, technology, although perceived as a tool to help ease the task of the teacher, may indeed make the act of teaching much more complex.

If you examine the diagram, "The Complexity of Teaching," you will begin to understand how difficult teaching is (Kysilka & Davis, 1988). You will note that the teacher is responsible for three distinct "acts" of teaching: Pre-Active (Planning), Interactive (Classroom events) and Post-Active (Evaluation). Not only does the teacher need to think of these "acts" in terms of what he/she wishes to accomplish, but the teacher must take into consideration what the students want and expect. This paper will examine what has happened to this complex task now that technology has been integrated into school programs.

PRE-ACTIVE STAGE

In the pre-active stage, teachers are attempting to set both long- and short-term aims, goals, and objectives. They need to consider what will be taught, why it will be taught, the specific content to be taught, how long it will take to teach the content, what the expectations are for the students, what activities might be used to stimulate and motivate the students, what special activities are needed to help students with special needs, what strategies would best meet the intent of the lesson, and how technology can help in these processes. With the emphasis on high-stakes testing, teachers now have the added dimension of ensuring that the content being addressed is that which is being assessed. Also, most states have adopted standards-based curriculum, so teachers must also keep in mind the various curricular standards the students in each of the grade levels and subject areas are expected to meet. Needless to say, this makes thinking about planning a much more complex task than teachers previ-

ously faced. Technology as a tool can help teachers in this planning stage. Most states have web-sites that address standards-based curriculum and have suggestions on how to incorporate activities and web-sites to help meet these criteria. States with high-stakes tests also have web-sites to help teachers plan instruction for the "teaching of the test." In addition, there are numerous web-sites that have been designed to give teachers "guidance" with respect to the mandated tests and the standards-based curriculum. Commercial publishers have encouraged many districts to purchase various computer-based programs which are "guaranteed" to improve student performance. The reality is, teachers must spend much more time searching through all of this "help" to find what might work with their students and which might be able to be integrated into the prescribed curriculum at the same time they are trying to keep instruction and learning fun and exciting to the students.

Thus, teachers might find that using technology as a tool, they might be able to enhance their instruction in the classroom, provide for special needs of students, arrange remediation for those who need it and enrichment for those who desire it. However, to plan for all of this, requires a great deal of time and thought on the part of the teacher. The complaint most teachers share is that time is their enemy (Becker, 1999; Fullan, 1991) and the technology seems to take more time than to give more time to the teacher. Perhaps part of this is the teachers' lack of experience in working with technology. Perhaps part can be attributed to the fact that most teachers are aware that the students may be more adept at using the technology than the teachers and teachers are reluctant to admit that or know how to effectively turn the students' knowledge into an asset for the teacher. Regardless, the advent of new technologies has not made the teaching task less complex (McKenzie, 2001).

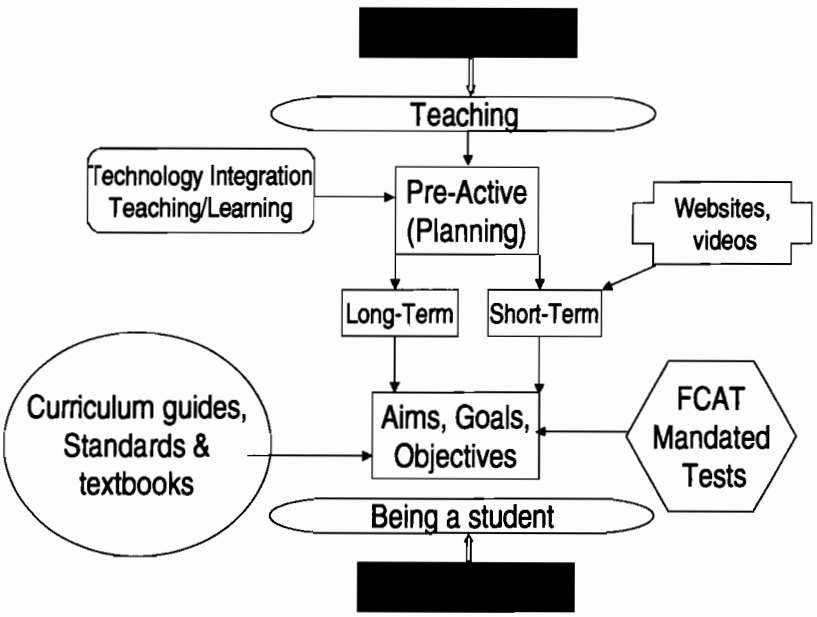

FIGURE 2
The Complexity of Teaching—Pre-Active Stage

INTERACTIVE STAGE

During the classroom interaction stage of the teaching act, teachers are faced with another set of events and challenges. This part of teaching, although planned for, frequently becomes much more spontaneous and event specific. For example, you have a 30 minute demonstration with key questions planned and you have just completed 15 minutes of the demonstration when your class is interrupted with an unscheduled fire drill. You move your students out of the classroom according to the prescribed directions. After 10 minutes, students are returned to their classes. You now have 20 minutes left in the period. What do you do? How much of your demonstration was "ruined," if any by the interruption? Do you start the demonstration again, from the beginning, realizing that you do not have sufficient time to use all the key questions you planned? Can you start where you were interrupted without losing the continuity of the demonstration? Do you "close it up" for the day and start again tomorrow? If so, what do you do with the remaining 20 minutes? All these decisions must be made quickly and efficiently.

Another example can relate directly to the use of technology as a teaching tool. Once again, you have a great lesson planned, this time using "presentation software" with all the right bells and whistles to engage the students in the presentation. After the first ten minutes, the computer freezes up and you are unable to complete the visual presentation that you spent four hours developing. Your call to the technician goes unanswered. Students begin to make suggestions on what to do. You try a few and realize that you are getting nowhere and cannot fix the computer presentation. Now what do you do? Can you refocus the lesson? Can you work from the board, can you put students into groups and give them some work related to the presentation, or do you have handouts that they can work from? Obviously, when you are working with technology, you need to have

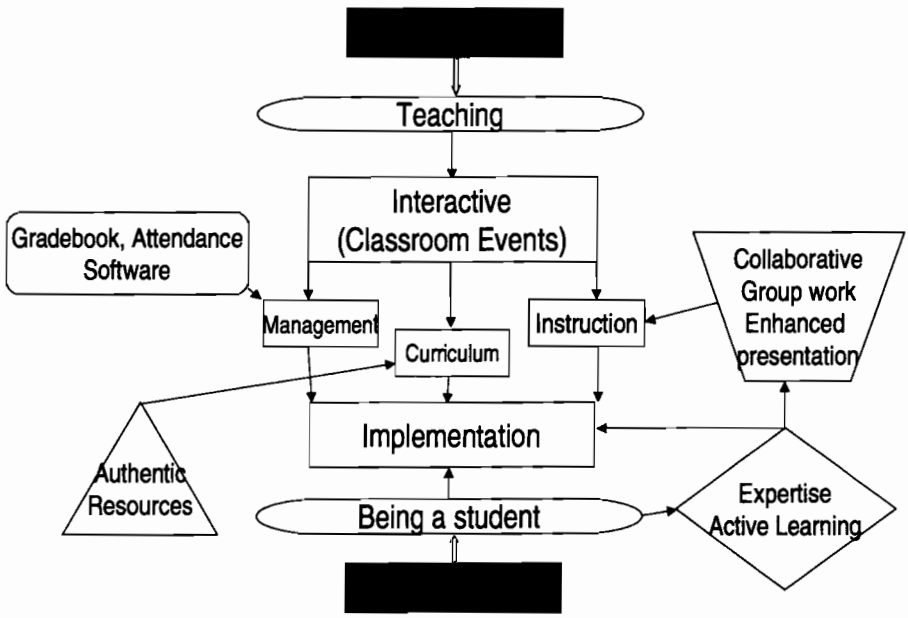

FIGURE 3
The Complexity of Teaching—Interactive Stage

a back up plan. . . did you have one? (McKenzie, 2000). How do you recoup the time that you lost? How will this affect what you will do tomorrow?

Teachers should always be aware of the "teachable moment." You have a great discussion planned on the effects of the demise of the Berlin Wall on the European economy. As your students enter your classroom, they are all abuzz about the recent bombings of the Taliban in Afghanistan. They are asking you all kinds of questions about this military action and what "extended war" might mean to them. Do you address their concerns and dump your planned lesson or can you take this current event and have it work to meet your planned objectives of how world events can affect world economies? If you choose the latter, how will you get access to information? Can you use the television within your classroom? Can you get on the Internet to gather relevant information? How can you strategically get students engaged in the necessary research to help them understand how our economy and other world economies are going to be affected by the activities in Afghanistan? The questions are many and you have to handle them quickly. You must adequately analyze the situation, plan an alternative, carry out your choice, and recognize the consequences of what you have planned. Changing your direction today will obviously affect what you do for the next several days in your classes.

The interactive stage of the teaching act is the one that is adjusted the most by events beyond a teacher's control. A teacher may have group activities planned and key students are absent, or students did not do their assigned work, or materials did not arrive that the students needed, or the computers were not functional. A teacher may have arranged for a special guest to come to the classroom and the teacher got a call just before class that the guest was involved in an automobile accident and would not be there. The best planning in the world can be easily foiled by numerous events, but the interaction in the classroom must go on. How well a teacher can think on his/her feet and make instantaneous decisions is crucial to the success of that teacher and to the learning that will occur in the classroom.

POST-ACTIVE STAGE

The post-active phase of the teaching act is perhaps the easiest to understand. In this phase, teachers are attempting to determine how effective their teaching has been; how effective the lessons were. Typically the data gathered and analyzed is a combination of observation of classroom activity and the results of students' written work. Teachers can examine students' test scores, projects they completed, and written work they did. If cooperative learning or group work was part of their activity, that can be evaluated as well. Teachers may reflect upon the classroom discourse. Who spoke? Who answered questions? What questions did the students ask? Did they participate in their groups and to what extent? Did they seem confused? Were discussions (whole class or group) exciting and spontaneous or were they strained and dull? By looking at these dimensions, thinking about the positive and negative aspects, teachers become reflective, responsible, good teachers. Teachers cannot function in this stage without good objective and analytical skills. So, how does technology affect this aspect of teaching?

Actually, it is in this stage that teachers may find the technology very effective. Student presentations can incorporate technology and make class presentations and demonstrations far more effective (Schacter, 1999). Teachers can help students create electronic assessment portfolios where various stages of students' written work is constantly available for both the student and the teacher to examine. Students can use their technology skills to develop showcase portfolios, which include projects their cooperative groups worked on, with all the necessary documentation of artifacts, etc. They can engage in group "chats" on their class projects which the teacher can monitor to determine individual student participation.

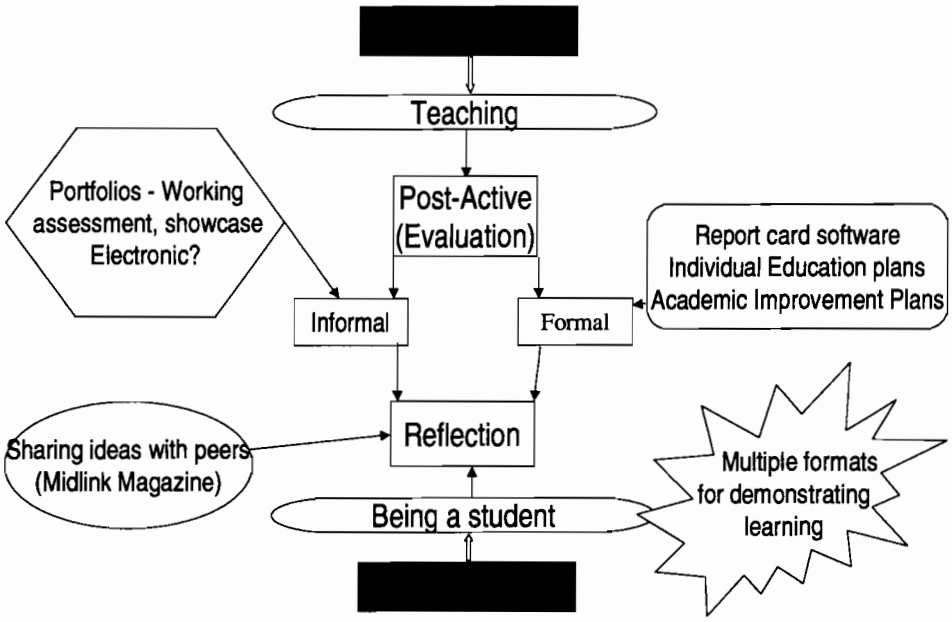

FIGURE 4
The Complexity of Teaching—Post-Active Stage

Rubrics can be designed and accessed on the computers for all the written and performance activities, thus making the paperwork easier for the teacher. More informal feedback can be given to the students as their work progresses if teachers have easy access to it via the computers. Also, teachers now have access to various electronic IEP's (Individualized Education Plans) and AIP's (Academic Improvement Plans) which makes for better documentation of pupil progress on specific objectives they are expected to achieve. Also, student report cards are becoming easier to complete now that most schools have turned to electronic reporting of grades. Finally, teachers may find that they can communicate with their peers more effectively on-line to help them make crucial decisions about the success of their activities in the classroom. This is particularly true for secondary teachers who do not always have the opportunity to meet regularly with their colleagues.

As teachers struggle with their responsibilities in each of the phases of the teaching act, students likewise are dealing with the same phases, except through their eyes. They have their own agendas for what goes on in the classroom. They know what they want to learn and how they want to learn it. If their "what and how" corresponds well with the teacher's perceptions of the "what and how," then there will be relatively few problems in the classroom. If however, the students' expectations are drastically different from the teacher's, then potential conflict and difficulty can and often does arise; thus the teacher must take on a new set of actions (Kysilka & Davis, 1988). Students are very astute young people. They know when they have not learned what they think the teacher expects them to learn. They also know who to blame (certainly not themselves). However, the use of technology in the classroom may find a way to keep students actively engaged in what the teacher wants them to learn and how the teacher wants them to learn. Students are attracted to technology—not as busy work, not as something to do when all else is done, but as a tool for learning (Kulik as cited in Schacter, 1999). Their enthusiasm may even get them involved beyond their abil-

ities to understand some of the content they explore via the Internet (which creates another role for the teacher). But, technology on the whole is a great addition from the students' perspective to the learning environment.

Technology certainly has its advantages, but alone it is not a panacea for lightening the teacher's role. It simply has redirected how the teacher may spend his/her time in preparing, delivering and evaluating what goes on in the classroom. Teachers now have more opportunity to engage students in creative learning through the use of technology. Technology itself, however, cannot drive the curriculum, nor should it. Technology is a tool. Since the tool can be used as part of the process of learning as well as in presentation of a finished product, technology has both a formative and summative part to evaluate. At each stage of the teaching act, the teacher should not only evaluate if the instructional objectives have been met, but also whether or not the technology used was effective in helping the students meet those objectives.

In summary, teachers not only have to be cognizant of their own role in the various phases of the teaching act, but they must also be aware of how the students' goals and cognitive abilities will affect the teaching act. Teachers must understand the complexity of teaching and its dependence upon good thinking skills of the teacher. Teaching is a thinking activity and what teachers need to think about while they toil away in their classrooms has become far more complex with the advent of new technologies than has typically been experienced in the past.

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