

Implementing Contextual Teaching and
Learning:
Case Study of David, a High School
Technology Education Novice Teacher

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Abstract

The purpose of this case study is to determine to what extent contextual teaching and learning (CTL) practices were demonstrated by David, a three-semester technology education teacher. The information in this qualitative study was collected via two all-day observations in each of two different semesters (Spring and Fall 2002) for a total of four observations.

David's use of CTL was immediately evident in his use of problem-based projects done in teams (cooperative learning). For example, students were to construct a chair entirely out of paper products which would be able to hold a person of a given weight. They were to find their own resources and maintain a project portfolio which would be graded along with the final product. Other projects included cardboard boats, mousetrap-powered cars, and rockets which could carry a raw egg into the sky and return it unbroken to the ground. This approach is far different from common "module-based" learning where students study concepts and demonstrate mastery via written tests.

Well-equipped labs were a key facilitator to David's use of CTL, as were helpful colleagues (both at the school and in his CTL cohort), supportive administrators, and motivated students (especially in the media class). Barriers included lack of time for preparation, constant problems with the media equipment, and problems related to 55-minute classes (e.g., limited time for projects that require set up and break down). He also faced an initial barrier in student expectations when he replaced a traditional (i.e., non-CTL) teacher.

Engagement seemed high as students were empowered to create their own learning. (Instead of giving them solutions, David would refer them to the Internet and other resources.) He also felt that doing work in teams kept students on task for two reasons: (1) individuals did not want to let other team members down, (2) teams were often in "friendly competition" with each other. Student mastery, as demonstrated by comprehensive final exams, also was high.

There is no doubt that David has taken CTL "to heart" and made it the centerpiece of his teaching, and, despite several barriers, he has begun his career on a successful note.

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Introduction

The information that follows is a case study analysis of a novice three-semester technology education teacher, David. The purpose of this case study was to determine to what extent contextual teaching and learning (CTL) practices were demonstrated in several of his technology education classes and to determine the impact implementation of selected CTL strategies were having on student engagement in the learning process and mastery of subject matter content.

This case study is one of several that have been completed by University of Georgia researchers involved in the CTL project that began as a three-year contextual teaching and learning preservice teacher development project (1998-2001) and was extended to 2003. The extension allowed researchers to study classroom implementation of novice teachers who participated in the preservice teacher development program at the University of Georgia. The research methodology was a qualitative, descriptive, case study approach to data collection, analysis, and reporting.

The researcher utilized field-based research strategies to observe the teaching and learning process and to organize information around six research questions of interest in this study. The six questions were as follows: (1) How does the teaching practice of CTL-trained first year teachers differ from more traditional approaches to teaching the subject matter? (2) Which CTL strategies do first year CTL trained teachers use in the

classroom teaching contexts? Why? To what perceived or measured outcomes? (3) What are the facilitators to implementation of various CTL strategies in actual classroom practice in school settings? (4) What are the barriers to implementation of various CTL strategies in actual classroom practice in school settings? (5) What effect does use of CTL strategies have on student engagement of subject matter content? And, (6) what effect does use of CTL strategies have on student mastery of subject matter content? According to Merriam (2001), qualitative researchers collect data through interviews, observations, and through document analysis with the goal of developing understanding and meaning of some phenomena or process. All three data collection strategies were used in this study. Analysis of gathered qualitative information usually results in the formation of categories or themes. The six research questions presented above served as the initial themes for collecting and analyzing information in this study.

Researchers were trained in qualitative research and case study approaches by Dr. Sharan Merriam and used information in her book entitled *Qualitative Research and Case Study Approaches to Education* (2001) as a guide to process and to discover meaning resulting in understanding.

In preparation for observation, researchers were given information regarding definitions of key CTL illustrative approaches that included: problem-based learning, project-based learning, inquiry-based learning, work-based learning, service learning, collaborative/cooperative learning, and authentic assessment. In addition, researchers were provided with assumptions and practices believed to underpin CTL approaches and those believed to be characteristic of traditional approaches to teaching. Researchers met several times during the data gathering process to share ideas, information, and progress.

An important characteristic of qualitative research is that the researcher is the primary instrument for data collection and analysis (Merriam, 2001); thus, training and review session with other researches and consultants were deemed very important in this study. The researcher in this study served as professor to David in several undergraduate classes that utilized CTL strategies and also worked with him on several construction projects that facilitated a bond of trust leading to open and frank discussions in the interviews.

The information of this case study was obtained through two all-day visits in the spring semester of 2002 and two all-day visits in the fall of 2002 to David's technology education classes in a comprehensive high school in North Georgia.

Setting

A major characteristic of qualitative research is that it is richly descriptive (Merriam, 2001). It is important to describe the environment in which the data were collected. Information regarding the community and the school is contained in this section.

Community

Norcross High School is located in the city limits of Norcross, Georgia, a suburban middle-class community located northeast of Atlanta, Georgia in Gwinnett County. Norcross is Gwinnett County's second oldest city and has played many roles in local history and development. Norcross maintains a quiet, picturesque downtown district while along its fringes corporations are doing millions of dollars of business on a daily basis. These corporations and businesses employ thousands of workers and contribute greatly to the city and county tax base. Lucent Technologies is the largest of these industrial giants, employing over 3,200 people and is Gwinnett County's second

largest employer. Lucent is second only to the Gwinnett County school system which is the largest school system in Georgia. The list of other major corporations include American Express, Rock-Tenn, Federal Express, General Electric, Hitachi American Limited, Quadram, J.M. Tull Metals, Komatsu, Norcorm, Nordson Corporation, Panasonic, Pfizer, and Travelers Insurance Co. Norcross is surrounded by other communities such as Duluth, Sandy Springs, Lawerenceville, Alpharetta, Suwanee, and Doraville. Norcross is very positive about its future for its enjoys the best of both worlds, a primarily residential area but surrounded by a growing number of high tech industries, large corporations, and many cultural and academic resources.

School

Norcross High School is a comprehensive high school within the Gwinnett County School District, the largest school system in Georgia. It is located in Norcross, a suburban middle class community located northeast of Atlanta, at the address of 5350 Spalding Drive. The school offers strong college preparatory and technology-career preparatory programs. Norcross High School has a long tradition of excellence, both academically and athletically. Norcross High is a recognized state school of excellence and takes pride in recognizing individual differences in the student body, promoting change, and assisting students with transitions to postsecondary institutions and careers. The total enrollment is 2,463 which consists of the following populations: 9th grade, 771; 10th grade, 649; 11 grade, 611; and 12th grade, 432. There are 200 faculty, and the counselor/student ratio is 416:1. The average class size is 25 students.

School Structure

The school has two major curriculum structures, academic and a technology-career option. Minimum graduation requirements are established in terms of units of credit by subject for each curriculum structure leading to either a college preparatory diploma, a technical diploma, or a dual seal. Six classes meet for 55 minutes per day, 5 days per week. The nine-month school year, from August to May, is divided into 18-week semesters. Credit is granted each semester independently of any other semester. A summer school program is offered at locations throughout Gwinnett County. Accelerated courses are offered in the form of advanced placement (AP) or International Baccalaureate (IB) in the following subjects: English, Math, Fine Arts, Performing Arts, Science, Social Studies, Foreign Language, and Business Education.

The technology-career curriculum structure consists of the following programs: drafting, media production, technology education, business education/CBE, and marketing education. There is a laboratory for family and consumer sciences but the program was not operable because no teacher could be found.

Graduates of Norcross High School are recognized for their achievement. Over 2.1 million dollars of scholarships were awarded to the graduates of the 2001 class. Ninety-one students of the 2001 class maintained a 90 or better numeric grade point average. Sixty-five percent of students who took the exams scored a 3 or better on advanced placement exams. Seniors scored slightly higher than the national average on the SAT exam with a score of 1027 as compared with the national average of 1020. There were 2 semi-finalists in the National Merit Scholars Program and 4 semi-finalists in the National Achievement Scholars Program.

Technology Education Program

David provided instruction in three major program areas with different classrooms and laboratories, technology education, Auto CAD (drafting), and media production.

Each of these programs and facilities are described as follows.

Technology Education Program

The technology education program serves students in the 9th through the 12th grades but most of the students enrolled are either juniors or seniors. Technology education is a program that provides students with knowledge and skills in four major technology areas: energy and power, communications, manufacturing, and construction. Students are provided instructional experiences that allow them to explore different technologies. The technology education program at Norcross High School has about 17 different work stations which contain equipment and materials that allow students to work in teams of two in modular instruction. The laboratory is a fairly large room with several auxiliary rooms, one for media production, one for silkscreen printing and manufacturing support, and one for the teacher's office. Classroom instruction can be delivered in the laboratory in an area where tables and stools with casters are located. A white board, TV monitor, and teacher's podium are located in the front of the instructional area. One of the interior walls has continuous counter tops with storage cabinets located beneath it for storage of materials and student work. Storage shelves are strategically located in the laboratory to provide printed resources. The laboratory has a sink area for washing hands. The laboratory is colorful and well lighted and is kept clean and very organized.

CAD Drafting

One of the course content areas of the technology education program is computer assisted drafting (CAD) that is often called AutoCAD. AutoCAD is a program that offers students instruction in communications through drawing and sketches using computerized drafting programs such as AutoDesk 2000. Drafting courses at Norcross High School offers student the options of architectural or pre-engineering technical drafting. The CAD drafting laboratory is located adjacent to the technology education lab through a door that connects the two laboratories. The drafting classroom/laboratory is a fairly large room equipped with PC computers that are used for CAD drafting classes as well for technology education classes. It is equipped with over 20 computers and has several printers, including a large blueprint printer. The drafting classroom/lab has a TV monitor, VCR, and computer projector to facilitate educational technology presentations such as PowerPoint slides. Storage cabinets and selves are strategically located to store reference materials and for student books and work. Computers are arranged on tables that are positioned in rows with plenty of aisle space between rows. Student seating is comfortable, cushioned chairs with casters that allow easy movement in the work area.

Media Production Classroom and Laboratory

Media production is a program that allows students to explore the knowledge and skills required for careers in TV production. Students are provided with actual experiences in developing scripts, shooting and editing productions, and producing live broadcasts to the faculty and student body of the school. The media production classroom and laboratory are located across the hall and several classrooms away from the technology education lab and classroom. The classroom is rather small and crowded

with tables and chairs. It has three auxiliary rooms, one to store camera equipment and two that have specialized computers for generating story-boards and producing graphics and media clips to use in producing broadcasts. There is a white board and teacher's podium and desk located in the front of the classroom.

The classroom is connected to a large production studio or lab that has track lighting, background scenery, various types of furniture, production cameras, and other TV production equipment and props. A small control room with glass windows is connected to the studio that serves as the command control center for the studio. This small room has all the sophisticated equipment needed to produce, edit, shoot, and re-shoot TV commercials and programs. The studio supports the production of the school's daily announcements that are produced by student in the media production classes. The actual equipment (VCR's and broadcast equipment) and supplies are housed in a secure area accessible only to qualified faculty members and support personnel.

Teacher

David has a Bachelor of Science in Education degree from the University of Georgia, College of Education, with a major in Technology Education. He is currently enrolled in the Masters of Education degree program in Occupational Studies at the University of Georgia. He began teaching at Norcross High School toward the end of the fall semester of 2001, replacing a teacher who was terminated. In his first full semester of teaching, he was assigned to teach CAD drafting, media production, and technology education classes. The technology education major at the University provided David with courses that prepared him to teach in several curriculum areas. He actually had a media production course as well as a number of technology education courses at UGA.

David was among the first cohort of CTL trained students. His first two education classes, Foundations of Education and Learning and Development in Education were CTL focused. All students in those classes were part of the CTL model of preservice teacher education. David also completed a contextual learning class and construction technology education classes that used a variety of CTL strategies, including building a small utility building off campus (contextual learning).

David completed an internship with a very innovative technology education teacher who had received no formal CTL training but has adopted many CTL teaching strategies, including project-based instruction, problem-based instruction, and authentic assessment. David was well prepared for his first year of teaching and had a number of CTL instructional tools in his teacher's toolbox that helped him greatly in his first year of teaching.

The researcher established contact with David and his administration in February and was given permission to observe him as often as needed in early March. The first visit to David was on March 20, and the second on April 5, 2002. David was visited two more times during the fall semester of 2002, on December 3rd and December 6th, 2002. David wanted to delay earlier visits during this fall semester until he was able to get some new equipment operational and to fulfill other obligations.

Methodology

I followed the guidelines for collecting qualitative data through interviews, observations, and mining data from documents described by Sharan Merriam in her book, *Qualitative Research and Case Study Approaches to Education* (2001). Informal interviews were conducted with the teacher sometimes during a planning period and after

classes ended for the day. I wrote short notes during my observations in an unobtrusive manner so that I could ask questions about specific happenings. I asked David questions about these events in search of understanding and to derive meaning in the interviews. I also had prepared questions that would help me gather information for the six research questions. I tried to ask these questions so that a continuous flow of information could be provided by David with as few interruptions as possible on my part. I wrote notes of his responses and typed these responses soon after the interviews ended so that I captured as much as possible of what he said and how he said it. I was able to conduct interviews and gather information on three of the four visits. There was insufficient time to conduct an interview on one visit due to a student conduct matter.

I observed David and his students as carefully as possible, guided by the six research questions but open to other events and information that characterize a good learning environment. I jotted down abbreviated notes, especially between class changes because I did not want students to think that I was writing down everything they did or said. I was more than a passive observer for I moved about the classroom and even assisted students with their work or answered questions that they asked. I was more like a researcher participant described by Gans (1982) in Merriam, 2001, p.102, as “one who participates in a social situation but is personally only partially involved, so he can function as a researcher.” David did a good job preparing students for my visits, and I believe students were at ease with me in the room.

I asked David for copies of selected documents, mainly copies of his syllabi, project sheets, rubrics, performance guides, assignment sheets, PowerPoint slide notes, and samples of student portfolios and work. I reviewed these documents carefully to

increase my understanding of the instructional process and to complement and substantiate information that I had observed or obtained in interviews.

Through observations, interviews, and document analysis, I was able to gather information that will be reported in the findings for each research question in the next section of this report.

Findings to Research Questions

The information in this section describes the information and findings obtained through observation, interviews, and analysis of supporting materials (artifacts). Information is organized according to the themes that emerged that are parallel to the research questions of the study. I was able to place all of my information in one or more of the six research questions.

Differences between CTL and Traditional Teaching Practices

I was interested in obtaining information as to the differences in teaching practice of David who had been prepared for the implementation of CTL strategies and the teaching practice of the traditionally prepared teacher. Having over 35 years of teaching experience as a classroom teacher and a teacher educator, I was able to observe a number of CTL strategies and traditional teaching strategies in the four, full-day visits to David's classes. The CTL strategies included:

- Cooperative or team group study
- Project-based learning
- Problem-based learning
- Portfolio development
- Authentic assessment
- Multi-disciplinary approaches (communications, science, math)
- Student empowerment

- Computer assisted learning
- Using performance guides and models to guide instruction
- Teacher facilitating learning through mentoring and coaching
- Shifting responsibility for learning to students
- Student oral presentations using PowerPoint presentation software
- Maintaining a learning community
- Valuing the opinion and feedback of students
- Relating class room learning to real-life situations
- Focus on the learning process as well as learning content
- Teachers perceived as a learner as well
- Providing specific feedback and encouragement to students
- Integrated career and technical student organization activities (TSA)

Traditional teaching and learning strategies observed included:

- Technology education modules
- Teacher demonstrations
- Teacher lecture/discussion
- Individual assigned work (drawing from book)
- Traditional assessments (quizzes, unit tests, projects, daily grades)
- Question and answer
- Individual and group monitoring and assistance
- Use of bulletin boards and posters
- Use of white board to introduce class objectives and activities

David has varied his instructional practice considerably from the traditionally prepared teacher. First of all, David structured his classes more like a community of learners rather than the traditional teacher-centered approach. When asked how he viewed his class in terms of learning climate, he responded “I remember what Dr. Schell taught us about a community of learners and I like that concept. I believe strongly that one of the best ways to learn is to teach. I learn something new every day from my students and I hope their experience is similar.” David has his students work in teams of

two to six depending upon the assignment or project. Traditional teachers may use group work occasionally, but David uses the team approach daily. When asked why he had his students in teams of two, he replied, “we were placed in teams of two in our university technology education classes to work on projects and were told that was an acceptable practice in the field so that all students are assigned diverse tasks or learning experiences. I find that two students is a good number so that there is maximum interaction. I do allow teams to talk with other teams about design problems and to help each other. In the real world, individuals work in teams in most production jobs and I feel that it is important for them to build trusting relationships and teamwork skills.” For example, when I asked David why students were moving about helping each other in the drafting class, he responded “I do allow students to render assistance to each other so long as they do it in a quiet manner. They are responsible for individual work on some assignments in classes but students generally prefer to work and learn from one another. I believe students learn effectively from each other and believe that they should develop this sharing practice when they become workers.”

Traditionally prepared technology education teachers are schooled in delivering modular instruction using commercially developed modules with an occasional culminating project. David has reversed this procedure with projects as the main instructional approach with modules used when appropriate for introductory, remedial, or enrichment learning. I asked David why he uses student projects as instructional activities. He responded “I believe strongly in the use of projects as the main culminating activity for student learning in a topic area. Students are encouraged to be creative and design and produce a product that meets certain criteria established by the teacher just

like individuals would be expected to do if they were part of an engineering team. I know that I really liked to work on projects when I was in college for I enjoyed working with other students, solving problems, and documenting progress on assigned projects. I believe students need to learn how to work together to design, produce, and test projects that employ what they have learned in an area. They really enjoy the freedom they have to be creative and they get caught up in the friendly competition with other teams. I believe it is important for students to take on a project and follow it through to completion.”

As I looked about the classroom and laboratory, I noticed a cardboard chair displayed near a door on a wall and was curious about this project. I asked David to tell me about the chair project and he responded as follows. “This was an example of a design project for my technology education engineering class. Students had to design and construct a chair that would hold a person of a certain weight. They were limited to paper products such as cardboard, cloth tape, and glue. The expected results were that students would gain insight into good design features and have a greater appreciation as to how to use common materials to build lightweight, but strong structures. I had students document their work in a project portfolio and scored their portfolio.”

In my spring semester visits, I asked David about other projects that his students had completed this year and would be working on before school ended. He informed me that they had completed a PowerPoint presentation about themselves, constructed a marine vessel out of cardboard large enough for a student to compete in a regatta race at a local park lake, a mousetrap powered car that they built and raced, and are currently working on a rocket project that has to carry an egg payload into the sky and return

without breaking the egg. I observed teams of students using internet sources to obtain ideas for their rocket and other teams drawing their rocket designs using AutoCAD or actually constructing their rockets from their drawings.

In the fall semester visits, I again asked David about additional projects used for learning. He described them to me and provided me with project sheets for most of them. These projects included: (1) a team building Lego activity; (2) building a model truss bridge and testing it; (3) building a tower and testing it through computer simulation and in an actual strength tester; (4) traditional drawing assignments from their drafting and design book; (5) designing, constructing, and testing a gumball machine model that could be massed produced; (6) developing two roof trusses and testing them through computer simulation and with a strength tester; and (7) designing a kitchen and constructing a 3-D model of the kitchen appliances and cabinets using foam board.

Like traditionally prepared technology education teachers, David follows the curriculum guide developed by the State Department of Education and the county developed guide to identify content for his classes. Instead of using modules and paper-pencil assignments for student learning which can be fragmented, he attempts to contextualize learning experiences and make them more holistic through interesting projects to make them as real-world or authentic as possible. For example, in the spring semester he taught one class of media production to a very select group of students who had expressed an interest in careers in this field. The class was organized into production teams to prepare scripts from information provided by staff of the main office that would be prepared for a live broadcast of the school's official daily announcements. Students

received essential instruction and then applied what they had learned in an authentic media production project.

Another major difference observed between the teaching practice of a traditionally prepared teacher and David's teaching is the personal responsibility placed on students for their own learning. Traditional teachers often do most of the thinking and learning and student passively follow along. David provides students with structured content using both traditional and innovative teaching strategies and then allows students to solve design and production problems associated with projects of interest. For example, I observed media production students trying to make a final shoot of the school's announcements that were to be broadcast the following day. There was missing information in the completed video, and David wanted them to shoot it over but there was not enough time. David could have solved the problem but instead, stepped back and let the student own it and work on it the following day. In David's words, "I could have stepped in and took over the production that would have resulted in completed announcements ready for broadcast that day, but then I would have denied students an opportunity to solve their own problems and complete assignments with minimal input from me." I concluded that David is using constructivist learning strategies where students discover interesting things about an object or process and construct their own personal meaning from it.

Other differences in teaching strategies include the use of authentic assessment tools such as project assessments using rubric, peer assessment of completed projects, reflection on learning projects, and project portfolios. I asked David about the use of portfolios in his classes, remembering that he had mentioned using portfolios with the

chair project. David gave me one team's portfolios of the chair project and replied "this is one of the team portfolios. They were expected to organize their portfolios with a table of contents and provide entries such as their rough design sketches, detailed drawings, bill of materials, plans for constructing the project, reflections on the project process, presentation plan, and evaluation section. I use a scoring rubric to guide their portfolio but do not have the students self assess their work with the rubric yet. I know that you are big on student self-assessment and I plan to develop a more detailed rubric and get student involved in self-assessment next year." I followed up on this intention in the fall visits. David has developed additional rubrics and is having students self-assess their own learning.

Other differences include the use of computer programs such as AutoCAD for the students to construct drawings of their projects, utilization of computerized instructional packages associated with learning modules, utilization of a design/testing computer software program called Model Smart that allows students to design components like trusses and to determine how strong they are, the use of the internet as a source for gaining information to help students design and construct their projects, the use of Power Point presentation software for students to use in communicating their project reports to the class, and the application of math and science in solving problems related to the design and construction of projects such as the cardboard chair, the mousetrap powered car, the rocket, and other projects.

In summary, David is using a blend of traditional teaching practices and contextual teaching practice and doing an exceptional job for a novice teacher in making learning meaningful and fun in his classes. I observed most students engaged in their

assigned projects and working in teams to complete their assignments. David provided the necessary information and structure for them to complete their assignments and then served as a coach and mentor to help learning teams as needed. The contextual teaching and learning practices demonstrated included cooperative or team learning; project-based learning; problem-based learning; portfolio development; authentic assessments; a multi-disciplinary approach using application of communications, math, and science; computer assisted learning; learning community; and student empowerment. The traditional teaching and learning practices observed included lecture/discussion, question and answer, demonstrations, homework assignments, quizzes and pencil-paper tests, daily grades, observation, and group learning. David's instructional philosophy is to make learning fun and to base his subject matter content as much as possible on real-world outcomes that require students to work individually and in teams to solve problems associated with designing and constructing learning rich projects.

Contextual Teaching and Learning Strategies/Perceived Outcomes

The previous section on differences included a great deal of information on CTL teaching and learning strategies, and this section adds more information. David identified the following CTL teaching and learning practices used in his classroom and lab: cooperative or team study, project-based learning, problem-based learning, portfolio development, authentic assessment, multi-disciplinary approaches to problem-solving, student empowerment, computer assisted learning, and learning community. I was interested in obtaining as much information as possible about the contextual teaching and learning practices being implemented by David and was able to observe and document a

number of these CTL strategies in my four full-day visits that occurred in the spring and fall semesters of 2002.

The first CTL strategy I observed on my initial visit was David using educational technology and computer assisted learning in his drafting class. David was presenting information on various lines of auxiliary views using his CAD program and projecting it on to a large screen in front of the class. David presented the lesson and then students began individual work on their computers on the assigned drawing. As I moved about the room, I observed that some students were working on different drawing projects and I asked David about this observation. David replied “most of the time I present drafting lessons using a combination of PowerPoint slides and prepared CAD drawings. I tell the students to follow along with me as I draw critical lines if they need to and then ask them to complete their drawings in class. Some students are able to grasp concepts much quicker and complete drawings on their own. The students who were working on other drawings during lab time were actually working on other assignments because they had completed the drawing I was presenting today.” I also noticed that students were moving about helping each other, and I asked David if students were working in teams in the drafting class. He informed me that they were doing individual work, but that he allowed students to “render assistance to each other so long as they do it in a quiet manner.” Students were engaged in completing their drafting projects, and David moved about the room monitoring student progress, rendering individual or small group assistance using his computer projector when several students were struggling with a problem, and inviting the class to observe if needed.

A second CTL strategy noticed was the establishment of a learning community. As I observed students working on their drafting problems and occasionally helping each other, I sensed that David was promoting a learning community. David was drawing a line on his computer screen and made an error that was noticed by one of his students. David acknowledged his error, thanked the student for pointing it out to him, and stated “I am not perfect and make mistakes also. I don’t profess to know everything and am a learner just like you.” In an interview later that day, I asked David how he viewed his class in terms of a learning community. He reaffirmed that he strongly supports the concept of a learning community that was introduced in Dr. Schell’s class and structures his class environment so that students and teacher learn from each other. As I continued to observe David and his students in the media production class and his technology education class, it was clear to me that students do feel a sense of community and share ideas and information with each other without being disruptive. In the media production class, David had established a number of teams that had to work together to prepare a videotape to broadcast the school’s announcements. I was astonished on how well these students seemed to work in their teams as well as interact with other teams to accomplish the assigned broadcast project. I later learned that these are selected students who have expressed an interest in careers in broadcast television, which may account for their concentration on the work assigned to them. I also believe they recognized that their work would be seen by teachers and other students, and they wanted it to be the best possible.

A closely related CTL strategy to the establishment of a “community of learners” is cooperative or team study. I observed teams at work first in the media production class

where two to three student were working together completing parts of the work required to produce and make the videotape for the school's announcements. In my observations of the drafting classes, I noticed that students were doing individual work on computers so I concluded that they were not working in teams. However, I did observe students were rendering assistance to one another in a quiet manner that I believe is an informal collaborative strategy. In an interview question later, I discovered that David assigns or allows students to form work teams in the media production and technology education classes, and teams are required to complete small team projects or a total team project as was the case in the actual school's announcements broadcast.

After the media production class ended, I asked David to tell me about the makeup of student teams. David replied, "I try to follow the work organization that is used in the real world. In a television studio, highly qualified individuals work in teams under the direction of a production manager. I choose capable student leaders as production managers as well as other teams leaders like the camera operator team. I revolve students through the various teams and team leadership positions even though I know that I could get better production results if I left very capable students in positions throughout the semester. This makes it harder on me to supervise the production and ensure that the productions are as good as possible."

Later that afternoon, I observed teams of two students working together in the technology education class designing their rockets that were to carry a live egg payload to an established height in the sky and return to earth using a parachute system without breaking the egg. [More information about this project will be presented later under the project strategy.] I asked David, in an interview question, why he assigns or allows

students to form teams of two. He replied, “I find that teams of two is a good number so that there is maximum interaction between learners. I do allow teams members to talk with other team members about design and production problems. In the real world, individuals work in teams in most production jobs and I feel that it is important for them to build trusting relationships and teamwork skills.”

I moved about the room observing student teams in various stages of designing their rockets and some were actually beginning to construct their rockets, while David was in the materials processing room supervising the operation of a band saw. It was great to see student working together unsupervised in the technology lab while David worked with another teams in another part of the lab.

Two of the main CTL teaching strategies used by David are problem-based and project-based learning, and these two strategies are blended together in his classes. Student are presented with a problem to solve, which is presented in the form of a project requiring students to design, construct, and test a completed product such as the design, construction, and launching of a rocket that would carry a raw egg payload into the sky at a certain height and then parachute to earth without breaking the egg. David had presented instruction to the students about the rocket problem and project prior to my observation visit. I observed students working in teams using the computer to search the internet for rocket specifications and designs that could be used to help them design their rocket body. They were engaged in trying to apply math and science principles to the design of the rocket body to reduce drag while making the rocket stable. They had to determine where the fins would be placed to stabilize the rocket in flight and to design a parachute system that would engage once the rocket began to fall to the ground. They

also had to design a packaging system to protect the raw egg from breaking on impact with the ground on the return flight. Students were working in teams of two but occasionally I observed teams consulting with each other. As the students worked, there was some friendly competitive comments made among teams as to whose rocket was going to be successful. Having observed previous rocket launchings, I pictured the competition that would be displayed on launch day by these students and the comments that would follow the next day when project results would be reviewed in class.

I was unable to schedule a visit with David on launch day; but, on my second visit, I asked David to describe the results of the rocket-launching project. David replied, “I wish that you had been able to come and observe the events that occurred that day. It is always an exciting event. We took the class out to the soccer field where we set up the launch pad and then each team of students had an opportunity to fire their rockets. As each rocket was launched, I had students use the altitude checker to see if it went high enough to meet specifications and then watched as some of the rockets fell to the ground with a crash because the parachute failed to open or opened only partially. If you recall, the rocket was carrying a real egg as cargo so it was rather messy with those rockets that failed to operate properly. Only one team successfully launched their rockets and that was a team of two girls who paid more attention to my guidelines and specifications and took care of details. Their rocket was beautifully colored, but it was not the best looking design. It functioned properly, however, and the girls were very pleased with their work. Some of the other teams were disappointed, but hopefully they learned from their mistakes. Following the launching, teams had to write up a report on their projects to include in their portfolio.” David escorted me to the winning rocket team and

complemented the girls on their rocket project in my presence. The girls asked if they could show me their portfolio that included pictures of their rocket and documentation of their work. They were very proud of their work and presented the highlights to me enthusiastically. Some of the boys made remarks that the girls borrowed their ideas from them. I concluded that they were probably trying to save face!

During my two-day visits in the fall semester, I observed other completed projects and watched students working on a gumball machine project in one class, a roof truss project in another class, and a kitchen model project in still another class. In a technical drafting class, I observed students using the computer software program, Model Smart, to design and test roof trusses that would be eventually built and tested in a strength testing machine. I detected a friendly spirit of competition as one student asked David what the record design of the trusses held in other classes has been. Students were trying to design their trusses to meet or exceed this value. Several students had completed their designs on the computer and were in the lab constructing their trusses out of balsa wood using glue to join members.

In an engineering class, teams of students were working on a gumball project that had to meet certain specifications. Some teams were still in the design phase on computers while others were actually preparing to construct their machines. David was working with small teams in the production room demonstrating the safe operation of tools and machines needed to build the gumball machines. I noticed in the materials for this project that David gave me that students would be required to complete three different designs and then a prototype for one of them. They would also have to use PowerPoint presentation software to share their completed prototype with the class.

David informed me that if time permitted, the entire class would form a company and mass produce the gumball machine so that students would experience on a small scale what is involved in manufacturing and marketing a product.

In an architectural design class, students were working on designing a model kitchen for their dream house. Using CAD, they had to draw and then construct a three-dimensional model of their kitchen showing all appliances and cabinets out of foam board. This was an individual project, but students were sharing their ideas with one another to arrive at their final design. Some students were still in the design phase using computers, while others were busy constructing their models. One student had already completed his model, and it reflected some of the good features of a well-planned kitchen. There was good access to other rooms from the kitchen, traffic lanes in the kitchen, appliances placed strategically for utilization, adequate counter top workspace, and sufficient cabinet storage space. Students in Architectural Design 1 had already completed assignments dealing with traffic patterns. Most of the students seemed to be very interested in this project. A few students needed a little encouragement to stay on task which David provided in a kind and caring manner. Students constructed their models using X-acto knives, cutting boards, glue, and measuring scales. I sensed an environment of friendly competition with this project, as I did with other student developed learning projects.

I wanted to observe students making an oral presentation and actually using machines to construct their gumball machines, so I scheduled my final visit with David on Friday of that week. As I entered David's classroom, he was taking roll. He told the class that one group had completed their three drawings and had built their prototype and

were going to present it to the class. The group presented the specification of their gumball prototype using PowerPoint slides, and then demonstrated how the machine worked with the class. There were some problems with the flow of the gumballs as they cascaded down the troughs of the machine, and I really did not think that the reservoir would hold 25 balls. The class critiqued the prototype machine and provided feedback to the presentation group along with comments made by David. I observed that presentation of the first prototype seemed to motivate other groups to work a little harder and then to make improvements to their three designs and begin construction on their prototype.

Another CTL strategy is using authentic assessment practices. As previously mentioned, David requires students to complete portfolios documenting their projects. He uses a scoring rubric to grade their portfolio and has not begun requiring students to self-assess their own portfolios. David uses real-world review sessions accompanied by specific feedback information in his media production class that engages students in the identification and correction of errors. Students are assigned a project to tape a live broadcast from a television program and then show it to the class. The class has to critique the program and rate its quality. In the discussion of the critique, students gain insight into what makes a video high quality. This assignment must be done before students are assigned textbook reading. Then students are assigned readings and form teams of three to create a storyboard for a production featuring a personal autobiographical interview for each team member. Team member take turns acting and shooting each other's videotape, where they learn important concepts and skills such as cuing in shots, camera work, and in-camera editing. Student teams can shoot either in

school or outside the school on school grounds. Once productions are taped, they are shown to the entire class without comment as students quietly record their critiques. Then the tape is showed again and stopped every time a class member has a comment. The instructor lets students do most of the commenting and critiquing. Students are required to identify the various types of shots and determine how well they were done. Students recommend a class grade for each production that is averaged in with the teacher's assessment of the student team's videos and storyboard to determine final team grades. Once the tapes are scored, the teacher meets with each team and offers constrictive criticism to improve future performances. By using this procedure, the teacher engages students in assessing the quality of a production and then gaining specific feedback on what makes a production either high quality or less.

I observed and discovered other authentic assessment practices being implemented by David. In one project, students are required to maintain a learning log of their actions and progress. Nearly all projects now have scoring rubrics. Most projects have performance guides and models of exemplary completed projects that are used to guide instruction. Students are required to reflect on their learning experiences in reflection papers. Students are encouraged to learn from their mistakes and to correct their errors. Assessment of performance projects is the main strategy for determining student achievement.

I observed mostly "turned on" students who were empowered and who were assuming responsibility for their own learning, which is another important CTL strategy. I concluded that in David's classroom, students feel free to make mistakes, knowing that they will not be ridiculed and will have a chance to correct their errors. They feel that

they are important members of a learning community and that their teacher is their ally, not their enemy. Students are empowered because they can use their creativity and genius to solve problems without subscribing to directed procedures. Students are empowered because they are involved in their own assessment.

In my final interview, I asked David to share with me perceptions of the outcomes of his CTL teaching practices now that he had taught a little over one year. He reminded me that he had shared some of his perceptions in earlier interviews, but would do it again. David strongly believes in problem-based and project-based learning because these approaches place the responsibility of learning more on students and challenges them to use their talents and abilities individually and in teams to solve problems, to construct objects, and to complete projects much like workers do daily in engineering fields. He maintains that students like the problem-based and project-based learning approach, because they like to be actively engaged in learning experiences that involve the application of knowledge and opportunity to use their hands as well as their minds. He believes students are less likely to be absent from school because they don't want to let their team members down and cause their team to get behind in completing performance projects in class. He reported that his students have a better idea of their talents and abilities and progress through participation in authentic assessment strategies that allow them to use their multiple intelligences. He also reported that students were developing the ability to evaluate their own work against criteria as workers do as they produce or service products. He feels that the learner-friendly environment he tries to maintain allows students freedom to be creative, to make mistakes without fear of criticism, and to learn from one another.

Facilitators to Implementing CTL Strategies

I was interested in determining what facilitators were perceived by David as being helpful in implementing CTL strategies. David identified the facilitators as follows: facilities, adequate budget for supplies and materials, helpful colleagues, good administrative support, support of peers in the CTL seminars, quality of the students enrolled in his classes, and a planning period. David told me that he receives a number of students who are very capable and have an interest in pre-engineering drafting technology, architectural drafting technology, technology education, and media production. The students who are enrolled in the media production class are capable students who are carefully screened to determine that they have an interest in this area as a career. In this class, he tends to get students who are not only interested, but have some experience with video and digital cameras and who like media and broadcast journalism.

Of course, he also has some students who are placed in his classes with no real interest in anything except earning a passing grade to fill an elective requirement for graduation. Even these students soon seem to get interested in his project-based learning approach. His students are mostly juniors and seniors that are familiar with many instructional strategies and can adapt to different teaching practices such as CTL strategies with ease.

David is very pleased with his facilities and equipment in his drafting technology class and technology education classes, but he is less pleased with the equipment in the media production area. In the fall, another teacher was hired to teach the media production classes which has reduced the burden on David considerably since this class was the one consuming much of his time with equipment failures. David demonstrated

his new strength tester to me, which he has already used to test the truss bridges students constructed, the towers, and soon will be testing the roof trusses presently under construction. His large working area in the lab, connected to a classroom, is full of Pentium II computers that are somewhat slow and limiting with regard to the utilization of new software programs. An adequate number of these computers, even with their limitations, enable David to give individual student assignments to solve problems and construct projects in two connected facilities under close supervision. His facilities are equipped with computer projection equipment and TV/video equipment that allows for video presentations. The equipment in the media production facility is very complex and is often subject to various problems that are discussed in the barriers finding of this report.

David is provided with an adequate budget that allows him to purchase needed supplies and materials to facilitate project-based learning. He is able to maintain modern versions of AutoCAD for his drafting technology classes and to partially maintain the learning modules in his technology education laboratory. There are, however, inadequate funds to allow for field trips to support his project-based learning approaches. (This also will be discussed later as a barrier.)

One of the greatest facilitators to the implementation of CTL strategies during the spring semester as reported by David was an experienced technology education colleague who was assigned to teach another media production class. I asked David in an interview about how he and his colleague work together in the media production class. David responded, "It has been a great learning experience for me to work with a colleague in this class. I had training at the University but the equipment we have here at the school is

different. I have had to spend a huge amount of time trying to learn the equipment and he has helped me with equipment related problems as well as sharing what he does in his classes. He also asked one of his students who is very knowledgeable about the computerized editing equipment to help me with editing problems, and he has really been very helpful. I have learned a great deal from this student.”

David told me that he enjoys great support from his school administrators and the county career and technical education coordinator. David told me for the most part that his students are capable, interested in his classes and well behaved, but he had to write up a few students for misconduct and the administration had backed him fully. David believes that the administrators of his school know that he is really trying hard to be a good teacher, and they are doing everything possible to assist him.

David expressed his thanks for having a planning period that he can use to plan instruction, develop instructional materials, and prepare tools, machines, and supplies for his project-based learning instructional approach. He has the responsibilities of maintaining his laboratory and over 25 computers which requires more time than that of the regular classroom teacher.

A final facilitator reported by David is the assistance, support, and encouragement he has received from other technology education teachers in the county and area as well as from his peers who met regularly in the CTL seminars conducted by University of Georgia faculty. He told me that he has borrowed a number of projects and instructional materials from other teachers and has learned about successful CTL implementation practices from his peers involved in the study.

Barriers to Implementation of CTL Practices

I was interested in determining David's perceptions of possible barriers to the implementation of CTL teaching practices. As expected, David considers the lack of time to be one of the major barriers he has faced this year in implementing CTL strategies. In his spring semester of teaching, he was assigned three drafting technology classes, one media production class, and one technology education class, plus a planning period. His planning period occurred just after the media production class and often he had to work on equipment that was malfunctioning in his class. An example of an event will help clarify the time barrier in this class. I observed David seemingly upset with the students in his media production class and asked him to describe his feeling about that observation. David replied, "I really was not upset so much with students, but with equipment failures that seem to be a regular occurrence. The equipment is used by my colleague's class just before my class and sometimes it is hard to determine how settings have been changed, which affects what I am trying to have my student do. There are plans under way to hire a full-time media production teacher next year, and this will certainly give me more time to focus on improving my other instructional responsibilities." David feels much better now that he no longer is assigned to teach the media production class. He now feels that he has more time to devote to his technology education courses.

David shared with me information about another barrier, which was overcoming student expectations they had of him based on their experience with a previous teacher. Some of the students who were taught by the previous teacher were not expected to do much except complete worksheets associated with the modules. They were not expecting

to have to assume responsibility for their own learning, work individually and in teams to solve problems, design, construct, and test projects, and complete authentic assessments. It took some time for students to get adjusted to David's problem-based and project-based learning approaches. David informed me that most students adjusted rather quickly because they preferred learning through projects to the canned, modular approach which they felt was boring and not relevant to the real world.

In my spring semester interviews with David, he mentioned that a few of his students are not as interested and motivated to achieve in his classes as expected, and he really does not know what to do to motivate them. In David's words, "I have one student in my technology education class that does not seem to care about doing any work. I have done everything imaginable to reach him, including trying to meet with his parents to get him involved with no success. He is headed toward dropping out of school. I have shared my concerns about him with my administration and fellow teachers."

David did not say anything about disinterested students in his fall semester classes, but he did indicate that it is sometimes challenging to serve a wide diversity of students, including some with special needs, without professional support.

Another perceived barrier mentioned in early interviews was the lack of class time for the integration of the career and technical student organization, Technology Student Association (TSA) into the instructional program. Georgia policy treats all student organizations as extra-curricular, meaning that they are forced to meet after school, which introduces transportation problems and affects student participation. Also funds are limited to support student travel to TSA activities.

In my final interview with David, I asked him again to summarize the major barriers he has faced in implementing CTL teaching practices. David replied as follows: “There are several barriers that come to mind including (1) one-hour class schedules that really limit the work one can do on projects which require tools, equipment, and materials; (2) out-of-date, slow computers and software to support instruction; (3) modules that cannot be used because of missing parts and information to repair them; (4) need for new modules and supporting equipment for specific learning content; (5) difficulty in transporting student to business and industry sites to see firsthand the applications of technology; (6) inadequate time to plan instruction and to develop supporting materials when one teaches five periods each day; (7) serving a wide diversity of students without adequate support services from professionals; (8) large number of students placed in classes; (9) overcoming instructional practices of the previous teacher; and (10) lack of machines and equipment to do more authentic work tasks.”

Student Engagement/Students on tasks

I was interested in what effect the use of CTL teaching practices had on student engagement in learning subject matter so I talked with some students and posed questions to David. I concluded that David has very few problems keeping students on tasks for he has introduced a number of interesting projects that capture the attention of students and he allows them to work individually and in teams to complete these projects. David closely monitors the progress of his students and offers assistance as needed to help them accomplish their projects. He has been forced to write up several students for misconduct or failure to do assigned work. These students have suffered the consequences which are known by other students, so they want to do what is required to avoid embarrassing

situations. I did ask David about an incident in which he took two male students just outside the classroom door and had a short discussion with them about, I assumed, inappropriate conduct or perhaps a lack of progress. David replied “Those two students were not on task and were wasting time that they did not have to complete assignments. I practiced one of the component teaching skills that I learned in my methods class called painless removal. I simply took them out in the hall, described their behavior, and asked them what they planned to do about completing their work on time. I believe you noticed that they focused their attention more on the task at hand after our little chat.”

David has established an environment close to a community of learners in which students are free to share information and ideas and to work together for the common good of the class. David has worked hard to establish and maintain a clean, well-organized learning environment where students are free to make mistakes so long as they correct them. In David’s words, “This is one of the things I learned from you that a mistake is a natural consequence of doing something and that mistakes are only opportunities to change behavior that result in success at a later time.” I sensed that the students hold a great respect for David and know that he really cares about them. David stated, “I really believe that I have mostly mature young men and ladies who want to learn. I believe they know I care about them and want to help them learn all they can in my classes. I try to engage students in activities that are meaningful, yet fun. Sometimes I have to criticize their behavior but I think they know that I simply want them to work harder and concentrate better on their work. David’s grading system requires timely completion of tasks, and this is another motivator for students to stay on task.

In my final interview, I asked David to again provide me with his perceptions of the effects of CTL teaching practices on student engagement in the learning process. David replied, “I really do not have a basis for comparison of what my students are learning through my CTL instructional approach as opposed to students who learn through the traditional modular approach to technology education. I believe they are more engaged in learning how to learn, to solve problems, to use their talents and skills, to use their creativity to design products, and to learn the most important principles and concepts that make up the subject matter of each course. My students seem to like the learning environment and instructional activities and stay on task for the most part. I really do not have many students who are absent repeatedly. I believe that when students are interested in a project or activity, and when there is an appropriate amount of friendly competition, students will work harder to be the best group or produce the best product in the class. I believe the use of cooperative learning reduces the threat that some students have because they perceive themselves as being unable to complete certain class assignments well [on their own].”

Student Mastery of Subject Matter Content

I observed David’s students in the spring and fall semesters of 2001 for nearly four full days in most of his classes except the early morning ones. Most students seemed to be interested in the content of his courses and could see the relevancy of what they were learning. I observed David relating what the students were doing to real-life jobs on several occasions. Students generally like to work with computers: David has structured his projects to build on the use of computers and to increase student knowledge of computer programs like AutoCAD, a powerful graphic communication program used

by technicians and engineers. Students realize that the ability to draw and depict objects using the computer is a powerful tool that can help them in other subjects as well as draw things they want to do at home or on their jobs.

In the spring semester interviews, I asked David how he thought that his instructional strategies and program impacted his students. He replied, “It may be too early to tell for I am still learning how to apply all the things I learned about CTL. I do believe that most students are now interested in my courses. They like to work in teams and design and build products. I believe one outcome has to be more motivated students. At firsts students seem to struggle to come up with project designs but they soon learned to use resources made available to them, and now I believe they have more confidence in accessing materials from a variety of sources. I believe they see more connection to the academic skills they are learning in their academic subjects as well as those learned in my classes to the design and construction of meaningful projects. For example, if you remember when I was describing how to determine the height that the rockets would fly, I told them that we could determine that by using trigonometric functions and that I had made a homemade device that would determine how high their rockets flew. I believe students’ ability to plan and document their work is improving as they develop their portfolios. The portfolios also provide students with an opportunity to reflect on their thinking and learning and to realize what went well and what needs to be done differently next time. Finally, I believe the students see the connection between what they are learning in my classes and real life for I do constantly clarify the connection.”

I had an opportunity to talk with a few of David’s students, with permission and without learning their names, about how they liked David’s classes. These students

affirmed what I observed; that is, they were really learning some neat things and knowledge and skills they felt could be applied in their present and future life and they really had a great respect for David as an effective teacher.

In the final interview conducted in the fall semester, I asked David to once again share his perceptions as to the effects his CTL teaching practices were having on students' mastery of course content. David's response was a long one but very thoughtful as follows. "I believe there is a direct relationship to student engagement and mastery of subject matter that I presented in the previous question. I have a pretty good idea of what my students know and can do in certain subject matter topics as a result of completed projects and observation of their daily work. I give a weekly grade for effort and making progress on assignments and most of my students earn their total points. A few of my students have entered TSA competition and have demonstrated their knowledge and skill in competitive events; and I consider this evidence that they have learned specific subject matter. The school requires that I administer a comprehensive final pencil-paper test. Most of my students demonstrated mastery of subject matter well on this examination. My subject area of technology education requires a certain level of mastery of content in order to be successful in other technology education courses. I have established prerequisites for my advanced courses, and students who have completed my basic courses are doing well in my advanced courses. I consider this evidence that they have learned the expected subject matter. I do not believe that simply learning subject matter in technological areas is my main student goal. I believe that helping students assume responsibility for their own learning and learning how to learn is much more important. In addition, I believe that my students are learning how to work

together in teams as a result of my project-based learning approach. They are learning how to solve problems, use their creativity, and be persistent by sticking with the assignments until they are satisfactorily completed. They are learning that doing quality work is personally rewarding and is appreciated by others. In my opinion, the real proof of mastery of subject matter, however, is not a test score, rather it is the ability of my students to understand and appreciate technology and to apply what they have learned in using technology wisely. I believe my students do have a new level of technological literacy as a result of my courses and program.”

The impact of teaching practices on student learning is difficult to determine in the short run, but David did provide some indicators that his students were achieving the goals and objectives established for his courses and developing a level of mastery in subject matter content. He informed me that several of his students were planning to attend Georgia Tech or another technical university to become engineers and that they feel better prepared for the rigors of that major as a result of the experiences they encountered in the drafting and engineering courses they completed. After careful analysis of my observation notes, interview information, and supporting materials, I conclude with confidence that his students are deeply engaged in his problem-based and project-based learning approaches and are developing knowledge of content and processes that will enable them to understand and deal more effectively with technology. I also believe that his students have developed confidence in their ability to work independently and in groups to accomplish learning and work tasks. Likewise, I think his students have developed a higher level of learning process skills as they have been required to utilize the internet for resources, utilize computer software programs, make

oral presentations, become independent thinkers, and use their talents and abilities in creative ways to solve problems confronting them. David is a novice teacher with just over one-year of teaching experience, and he is still learning how to improve teaching practices. In his first year of teaching, he has done an exceptional job of utilizing a variety of traditional and CTL teaching practices to deliver instruction and to facilitate student learning.

Discussion

The purpose of this case study was to investigate novice teacher implementation of contextual teaching and learning approaches in a technology education classroom. This was a case study analysis, and the findings cannot be generalized to other teachers and other settings. However, if readers can see themselves in a similar teaching setting, they may gain a better understanding of CTL teaching practices and how to use them to effect learning. An even richer understanding may result when this case study is compared to the other case studies that have been written for this project.

This has been a valuable learning experience for me as I have never been involved in such an extensive, purposeful investigation of the teaching practices of a novice teacher. I served as a college supervisor of new career and technical education teachers for over thirty years, and the knowledge and skills learned over those years have been most useful in this study. I acknowledge that the training observers like me received from Dr. Sharan Merriam, a nationally recognized expert in qualitative research, and the content of her book gave me more confidence and new insights on how to conduct a qualitative research case study and to analyze and report the data. Hopefully the reader

will recognize a number of CTL teaching practices implemented by David and understand the impact these learning strategies have on student engagement and learning.

David shares many of the same challenges confronting new teachers such as having enough time to plan instruction and prepare instructional materials. David has taught and is currently teaching five one-hour classes daily with a one-hour planning period. He had to cope with the adjustments required from replacing a teacher who left during the later part of the fall semester of 2001. He also had to deal with teaching a media production class in another classroom and laboratory during the spring semester of 2002 in which he experienced continuous problems with equipment. David responded well to these challenges and quickly earned the respect of his students. He changed the learning environment from teacher-centered to a learner-friendly environment; from students mostly in a passive role to students assuming responsibility for their own learning; from teacher doing most of the thinking and problem-solving to students exercising independent thinking and using their multiple intelligences; from mostly individual work to learning in teams; from assessing students in traditional ways to assessing students using authentic assessment instruments; from students working on modules in pairs to students working in teams to design, construct, and test individual products they had created. David accepted the challenge of implementing many of the CTL strategies he had learned in his teacher preparation program for he was convinced that his students would learn better using the CTL approach instead of through the traditional teaching-learning approach. David is an energetic young man with a very strong work ethic. He believes strongly that students learn best through hands-on applications of knowledge. He also believes that students will be more motivated to learn

when the learning activities are viewed as relevant and are fun to do. His goal is to help his students develop an appreciation for technology and to become technologically literate. He also wants them to develop a thirst for learning and to develop the attitude, skills, and knowledge required for lifelong learning.

I was very impressed with the knowledge and skills of teaching demonstrated by David with his classes at Norcross High School. I was very pleased that he was using a number of the contextualized teaching and learning practices that faculty in UGA's Department of Occupational Studies were modeling and imparting to students. In many ways, David is performing at a level much higher than would be expected by a first-year teacher. It is obvious that he is working very hard preparing daily instruction and developing his program. My conversations with him revealed that he had gained a great deal of useful information and teaching practices during his student teaching experience and from his mentor teacher at Norcross High School. He also identified teaching practices that he had learned in his courses at the University of Georgia.

It is my best prediction that David will become a National Board for Professional Teaching Standards certified teacher soon after his third year of teaching. I believe he will become one of the best technology teachers in Georgia, and his program will become a model for others to follow. I have no doubt that he will affect the lives of many of his students in a positive manner.

References

Merriam, S. B. (2001). Qualitative research and case study applications in education. San Francisco, CA: Jossey-Bass Publishers.

Artifacts

(available for review from project office)

- Four different course syllabi including Technical Drafting I, Technical Drafting II, Architectural Design I, and Engineering III/ Manufacturing
- Traffic Pattern Exercise
- Prototyping and AutoCAD
- Two student portfolio of the chair project
- Power Point Slides handout on Bathroom project (Down the Toilet)
- Marine vessels project materials
- Team building Lego activity
- Nuts and bolts activity
- Transportation dynamics assignment
- Egg-carrying rocket materials
- Model truss bridge building project
- Safety materials
- Tower project materials
- AutoCAD drawings assignment
- Gumball machine materials
- Architectural design Power Point slide handout (kitchen model project)
- Roof truss project materials
- Student drawing of bridge trusses
- History of Norcross High School and school data
- Response form for David