

Implementing Contextual Teaching and Learning by Novice Teachers

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Final Report
June 30, 2003

The work reported herein was prepared in association with the *contextual teaching and learning in preservice teacher education* and *studies of novice teachers' implementation of CTL approaches in the classroom* projects at the University of Georgia, with funding support from the U.S. Department of Education, Office of Vocational and Adult Education, Contract # ED-98-CO-0085, 1998 – 2003.

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Background on the CTL Teacher Education Project at UGA

The Contextual Teaching and Learning (CTL) research reported herein represents a continuation of the original contract to the University of Georgia (UGA) to develop a CTL-based preservice teacher education model. The preservice CTL project at UGA began in Fall 1998 with a three-year contract from the U.S. Department of Education to develop a model of excellence for contextual teaching and learning in preservice teacher education. The result of this work was the development and implementation of a teacher education model where students (a) completed courses, seminars, and other experiences in professional education and content areas which integrated contextual teaching and learning concepts into instruction; (b) used experiences in community, workplaces, and school contexts to inform teaching and learning; and (c) were prepared to use CTL strategies in professional practice. In September of 2001, the U.S. Department of Education extended the CTL contract at UGA for 18 months. The purpose of the new work was to better understand the applications of CTL strategies by novice teachers in actual teaching contexts.

The original preservice CTL project was a joint project of the School of Teacher Education and the School of Leadership and Lifelong Learning in the College of Education and also involved faculty from the College of Arts and Sciences and School of Professional Studies at UGA, as well as participants from the Athens Area Chamber of

Commerce, local school systems, and local business and industries. The UGA-based project staff initially involved 28 full-time faculty members and department heads from nine different departments. By the conclusion of the three-year funding cycle, participants included more than 60 UGA faculty from 15 different departments, over 1,000 preservice teacher education students, at least 16 different business and industries, and countless public school personnel.

The preservice program model developed at UGA over the course of the three-year project included development of some new courses and revision of many others, highlighted as follows:

Pre-professional Courses

Two existing, required courses for teacher education in educational psychology (Learning and Development in Education) and educational foundations (Social Foundations of Education) were revised to include contextual teaching and learning principles and applications.

Community Work Experiences

Academic Service Learning, an existing elective course involving service projects in various community agencies, was redesigned to include structured field projects in business, government, and other professional work settings. Another existing elective course, Internship in Business and Industry, was offered to students interested in completing an extensive internship in private, corporate, or nonprofit sectors. In addition, students were involved in other classes or seminars with business or community short-term internships, tours, field trips and interviews, focus groups, and other nonschool contexts to help them connect knowledge with real-world applications.

Seminars

A series of core CTL seminars were developed to involve students in field experiences that connect education and the world outside of schools. These seminars were entitled (a) Disciplinary Knowledge: Basic Principles and Ways of Knowing; (b) Workplace and Community Experiences: Connecting Academic Learning to Out-of-Classroom Contexts; and (c) Contextual Teaching and Learning in Schools.

Disciplinary Courses

Required courses in curriculum and methods of teaching, subject matter disciplines, and student teaching were revised to incorporate contextual teaching and learning examples and concepts so that students could experience and apply CTL strategies in school and non-school settings. Elective courses were added in some departments to enrich the preparation of teachers specifically in contextual teaching and learning. A 12-credit, interdisciplinary, freshman core program (i.e., four courses) with considerable CTL approaches was introduced in the College of Arts and Sciences.

Over 50 courses in the Colleges of Education and Arts and Science were revised to include strategies identified with contextual teaching and learning. Course changes have been grounded in the supporting theories and literature underpinning situated cognition, constructivism, multiple intelligences, and distributed expertise. Illustrative teaching approaches incorporated in the teacher education and arts and science courses and thus taught to teacher education students include:

- Problem-based learning
- Project-based learning
- Inquiry-based instruction
- Work-based learning
- Service learning
- Collaborative or cooperative learning
- Authentic assessment

Based on our review of the extensive materials developed in the various departments, programs, and courses, five primary outcomes were identified from the three years of

work on developing and implementing a model for contextual teaching and learning in preservice teacher education¹ and reported in 2001:

1. Curriculum and instruction in preservice teacher education at UGA have changed and, for some courses and some programs, profoundly so. Faculty and students report much more use of real-world contexts, linking education and the working world, use of varied teaching methods and assessments, and creating connections with content and applications and thus facilitating students' transfer of learning. We found contextual teaching and learning to be very different than traditional classroom teaching and--although implemented differently in different courses, departments, and programs at UGA—approaches identified with CTL became increasingly evident throughout the preservice teacher education programs over the three years of development.
2. Students, especially, noted and reported on the changes they were seeing, particularly in instruction, and the effects they felt contextual teaching and learning strategies would have on their subsequent work as classroom teachers. They became knowledgeable of CTL practices and planned to incorporate them into their own curriculum plans and instructional strategies when they became teachers.
3. There was a significant effect between the number of CTL classes taken on students' perceived preparedness to use contextual teaching strategies and their intentions to use these strategies in their future teaching. The more immersion students had with CTL strategies, the greater their intention to incorporate them into their work as classroom teachers.
4. University faculty professional development activities—such as tours of local business and industry sites, workplace internships, conversations and debates about teaching and learning, involvement in committee work focusing on teaching and learning, seminars, and internal and external collegial networking--were very important to establish context for the work, develop a conceptual framework, and implement CTL at the University of Georgia. Further, and because of our attention to faculty development, we believe there is now greater understanding on the part of university faculty of businessperson and employee concerns about the poor quality of education they perceive some young people to be receiving and perhaps greater faculty sensitivity for different student learning styles, different education and career paths for students, and different ways of presenting and learning subject matter.

¹ NOTE: Extensive materials are available for review on the UGA College of Education website at www.coe.uga.edu/ctl. Of special note is September, 2001 report: A Model of Excellence for Contextual Teaching and Learning in Preservice Teacher Education: Final and Summative Report.

5. We did create a model of excellence that can be transported to other colleges of education and, if collaboratively implemented with a college of arts and science, the community (including business and industry partners), professional educators, and other stakeholders should result in teacher education graduates who are well versed in and capable of delivering instruction through contextual teaching and learning strategies. Our model, of course, was developed within the context of the College of Education at the University of Georgia.

Theoretical Grounding of Contextual Teaching and Learning

The grounding of the contemporary work on CTL is based in the writings of John Dewey in the early 1900s who believed that schools must create communities of learners emphasizing experience, scientific methods of investigation, and democracy in the learning environment (Kincheloe, Slattery, & Steinberg, 2000). Dewey advocated a curriculum and teaching methodology tied to a child's interests and experiences, blending mind and body, and linking academics to application (Dewey, 1916). He believed that the most powerful learning would come from combining the intellectual and the practical, and in situating learning in the vocations of adult life, whether that is in professions or trades, academics, or the arts.

Other theoretical strands that have contributed to the theory and practice of CTL include experiential learning, cognitive apprenticeship, transformative learning, critical theory, constructivism, situated cognition, and most recently the work on multiple intelligences. An important basis for CTL is application from brain-based research that shows learning occurs faster and more thoroughly when what is being learned is presented in meaningful contexts, rather than as fragmented facts (Caine & Caine, 1991; Resnick, 1987) and that skills are developed more easily if learned in the context in which they will be used (Hughes, Bailey, & Mechur, 2001). Recent studies on brain-based research have produced strong implications for how to teach including drawing on

students' preconceptions about how the world works, helping students organize knowledge that facilitates retrieval and application, and drawing on metacognition to help students take control of their own learning and progress (National Research Council, 2000). Studies also show that social learning and the interactions among people when information is processed is an important condition of what is learned and how it is learned (Resnick, 1991; Vygotsky, 1978). Retention of new information (learning) requires cognitive restructuring and the connection of new information to what is already known.

Johnson (2002) states that “the heart of contextual teaching and learning is the connection that leads to meaning. When young people can connect the content of an academic subject such as mathematics, science, or history with their own experiences, they discover meaning, and meaning gives them a reason for learning” (p. 43). Johnson further grounds the CTL approach in three critical scientific principles which quantum physicists, cosmologists, and biologists have found sustain and order all living systems: interdependence, differentiation, and self-organization. Johnson believes CTL works because its central aim, to find meaning by connecting academic work with daily life, corresponds to the three central scientific principals of nature and the research of psychology and neuroscience.

Others view CTL primarily as a conception of pedagogy that requires educators to use instructional approaches to relate subject matter content to real-world situations that, presumably, will help students apply this knowledge to their current and future roles as students, family members, citizens, and workers. Much of the work that underpinned the

CTL project at UGA and other federally-supported CTL projects nationwide from the late 1990s to the present embraced Howey's 1998 operational definition of CTL:

Contextual teaching...enables learning in which students employ their academic understandings and abilities in a variety of in and out of school contexts to solve simulated or real world problems, both alone and with others. Activities in which teachers use contextual teaching strategies help students make connections with their roles and responsibilities as family members, citizens, students, and workers. Learning through and in these kinds of activities is commonly characterized as problem based, self regulated, occurring in a variety of contexts including the community and work sites, involving teams of learning groups, and responsive to a host of diverse learners needs and interests. Further, contextual teaching and learning emphasizes higher-level thinking, knowledge transfer, and the collection, analysis, and synthesis of information from multiple sources and viewpoints. [CTL] includes authentic assessment, which is derived from multiple sources, ongoing, and blended with instruction [Erickson & Berns (1999) www.BGSU.edu/organizations/ctl/navigation/resource.html]

A common denominator of the varied research on CTL-related areas is that education should build on experience and contexts—such as workplaces, communities, and prior knowledge and experiences—that are familiar to learners. Medrich, Calderon, and Hoachlander (2002) in their review of key research on CTL found that CTL affects three aspects of schooling: curriculum reform strategies, teaching or instructional practices, and supporting organizational structures. CTL as a curriculum strategy emphasizes concrete applications of abstract ideas using contexts that have meaning and can engage students, creating opportunities for students to experience these applications first hand, and even organizing an entire program of studies around a profession or theme. CTL as instructional reform affects how a curriculum is delivered and supplements traditional teaching methods by allowing students to design and carry out projects, engage in hands-on learning, and learn from complex problem solving involving cross-disciplinary knowledge and skills. Medrich et al (2002) identify the following

strategies as those typically used in CTL: collaborative and cooperative learning, curriculum integration or interdisciplinary teaching, service learning, project-based learning, problem-based learning, and work-based learning. Each of these teaching approaches has its own literature and research base that supports the use of these methods for engaging and motivating students to learn. Supportive structures for CTL include strategies such as small learning communities within schools and career academies to facilitate the adoption of CTL instructional approaches. Research shows that smaller schools tend to use more of the CTL strategies identified above (Cotton, 2001).

Research on Use of CTL by Novice Teachers

In September 2001, the U.S. Department of Education approved an 18-month extension of the CTL project at UGA; that is, through March 30 of 2003. The purpose of this research was to better understand the applications of CTL strategies in actual teaching contexts and how this might affect teaching and learning. This research was congruent with one of the goals of the original preservice CTL project: to ensure that graduates of the CTL model preservice teacher education model are able to develop and use authentic and contextual teaching and learning activities in school settings.

The study identified eight novice teachers (student teachers or first-year, full-time teachers) who had participated in UGA's CTL teacher education model. Research was designed to examine which CTL concepts and practices beginning teachers used with their students to (a) enrich subject matter, (b) engage students in learning, and (c) increase student mastery of subject matter. By examining actual teacher behaviors in the context of school classrooms, we have been able to deepen our understanding of the

transfer of CTL knowledge from university teacher preparation to the real world of teaching practice in public middle and high schools.

This study primarily adhered to qualitative, descriptive, case study approaches and utilized field-based ethnographic methods of data collection, analysis, and reporting. It focused on the following research questions:

- How does the teaching practice of CTL-trained novice teachers differ from more traditional approaches of teaching the subject matter?
- Which CTL strategies do CTL-trained novice teachers use in classroom teaching contexts?
- What are the facilitators and barriers to implementation of various CTL strategies in actual classroom practice in school settings?
- What effect does use of CTL strategies have on selected measures of student achievement such as student engagement and mastery of subject matter content?

Case Study Methodology

This section identifies the (a) methods used to collect, analyze, and report the primary data used in the case study research; (b) methods used to collect information and prepare reports on two additional sources of data about the novice teachers: a community of practitioners approach with the eight novice teachers comprising the sample for this study, and surveys and interviews with middle and high school students enrolled in CTL-focused classes taught by the novice teacher; and (c) assumptions and limitations of the research reported herein.

Sample Selection

The pool of possible candidates for this study consisted of current or former students who had participated in a sufficient number of courses and activities in the preservice teacher education program at UGA to be grounded in CTL concepts and strategies, had graduated from UGA, and had full-time teaching positions. Initial review of student participation records from the CTL model indicated that, due to the timing of this study, many of the students who completed the core CTL courses had not yet completed their student teaching or other degree requirements and graduated from UGA. We made the decision to operationalize the definition of novice teacher to include practicum (student) teaching as well as full-time employment in the schools. The eight current or former students around whom we conducted a case study had each completed two or more CTL core courses and subject specific curriculum and methods courses that included instruction in CTL strategies, either graduated from UGA or were in their senior year, and were either student teaching or holding a teaching job during spring semester 2002. Three who completed practice teaching spring semester were subsequently employed as full-time teachers during the fall 2002 semester. Each of the eight was contacted, the requirements of the study explained to him or her, and a consent form obtained. An application was filed and approved by the University Institutional Review Board for Human Subjects Research.

The following is a very brief description of the eight novice teachers; all names are pseudonyms:

- Cindy — Full-time teacher, first year, high school, female, taught 9-12th grade family and consumer sciences spring '02 and fall '02 semesters

- David — Full-time teacher, first year, high school, male, taught 9-12th grade technology education spring '02 and fall '02 semesters
- Julia — Substitute teacher, middle/high school, female, taught science education spring '02 semester; full-time middle school science teacher fall '02 semester
- Lynn — Student teacher, high school, female, taught 12th grade mathematics, spring semester '02, completed graduate degree fall semester '02, full-time math teacher spring '03
- Nancy — Student teacher, high school, female, taught 10-12th grade biology, science, spring '02 semester; intern with Center for Disease Control, curriculum development fall '02 semester
- Rhonda — Student teacher, high school, female, taught 9-10th grade mathematics spring '02 semester; full-time teacher, high school math, fall '02 semester
- Sarah — Full-time teacher, first year, middle school, female, taught 7th grade life science spring '02 and fall '02 semesters
- Susan — Student teacher, high school, female, taught 9-12th grade marketing spring '02 semester; worked in business fall '02 semester

Faculty Researchers

UGA faculty members who served as the researchers for this case study project were all participants in the original CTL preservice teacher education project at UGA. Their experience with the development of the preservice CTL model and their understanding of CTL theoretical concepts and instructional strategies was an important qualification for their participation in this research. All had participated in the faculty professional development components of the 1998 – 2001 CTL project at UGA, and all had implemented CTL strategies in courses they taught at the university. The faculty case study researchers consisted of the following individuals:

- Dr. Jonathon Arnold, Professor, Department of Genetics, College of Arts and Sciences
- Dr. Shawn Glynn, Professor, Department of Educational Psychology, School of Professional Studies, College of Education

- Dr. Elizabeth Pate, Associate Professor, Middle School Program in the Department of Elementary Education, School of Teacher Education, College of Education
- Dr. John Scott, Associate Professor, Department of Occupational Studies, School of Leadership and Lifelong Learning, College of Education
- Dr. Bettye Smith, Associate Professor, Department of Occupational Studies, School of Leadership and Lifelong Learning, College of Education
- Dr. Wanda Stitt-Gohdes, Professor, Department of Occupational Studies, School of Leadership and Lifelong Learning, College of Education
- Dr. Catherine Teare-Ketter, Academic Professional, School of Marine Programs, College of Arts and Sciences
- Dr. Deborah Tippins, Professor, Departments of Science Education and Elementary Education, School of Teacher Education, College of Education
- Dr. Heide Wiegel, Academic Professional, Department of Mathematics Education, School of Teacher Education, College of Education

Each of the researchers was assigned to one of the novice teachers, with the exception of Drs. Arnold and Teare-Ketter who worked as a team with their assigned novice teacher.

Additional faculty participants included Dr. John Schell, Associate Professor, Department of Occupational Studies, who conducted the Community of Practitioners seminars and Website discussions with novice teachers and Dr. Nancy Knapp, Associate Professor, Department of Educational Psychology, who conducted student focus group and survey research for the project. Both of these faculty members had been actively involved with the CTL preservice teacher development project at UGA in the past three years. Dr. Schell headed the faculty group that developed the CTL theoretical framework for the project, developed and taught several courses in the CTL model including one on situated cognition, and wrote the final conceptual framework for CTL in preservice teacher education that emerged from three years of work with the UGA project. In this

continuation project, he developed and led the community of practitioners seminar for the novice teachers that met during the two semesters of case study research. Dr. Knapp taught several CTL sections of the educational psychology course required for preservice education in the CTL model, collected data on student and faculty perceptions of CTL throughout the project, and contributed to our early thinking about defining CTL and integrating it into teaching strategies at UGA and in the schools. In this project, she designed and conducted the survey and focus group research on student impressions of teaching strategies used by their novice teacher and how it affected their educational experience in the CTL-focused class compared to other classes in the same content areas.

Research Training

Because of the diverse discipline background and varied research experience and academic training of the faculty research team, a required one-day intensive training workshop in qualitative research and case study methodology was conducted for the group prior to the initiation of field data collection. This workshop was conducted by nationally known case study researcher and author, Dr. Sharan Merriam, Professor in the Department of Adult Education in the College of Education at UGA. Dr. Merriam authored the definitive textbook on case study research in education, *Qualitative Research and Case Study Applications in Education*, San Francisco: Jossey-Bass Publishers, which was used by the faculty researchers as a guide for their work on this project. The workshop covered the design and uses of qualitative and case study research, data collection methods, observations and field notes, documents, interviewing, data analysis, and issues of validity and reliability in qualitative research.

Midway through the study, after the research team had gathered sufficient field information for initial analysis, a second workshop was held for the team by Dr. Merriam to demonstrate appropriate analysis and reporting of qualitative field data. Actual transcript or interview data were used to identify tentative findings in each of the case studies. In addition to this workshop, faculty researchers met several times as a group to discuss their field work, share their preliminary findings, identify common emergent categories for analysis, and discuss preparation of the final case study report. Quality control in reporting research findings was achieved by having a recent doctoral graduate in qualitative studies, the principal investigator, and project manager review and provide feedback to faculty researchers on their drafts and final case study reports.

Data Collection

Information about CTL teaching practices of the novice teachers was collected through the following methods: (a) on-site classroom observations of teacher and student activities in schools of the participating novice teachers, (b) individual and group interviews and discussions with novice teachers about their views and use of CTL strategies in teaching, (c) review of samples of instructional materials or activities developed and used by the novice teachers, and (d) review of samples of student work in classes of novice teachers using CTL strategies. Other sources of information included structured discussions of CTL applications by participating novice teachers in “community of practitioners” seminar series and Internet-based chat-room, conducted by a UGA faculty member from the CTL project. Surveys and focus group discussions also were conducted with students from classes of participating novice teachers to gather data on student perceptions of CTL strategies.

Data collection began in spring semester 2002. Each novice teacher was visited several times in the school, and individual interview sessions were conducted by UGA faculty researchers either at the schools or other locations. Student and teacher-prepared materials were reviewed. An initial draft report of the field-based findings was prepared by each faculty researcher at the end of the first semester of study (i.e., June, 2002). On-site school visits were continued in fall semester 2002 to gather additional information about teaching and learning and artifacts for the final case study report due at the end of the fall semester (i.e., December, 2002). Some follow-up interviews and further review of data and artifacts continued in January, draft reports were prepared in February, and final case study reports were completed by March 30, 2003. A copy of each of the complete case studies is included as Appendix A.

Data Analysis and Reporting

Data collection and analysis is actually a simultaneous activity in qualitative research, an interactive process that occurs throughout data gathering. Data analysis is the process of making sense of the data. It involves consolidating and interpreting what the researcher has seen, heard, and read. Merriam (2001) points out that “unlike experimental designs in which validity and reliability are accounted for before the investigation, rigor in a qualitative research derives from the researcher’s presence, the nature of the interaction between researcher and participants, the triangulation of data, the interpretation of perceptions, and rich, thick description” (p.151). Methods of analysis used by qualitative researchers include narrative analysis, phenomenological analysis, constant comparative method, content analysis, and analytic induction.

Case study researchers in this project constructed categories by comparing and grouping units of information based on common meaning and contributions to overall understanding. To insure that data in the reports would address the research questions in this study and allow cross-case analysis of findings, the researchers agreed to begin with common categories that captured the overall focus of this research: teaching differences (CTL vs. traditional methods), CTL strategies used, facilitators and barriers to CTL uses, student engagement, and student mastery. Within these overall categories, the emerging data analysis by each researcher led to more specific categories that were unique to each of the case studies.

Each faculty researcher brought his or her own experience and perspective to this study, and this is reflected in the diverse ways that information is organized and presented in each case study report. There is no standard format for reporting case study data; researchers must convey their “coming to know the case” (Stake, 1995, p.127) to their audience in a convincing narrative way. We have tried to avoid forcing each case study in this research project to fit a standard format, so that the richness of the author’s own view of his or her novice teacher and CTL can be conveyed in the report.

Cross-Case Analysis

Once the case studies were completed and reviewed, the project staff began a process of cross-case analysis. Each case was read and reread by a team consisting of the (a) principal investigator, (b) project manager, and (c) a specialist in qualitative methodology and recent doctoral graduate from the UGA College of Education. As reported by Merriam (2001), citing Yin and Miles and Huberman, when conducting cross-case analysis, “The researcher attempts to ‘build a general explanation that fits each

of the individual cases, even though the cases will vary in their details” (p. 195). The researcher attempts to see processes and outcomes that occur across many cases (in this case, eight), to view them in context and thus qualify them by local conditions, and then “develop more sophisticated descriptions and more powerful explanations” (p. 195). Data tables were developed, and data clustered into themes and categories that seemed to emanate from the data and seemed to make sense to this research team. The researchers collaborated often on the data and eventually reached consensus on the themes that emerged and data that supported those themes across the eight cases. The complete report of the cross case analysis is attached as Appendix B.

Other Sources of Data

In addition to the eight case studies of novice teachers resulting from field data gathered in school settings and the cross-case analysis, two other sources of data provided information on the research questions for this study. Dr. John Schell organized and facilitated a community of practitioners group, consisting of the eight novice teachers in this study, to provide a support structure and professional resources and development to these teachers. Periodic seminars, a website, electronic bulletin board, listserv, and personal visits with teachers at their home schools by Dr. Schell comprised the major support structures. Seminars provided an opportunity for the novice teachers to discuss their efforts to use CTL strategies, barriers encountered, and successes achieved and to learn from guest speakers on CTL applications in teaching. The novice teachers also learned from each other in the seminars through sharing samples of CTL instructional lessons they had developed and used in their classes. Contextual-based field experiences were conducted to provide additional CTL resources and illustrations for use by novice

teachers in their classes. Electronic resources including a Web-CT Internet site and bulletin board facilitated sharing of information and experiences of the novice teachers throughout the study and provided them with additional resources and sources of information. Dr. Schell's report is included as Appendix C.

A final, important source of data was the student information collected and analyzed by Dr. Nancy Knapp during this study. Dr. Knapp developed a course evaluation survey of student impressions (perceptions) that was administered to students in target classes by five novice teacher participants who were working as regular teachers during the study. In addition, Dr. Knapp conducted focus group interviews with those students in each target class who turned in parental consent forms to participate in the research.

The survey and interview instruments were pilot tested during spring 2002 with two novice teachers with full-time teaching positions, revised, and administered to fall semester CTL focused classes taught by five novice teachers. The survey included 18 Likert-scaled questions from the UGA CTL theoretical framework used previously to evaluate CTL core courses in the preservice teacher education curriculum. More than 80% of students completed surveys in all but one of the classes taught by the novice teachers. Students were asked to compare their current class to other classes they had taken in the same subject to identify whether students perceived CTL principles in use to a greater degree than in other classes, and whether they found the class to be more interesting and effective for learning than other classes in the same content area.

One or two focus group interviews were held with students in each class taught by a full-time novice teacher. Interviews were confidential, held at the school outside of

class time, and used semi-structured questions to avoid unduly influencing student discussion of the most important aspects of their classes. Data were analyzed and sorted to identify student-provided evidence of the extent to which 11 key CTL principles were characteristic of teaching and learning in their classes taught by novice teachers. Dr. Knapp's report including survey data, cross-class findings, and group interview data is attached as Appendix D.

Assumptions and Limitations

Qualitative research is intended to deepen our understanding of processes and phenomena in real life contexts. Case study research is descriptive, interpretive, field based, holistic, naturalistic, and inductive (Merriam, 2001). It addresses questions of how or why, rather than focusing on outcomes and causality (i.e., if this, then that). Findings from this study can help us to better understand how novice teachers who have been prepared to use CTL in their teaching actually transfer this knowledge to their classrooms and students during student teaching or in their first full-time jobs as teachers. It gives us an in-depth and extended (two semesters) look at how CTL is being used in classroom situations by these eight teachers and provides rich detail and examples of what CTL looks like in practice. However, it should be stressed that our findings are limited to these eight cases and any generalization of findings beyond the novice teachers in this study should be done with caution. In our cross-case analysis, we were able to reach conclusions by using analysis of repeated themes in the field data across the eight case studies and then triangulate case study data with surveys and focus group discussions with students in some classes taught by the novice teachers.

Another limitation of this study is the fact that the observations and interviews by faculty researchers provide only a partial picture of the teaching-learning process used by the novice teacher. While repeated visits to the school did occur, teaching that took place when the researcher was not present was not reported. School visits were a sampling of typical teacher and student behaviors, supplemented by discussions with teachers and review of instructional materials. However, unique circumstances occurring in the school during an observation visit (e.g., testing, school wide events) may have given a non-typical view of the learning process.

In addition, some of the field data gathering occurred during student teaching semesters, when the novice teachers were limited by the expectations and structure of this learning experience, lacked authority and responsibility for ongoing classroom instructional materials and delivery, and worked with a supervising teacher who made decisions about the class and the role of the novice teacher within it. All of these factors influenced the range of instructional options that could be exercised by novice teachers, and provided a more restrictive setting than might be the case for regular full-time teachers. Therefore, generalizing these findings to more experienced teachers should also be done with caution.

Finally, we acknowledge the complexities inherent in this qualitative study of novice teachers and the inability (due to the methodology used) to control for a whole host of factors that might influence a novice teacher's use of CTL in his or her first attempt at "real" teaching in a "real" public school classroom. We know from our previous work with developing a CTL-focus in preservice teacher education (including classes from the College of Arts and Sciences) at the University of Georgia that CTL

strategies fit somewhere on a continuum which might range from very minor student engagement in the subject to complete immersion (i.e., learning in nonschool contexts or “in the field,” so to speak) with real-world practice and application. We also know that many factors affect the decision by K-12 teachers about which strategies to use, including but not limited to, their own comfort level with subject matter and its applications, the nature of the students they are teaching, and the environment in which they teach. In fact, we found this to be very true in this study. For example, student populations differed by age, socioeconomic status, minority status, ability level, and experience in and motivation toward class content and this greatly affected the teacher’s choice of strategies. The diversity in content being taught and in student census actually provided much of the context for the description of CTL strategies used in the various case studies and the description of findings from the student survey and focus groups. This was a “naturalistic study” which has helped us understand the complexities inherent in teaching students to use nontraditional (i.e., CTL) strategies and their actual use of them in real classrooms, but we were unable to “design” the study to control for a whole host of factors that might have affected the implementation of more and complex CTL strategies in classrooms.

Summary of Findings

The complete reports prepared for this study of implementation of contextual teaching and learning in classrooms by novice teachers are appended to this final, summary report. They include:

Appendix A

Case study of Cindy, a High School Family and Consumer Science Novice Teacher, Researcher: Bettye Smith

Case Study of David, a High School Technology Education Novice Teacher,
Researcher: John Scott

Case Study of Julie, a Middle School Science Novice Teacher
Researchers: Deborah Tippins and Chessa B. Knight

Case Study of Lynn, a High School Mathematics Novice Teacher
Researcher: Heide Wiegel

Case Study of Nancy, a High School Science Novice Teacher
Researcher: Jonathan Arnold and Catherine Teare-Ketter

Case Study of Rhonda, a High School Mathematics Novice Teacher
Researcher: Elizabeth Pate

Case Study of Sarah, a Middle School Science Novice Teacher
Researchers: Shawn Glynn and Anna Scott

Case Study of Susan, a High School Marketing Novice Teacher
Researcher: Wanda Stitt-Gohdes

Appendix B

Cross Case Analysis, Researchers: Richard Lynch and Scarlette Spears Studdard

Appendix C

Report on the Community of Practitioners, John Schell

Appendix D

Student Perceptions of Classes Taught by CTL Novice Teachers, Researcher:

Nancy Knapp

Research data resulting from several sources in this study, including the eight case studies of novice teachers, the cross-case analysis, the community of practitioners seminars, and the surveys and focus group discussions with students of novice teachers, has provided a wealth of information to inform our understanding of CTL and its uses in schools. Key findings are summarized in this section, using the four research questions that guided this study. Table 1 is a synthesis of the data, followed by a discussion of the

findings for each research questions. Next, Table 2 introduces a discussion of other findings not integral to the four research questions, but informative about novice teacher implementation of CTL. Finally, some discussion and analysis is provided.

Table 1. Summary Analysis of Novice Teacher Implementation of Contextual Teaching and Learning by Research Questions

1. How does the teaching practice of CTL-trained novice teachers differ from more traditional approaches to teaching the subject matter?

- Very different, movement from passive reliance on textbooks, lectures, rote memorization, notetaking, drill and questioning, individual student work, and tests of recall to much more project- and problem-oriented teaching, real-world contexts as sources of knowledge, authentic assessment (portfolios), student presentations, teacher mentoring and coaching, caring and nurturing environment, cultural relevance, learning community, use of community and workplaces as sources of knowledge, and student ownership of learning
- Noise, Active - lots of involvement, interactive, fast-paced; students and teachers move around and work together; classroom environment so structured to facilitate movement and group work; students say its fun, imaginative, easier to learn, and that they learn more
- Students and teachers offer assistance - community of learners, teams, coaching and mentoring by teacher, peer teaching
- More student oriented and focused (as opposed to teacher directed and centered); considers diversity, “sub” populations, and equality; teacher knows students well, respects them and meets individual needs
- Multidisciplinary – content “across the disciplines” emphasized

2. Which CTL strategies do CTL-trained novice teachers use in classroom teaching contexts? Strategies that were seen more commonly:

- Repertoire of hands-on activities and strategies – concept maps, games, simulations, “mirroring the work of scientists and scholars,” experiments
- Student collaborations – group or team work, “partners study,” brainstorming, reciprocal teaching, multiple sources of authority, peer tutoring, think-pair-share
- Community involvement – speakers, surveys, field trips, “doing it” (i.e., real science), community service, case studies, employment connections
- Real-world connections – tests on alcohol, blood, water pollution, disease control, bacteria in school, statistical control, probability, business plan, design a rocket, build a boat, community case studies, sports analysis, build a roller coaster, plant a school garden, and more...
- Problem-based learning – real-world problem solving
- Project-based learning – creative, collaborative, interdisciplinary, sustaining
- Self-directed and inquiry learning – with projects, experiments, division of labor, figuring it out, and “what if” scenarios
- Meaningful assessment – portfolios, rubrics, journals and notebooks, external validation, data analysis, reflection papers, oral presentations, teamwork, some student selection

- Technology-assisted instruction – networks, problems on www, info search, creative designs, on-line support, calculators, videos, design/testing computer software, accessing materials from a variety of sources

3. What are the facilitators and barriers to implementation of various CTL strategies in actual classroom practice in school settings?

Facilitators

- Teacher’s philosophy – believes it is the best way to teach and students to learn
- Positive response from students – engaged, motivated, excited
- Time (block schedule)
- Support from supervising teacher, principal, peers, mentor, university; encouragement to teach to higher levels of learning; funding; good textbook and resources
- Technology
- Good training from the University – CTL focus, internships, community experiences, role modeling

Barriers

- Subject matter, especially in math and science – harder to think of context and be creative; pressure to “cover material” and stick to the book
- Time and hassle - poor time management, 55 minute classes, takes time to develop and prepare students, paperwork in arranging [some] CTL activities
- Lack of support from supervising teacher, principal, peers; may include lack of funds for additional activities and equipment; “crises” exist in some schools
- Student apathy/lack of preparation (e.g., in math and thus impediment to curriculum integration)
- State curriculum, textbook, and testing requirements – “stay up with the other teachers,” “keep moving,” “more chapters to be covered,” “teaching the book” “this is on the test,” “real-world problems in book are stupid,” “same day, same page” mandate, “boring”
- Classroom management – teacher perceives loss of control, especially with tremendous student diversity in classes
- Parents – lack of involvement, pressure to prepare for tests

4. What effect does use of CTL strategies have on student engagement and mastery of subject matter content (i.e., selected measures of student achievement)?

- Students stay on task, are more attentive, are more interested, more cooperative, and better behaved
- Better recall of material (better assessment scores, better grades)
- Students are more motivated, excited, “connected,” and say they learn more
- Higher levels of learning process skills – formulating hypotheses, remembering, drawing inferences, generalizing, seeing relationships
- Metacognition – making sense out of content, reflection, self assessment

1. How does the teaching practice of CTL-trained novice teachers differ from more traditional approaches to teaching the subject matter?
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Based on the data presented in the case studies, the cross case analysis, and student survey and focus groups, it is clear that the teaching practices of CTL-trained novice teachers do differ from more traditional approaches. In fact, practices appeared to be very different in most of the cases studied.

In traditional schools and classrooms, teaching strategies reflect the teacher as authority, dispenser of knowledge, and primary source of wisdom and experience. The curriculum is a standard one, focused on the content to be taught, and the curriculum guide usually spells out what is to be taught on what days and often includes the questions to be asked of students, vocabulary words, and any problems to be solved (i.e., in math). Students are rather passive, involved in note taking, listening to the lecture by the teacher, perhaps engaged in some drill and questioning by the teacher, spending time working quietly at an individual seat, and frequently taking written quizzes and tests sprinkled throughout the lessons.

We found, with our CTL-trained novice teachers, very active classrooms with students working together, constant teacher and student interaction—both with the large and smaller groups, considerable noise, much application to real-world contexts, use of both problem- and project-based learning, use of portfolios replete with various and authentic assessments, a caring community, and so much more. Instruction tended to build on knowledge and prior experience from a multidisciplinary perspective, that is, applications and assignments were observed to be drawn from math, writing, communications, physics, and technology subjects. Students and teachers offered

assistance to each other, and the environment was structured to facilitate movement and use of team and small group work.

It was clear from all of the data that these CTL-trained novice teachers valued a learning community where students and the teacher work together to learn. Students and teacher moved freely about the classroom, asked questions, and worked together to better understand the material. Additionally, CTL-trained novice teachers appeared to give students more freedom in the classroom. As both observers and the public school students themselves noted, students in the CTL-trained novice teachers' classes were clearly more self-directed, more engaged in the learning process, and more tuned in to the subject matter than those in more traditional classrooms. The classroom atmosphere (e.g., conversations, discussions, directions) was centered on learning, and the teachers seemed to understand well the needs of their students, as learners and as individuals.

Student survey data indicated, too, that the classes taught by these novice teachers were considerably different than those taught by other teachers in the same content areas. On all but three of the 18 survey questions, students rated these classes as embodying CTL principles to a greater degree (*more than average*) than most classes in the same content area. On the other three questions, the range was *about average*. Particularly strong ratings were in CTL principles identified with active engagement, student collaboration, real-world connections, use of knowledge to help society, adaptive teaching (i.e., to individual student needs), problem solving, self direction, and facilitating a caring community. In addition, students clearly and consistently rated these classes as more interesting, and they felt they had learned more in these classes than in most classes in the same content areas.

2. Which CTL strategies do CTL-trained novice teachers use in classroom teaching contexts?

The CTL-trained novice teachers in this study used a variety of strategies. Overall, the most commonly used strategies across all eight cases were: hands-on activities, collaborative learning, problem- and project-based learning, real-world applications, authentic assessment, and technology integration. Table 1, Research Question 2, summarizes the CTL strategies used and provides some detail on the specifics as provided by the teachers and through review of their curriculum and lesson plans and student work at the schools.

The strategies differed somewhat depending on the teaching content. Teachers in elective subject courses tended to use all strategies typically identified with CTL and to contextualize most of their units. Teaching lessons and strategies reflected applications in workplaces, knowledge drawn from use of practices in today's workplaces (e.g., technical information, team work, learning-by-doing, group problem solving, use of rubrics in assessment, technology, etc), and principles of work-based learning. Teachers of elective courses all used field trips, community-based activities, guest speakers, extensive projects, community case studies, and other off-site environs as sources of learning and applications.

Teachers in the core academic areas, science and math, struggled at times for ways to contextualize the material. They did use some hands-on activities such as games, simulations, experiments and real-world connections (e.g., blood testing, statistical control problems, growing a school garden); in-school lab experiments; and technology.

Teachers in core academic areas tended to use more school-based strategies (e.g., problem solving, inquiry learning, portfolio assessment) and many of these were similar to those in the elective areas, but they tended to rely much more on lecture, note taking, quizzes on facts and textbook content, and teacher-directed instruction.

3. What are the facilitators and barriers to implementation of various CTL strategies in actual classroom practice in school settings?

In Table 1, Research Question 3, facilitators and barriers are summarized. It was interesting to note that all of these CTL-trained teachers felt that CTL was (a) the best way to teach and (b) comprised the best cumulative set of strategies to help students to learn and to learn more. They also noted—and the student survey and focus group data supported—that students became engaged, motivated, and excited (most of the time) when CTL strategies were used. Other facilitators most commonly found were: support from administration and colleagues, block schedules (90-minute class periods), positive student response, technology, and good training from the university that included internships, community-based experiences, and good role modeling. Financial support for field trips, materials, and technology was also deemed important.

There were several factors that were barriers to CTL implementation. The universal barrier was time—time to plan, develop, implement, and evaluate CTL strategies; time to prepare the students and then guide or manage them through implementation; time to execute, especially within 55-minute class periods; and the time associated with the hassle, such as paperwork, to take field trips, use guest speakers, and even take the students “outside.” A second, rather large and often emotional barrier was lack of support for their efforts. Just as support was deemed important to facilitate implementation of CTL, it is a barrier when it is withheld. Thus a lack of support from

administrators, peer teachers in the schools, parents, the students themselves (apathetic, unmotivated, uncooperative, can't behave in off-campus sites, etc.) all frustrated CTL implementation for some of the novice teachers. Further, all of the pressure and perceptions—real or not—that surround the “same day, same page” clamor for uniformity in curriculum and instruction, high stakes testing, stick to the textbook, and this-will-be-on-the-test mentality of teaching was offered as a strong barrier by the novice teachers of core academic subjects. One or two seemed intimidated by it all and by the resulting “crisis” atmosphere in their schools.

Classroom management was another problem with which the novice teachers struggled as they attempted to implement CTL. This included a wide range of comments about students including: apathetic, wannabe drop-outs, poorly prepared, get too noisy, lousy attitude, can't behave when off-campus, and don't understand English. Classroom management is always a concern for new teachers and the novice teachers in this study were no different. Interesting though, and on the issue of classroom management, researcher observation and student perception data from the surveys and focus groups contrasted with the self-perception of a number of novice teachers who felt they were struggling with control issues in the classroom. Students described their CTL novice teachers as highly effective classroom managers and caring teachers. Evidence from the students indicates that these teachers had developed classroom management techniques that enabled them to simultaneously control and motivate students to behave appropriately. Data confirmed that these teachers used effective teaching strategies that actively engaged students and enabled them to do real-world problem solving, while adapting to individual student needs and interests. In these CTL-focused classrooms,

students said they experienced little of the boredom and frustration that often leads to classroom misbehavior. The researchers who observed in the classrooms also almost unanimously commented on the student interest and engagement when CTL strategies were being used and noted that (nearly) all students seemed to be learning.

4. What effect does use of CTL strategies have on selected measures of student achievement such as student engagement and mastery of subject matter content?
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Student achievement, mastery, and engagement were also topics of interest in this study. The novice teachers all reported that CTL strategies had a positive impact on student engagement and mastery. The novice teachers believed that students gained a better understanding of the material and retained the material longer when CTL strategies were employed. Additionally, the novice teachers reported that students were more engaged, motivated, and attentive when CTL practices were in use.

The novice teachers perceived that their students achieved better due to the contextual teaching and learning strategies. They reported that more students performed better on tests, projects, written assignments, experiments, and other measures of achievement, especially when more authentic assessments such as oral presentations, rubrics, and portfolios were utilized. Novice teacher reports and field data indicated that students recalled information readily and could apply diverse information to complete various problems and projects. Student engagement also increased with the implementation of CTL strategies. Students became more excited about the content, stayed on task, increased their motivation to get involved (e.g., with experiments, real-world projects), and just showed more interest in the work of the class. One novice teacher noted that attendance (e.g., possibly due to group projects) increased with use of CTL strategies.

Of particular interest was the novice teachers' self reports and the observers' comments about the higher levels of learning that seemed to take place when teachers were using CTL strategies. The projects and lab work were set up to encourage and coach students to formulate hypotheses, draw inferences, experiment, reflect, self assess, generalize, see relationships, make sense of it all, try again, and transfer the knowledge and its uses to the real world. Researchers, novice teachers, and the students themselves all described strategies typically associated with constructivism, metacognition, and—well—CTL when attempting to describe what was occurring in their classrooms.

As noted with Research Question 1, student survey data indicated that classes taught by CTL novice teachers embodied CTL principles to a greater degree than most classes in the same content areas. Students in the classes taught by full-time novice teachers also clearly and consistently rated these classes as more interesting, and felt strongly that they had learned more in these classes than in other classes from the same content area. Specifically, 94 percent of the student respondents said they learned *more than the average* amount from CTL-focused classes than they did from others from the same content area. The mean for the survey questionnaire item 'Compared to other classes you have taken in this subject, how much do you think you learned in this class?' was the highest of all responses, 4.12 on a scale of 1 (not much at all) to 5 (a lot). Students said in the focus groups that their novice teacher cared about their learning, supported them in their efforts to learn, and communicated strong expectations for their success. Students also provided many examples of how the CTL approach engaged them in the learning process and increased their interest in what was being taught. This triangulation of the data among teacher perceptions, student perceptions, and field

researcher observations provides very strong validation of the impact of CTL strategies on student learning. We believe this to be particularly striking since these classes were taught by inexperienced first-year teachers.

Other Findings

In addition to data and information to inform the four research questions that framed this ethnographic study of novice teachers and their implementation of contextual teaching and learning in public school classrooms, we found other interesting findings. Table 2 provides a summary of findings that we felt were readily triangulated by the various sources of data used in this study.

Table 2. Other Findings about Novice Teacher Implementation of Contextual Teaching and Learning

CTL was applied very differently in elective courses than in academics; probably due to both the “nature” of career and technical courses (e.g., explicitly hands-on), pressure to teach to tests and follow curriculum strictly in academic courses, and administrative pressure in academics to increase standardized test scores

CTL strategies are very important to minority cultures – Hispanics, African Americans – tying subject back to home country and community contexts and including projects of relevance to their culture (chef training, dog breeding, blood typing, disease control, statistical relevance); the focus on individual needs of students a strength; consideration of diversity-in a broad sense-valued

Opportunities (e.g., work-based and service-learning) were often missed by novice teachers to use contextual applications, particularly in executing day-to-day lessons

Community-based experiences were limited – may be due to costs, security issues, administrative reluctance to approve, and perceived hassle

CTL approach provides transferability and opportunity in other employment; for example, two novice teachers left for similar, but more lucrative, jobs – one in business (training) and one at Center for Disease Control (curriculum development for science); several others acquired summer internships or employment related to their teaching field

These novice teachers performed at a much higher level than might be expected for a typical first-year or student teacher as evidenced by surveys of and interviews with their former students; researchers reporting them as more confident, good classroom managers, student focused, and definitely “not boring”; seemed to know when “not to cross the line” with student-teacher interactions; observers noted strong student respect, engagement, and cooperation with teacher.

Perhaps the most obvious “other” finding, but verified through data in response to Research Question 2, is that CTL played out somewhat differently in academic and elective (i.e., career and technical) courses. The elective teachers used CTL strategies, and especially those that were immersed in workplaces and communities, more frequently than did those who taught math and science. CTL strategies appeared to be the norm, rather than the exception, in elective classes. They were utilized each and every

day: hands-on, projects, applications to varying contexts, academic and real-world connections, group work, and so on. The academic teachers also used CTL strategies, but less frequently and sometimes reluctantly. They felt pressure to be sure they drilled on vocabulary, covered questions that might be on the test (i.e., high stakes state tests), and kept up with the curriculum. CTL strategies were sometimes viewed as detracting from _ not contributing to _ the mastery of content that might be tested on state tests.

But, it was also noted by the researchers that novice teachers often missed opportunities to use contextual teaching applications that would strengthen mastery of the content and make it more interesting to students. Many examples were provided where teaching math and science content could have been strengthened with applications or discussion of how it is used in workplaces, community activities, and in solving problems typically encountered by citizens each and every day. Related, community- and work-based learning experiences and applications observed in this study were very limited. Nearly all of the teachers said they wanted to use more of them, but were discouraged from doing so because of costs, security issues, reluctance to take some of their students into the community, and administrative hassles.

Interesting to us was the support of CTL strategies from minority populations, notably African American and Hispanic students. Responsiveness to the broad spectrum of diversity—whether it be related to different cultures, races, learning styles, socioeconomic groups, or other factors—through varying teaching strategies was noted by researchers and students as a great strength of these novice teachers.

Finally, it seemed clear from all of the data that these eight novice teachers were performing at levels well above the usual expectations for first-year teachers. Their effort,

work, and results were well regarded by their peers and school administrators, research observers, and students. They were definitely identified as a “cut above the rest” in their confidence, ability to manage their classes, teach their students well, and advance the science and art of effective teaching. It is also noted that two of them, at the time of this report, were working in organizations that employed them, in part, because of their knowledge of and experience with contextual teaching and learning. Several others were also hired or employed as interns during the summer in jobs related to their content areas; e.g., writing health-related lessons for science classes, doing water testing for a research lab, and working at a magazine related to the food and garden industry.

Discussion and Analysis

Based on all evidence in this study, contextual teaching and learning techniques enabled the CTL novice teachers to manage, motivate, and ultimately teach students effectively. The findings across the eight case studies strongly indicate that the novice teachers did implement CTL strategies in their teaching practices. All tailored the strategies to meet the needs of their students and the demands of their discipline. All found facilitators and barriers to the implementation process. While the eight novice teachers implemented CTL strategies in unique ways, all data indicated that CTL strategies enhanced student engagement and metacognition and thus improved student achievement and content mastery.

This summary conclusion, based on findings from this study, is supported by a body of evidence that (a) when students are actively engaged in working on real issues, they are more motivated to master content and (b) that in classrooms responsive to personal interests of students, academically uninterested students become more motivated

(Covington, 1992; Newman, Wehlage, & Lamborn, 1992). Research on project-based learning shows that students remember information longer and are more likely to apply knowledge appropriately (Norman & Schmidt, 1992; Allen, Duch, & Groh, 1996). Medrich's (2002) review of research on student engagement found that "individuals who are interested in particular activities or topics pay closer attention, persist for longer periods of time, learn more, and enjoy their involvement to a greater degree than individuals without such interest" (p.14).

The summary conclusion is also supported, in this research on CTL practices of novice teachers, by the responses to surveys and focus group interviews of the students of the novice teachers. The data from students indicate that classes taught by these novice teachers were considerably different than those taught by other teachers in that they embodied CTL principles to a greater degree than most classes in the same content area. Further, students from all classes perceived these novice teachers as caring deeply about them and their learning. Examples of effective caring, the kind that supports students in their efforts to learn and also communicates to them strong expectations for their success, abounded in the student descriptions of their CTL classrooms and teachers. The highest ranked item on the student survey was the students' self assessment that they had learned *a lot more* from this teacher when compared to others in the same content area. In addition, students clearly and consistently rated these classes as more interesting and more engaging.

An unexpected result from the qualitative data was that high school and middle school students (i.e., through focus groups) described these novice teachers as highly effective classroom managers who use strategies to simultaneously teach, control, and

motivate students to behave appropriately. This finding did not seem to be *just* because the teachers were young and new; but because they were using strategies to engage students in learning, adapting instruction to diverse student learners, enabling students to do real-world and critical problem solving, and forging a community of learners in the classroom. In these CTL-focused classrooms, students seem to experience little of the boredom and frustration that often leads to most classroom misbehavior.

There were other interesting points that came to light during the course of this study. For instance, the differences noted between these CTL-focused classrooms and a more traditional classroom had a strong connection with the teachers' philosophy of teaching and learning. The fact that the teachers gave the students responsibility and freedom in the classroom spoke volumes about their belief in their students and demonstrated how a community of learners functions. The teacher was a key component, but not the central component in the classroom. The strategies implemented were a reflection of teacher beliefs, subject matter, and teacher comfort and confidence level. Teachers in a more supportive environment tended to implement more CTL strategies. Teachers who were less comfortable with their ability, their situation (i.e., the atmosphere in their school), or had less confidence in their students tended to utilize fewer CTL strategies. Teacher beliefs about CTL were central to implementation as well. Teachers who had a harder time contextualizing the subject matter often resorted to more traditional methods to convey the subject matter.

Barriers and facilitators provided interesting insight into the day-to-day implementation of various strategies and were often at opposite ends of the same spectrum. For example, a common barrier was lack of classroom time for those who

taught 55-minute classes. Conversely, several of the novice teachers mentioned block schedules with ~90 minute classes as an asset to CTL implementation. Likewise, the support of colleagues and the financial support provided by the schools could be either beneficial to CTL implementation or a serious constraint. Although barriers and facilitators varied by teacher based on school setting and subjects taught, some commonalities emerged from the overall data. Student response was important to implementation. Apathetic and uninterested students were a concern for teachers. And sufficient time to develop and deliver new strategies as well as the support received for this effort seemed most important in how the novice teachers viewed the effectiveness of their implementation efforts. These factors, whether positive or negative, deserve serious consideration when attempting to implement CTL strategies.

The entire arena that surrounds public school accountability and student standardized testing surfaced and, indeed, was cited by researchers and novice teachers as an impediment to implementation of contextual teaching and learning—at least in the core academic subjects of math and science. Findings from this study certainly add to the national debates over the value of assessing student learning through a single score, machine graded, standardized, high-stakes state-competency test. The novice teachers, researchers, and students in this study all commented on the teacher-directed “grill and drill” teaching style and student memorization that are perceived to prepare students better to pass the state tests. Students called that style of teaching “boring” and uninteresting. Novice teachers trained in the use of CTL strategies didn’t want to use much of it, but felt pressured by their peers in the same content area to “cover” all of the topics and constrained by their own concerns that the students, indeed, pass the test.

Researchers noted that educational reform laws virtually require teachers to adhere to a standardized curriculum and to drill students on the facts and concepts that, in all likelihood, will appear on the state standardized test. Much of this teaching philosophy and style that is associated with standardization, one-size-fits-all _ certainly as played out to the extreme _ is incongruent with the essential theories and researched practices that underpin CTL.

Each of the novice teachers in this study had a positive view of CTL. All implemented CTL principles and strategies to the best of their ability. However, their implementation of CTL strategies varied. It appears that the value of CTL may depend on the subject matter and a related relative frequency of use of specific strategies. For example, the elective courses, such as those in technology education and family and consumer sciences, lent themselves to contextual approaches. Hands-on and real-world activities were common, and students could clearly see how these courses would be useful in the future. Science and math, where content is more abstract, were more difficult to contextualize and thus CTL strategies were used less frequently. The novice teachers in these areas struggled to find ways to make the material more applicable to students' lives. Because of the struggle to contextualize, teachers in these more academic areas tended to utilize fewer CTL strategies.

It also appears that the novice teachers in this study missed opportunities to incorporate CTL approaches into their practices. Few examples of work-based or service learning were observed. These types of learning could provide a clear context for learning, and yet they were not utilized extensively by these novice teachers. It may be that as the novice teachers become more accustomed and comfortable in their role as

teachers and simply have more experience with their communities, they will utilize even more CTL approaches. School administrative factors also may have limited the implementation of certain CTL approaches which require student time away from school, additional financial support, and significant additional teacher time to initiate and execute, particularly activities such as work-based or service learning.

It was also interesting to note that although not every novice teacher chose to immediately pursue a career in education, all pointed out the positive aspects of CTL. Additionally, those who did pursue careers outside of education indicated that CTL approaches are very transferable. For example, one who has chosen a career as a marketing representative stated, “It is very hands-on and I’ve already been asked to assist in training other reps, where I find CTL strategies to be effective.” Even though her career had taken her out of the classroom, she continued to find CTL approaches to be beneficial to learning in varied settings.

As gleaned through all of the data collected not only during this phase but through the nearly five years of our work on contextual teaching and learning, we have come to conclude that teaching, indeed, involves great complexity. Just in our work alone, we found great debate and disagreement related to: (a) varying teaching philosophies espoused; (b) the complex interrelationships between standards, curriculum, instructional strategies, and assessment; (c) multiple education reform initiatives, laws, and policy mandates to maneuver; (d) how best to respond to the tremendous diversity of students; (e) the lack of engagement by some parents and communities in education; (f) political rhetoric about the poor state of education generally, and the lack of faith in youth—much of which doesn’t make sense from an informed perspective; and much more.

We continue to believe—and believe we found evidence—that CTL principles are grounded in solid theory and research on cognition and effective teaching practices. Our findings, and those of others, provide encouragement to continue our examination of the dynamics of CTL in promoting improved teaching and learning. As novice teachers move into more expert use of the tools of their profession and gain confidence and control of their instructional environment, we expect that the opportunities to implement CTL strategies will increase and the variety of applications by teachers also will grow. Addressing barriers and facilitators identified in this study can create a more supportive school environment for use of CTL as well.

We need to continue to document and understand the way that CTL supports student achievement in areas of learning that are beyond recall of content assessed by standardized examinations. Evidence from our case study and survey research in this arena is promising and warrants further study. Both students and their teachers believed they were learning, understanding, and retaining material taught in CTL-focused classes. The students were excited, engaged, and said they learned more through use of CTL strategies. Consistent with the evidence of other research cited earlier, our case study research indicated that when students are actively engaged in working on real issues, they are more motivated to master academic content. Researchers have known for years that there is little mental development without the interest and engagement of the learner, which is the prerequisite for attention and comprehension of the knowledge we are seeking to impart. Our observations of the uses of CTL strategies by novice teachers in this study lead us to believe that (a) engagement and motivation of students was increased, (b) student attitudes toward learning were improved, (c) behavior was

improved, and (d) resulting interactive effects will result in deeper understanding, retention, and application of knowledge and information. These are important outcomes of education that contribute to improved student achievement. Further study of this critical connection between instructional strategies and student achievement is warranted.

References

- Allen, D.E., Duch, B.J., & Groh, S.E. (1996). The power of problem-based learning in teaching introductory science courses. *New Directions for Teaching and Learning*, 68, 43-52.
- Brown, A.L., & Campione, J.C. (1994). Guided discovery in a community of learners. In K. McGilly (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice*. Cambridge, MA: MIT Press.
- Caine, R.N., & Caine, G. (1991). *Making connections: Teaching and the human brain*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Cotton, K. (2001, December). *New small learning communities: Findings from recent literature*. Northwest Regional Educational Laboratory.
- Covington, M.V. (1992). *Making the grade: A self-worth perspective on motivation and school reform*. New York: Cambridge University Press.
- Dewey, J. (1916). *Democracy and education*. Carbondale and Edwardsville: Southern Illinois University.
- Erickson, P., & Berns, R. (1999). Bowling Green State University: Retrieved from <http://www.bgsu.edu/ctl>.
- Hughes, K.L., Bailey, T.R., & Mechur, M.J., (2001). *School-to-Work: Making a difference in education. A research report to America*. Columbia Univ., New York, NY. Institute on Education and the Economy. Available: <http://www.tc.columbia.edu/~iee/Public.htm> [July 9, 2002].
- Johnson, E.B. (2002). *Contextual Teaching and Learning*. Thousand Oaks, CA: Corwin Press, Inc.
- Kincheloe, J.L., Slattery, P., & Steinberg, S.R. (2000). *Contextualizing Teaching*. New York: Longman, Inc.
- Medrich, E., Calderon, S., & Hoachlander, G. (2002). Contextual teaching and learning strategies in high schools: Developing a vision for support and evaluation. Unpublished document.
- National Research Council (2000). *How people learn*. Washington, DC: National Academy Press.
- Newmann, F.M., Wehlage, G.G., & Lamborn, S. (1992). The significance and sources of student engagement. In Newmann, F.M. (Ed.), *Student engagement and achievement in American school*. New York: Teachers College Press.

Norman, G.R. and Schmidt, H.G. (1992). The psychological basis of problem based learning: A review of the evidence. *Academic Medicine*, 67(9), 557-65.

Resnick, L.B. (1987). *Education and learning to think*. Washington, DC. National Academy Press.

Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Cambridge: Harvard University Press.

Whitehead, A.N., (1929/1967). The aims of education. In *The aims of education and other essays* (pp. 1-14). New York: Free Press.