

# Implementing Contextual Teaching and Learning: Middle and High School Student Perceptions of Classes Taught by CTL Novice Teachers

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**Abstract**

In Fall 2002, students' perceptions of their learning experiences in classes taught by five of the novice teachers participating in the contextual teaching and learning (CTL) study were accessed in two ways. First, each teacher administered a course evaluation survey in a target class, asking students to compare that class on 11 CTL-related dimensions to other classes they had taken in the same subject area. Second, a subset of students from each target class (generally those with parental permission) were interviewed to capture their descriptions of classroom procedures and activities and what they felt they had learned in the class. These interviews were then analyzed for evidence of the overall pervasiveness of the same 11 CTL principles in the class. One difference in the two data collection methods is that the surveys asked students to compare, for example, a science class to other science classes they had taken. In contrast, the interviews were used to evaluate CTL use independent of subject area or earlier experiences.

Although the classes had varying strengths and weaknesses, data from student course evaluation surveys across all classes reveals an impressive record. On all but three of the survey questions, students rated these classes as embodying CTL principles to a greater degree than most classes in the same content areas. In addition, students clearly and consistently rated these classes as more interesting, and they felt strongly that they had learned more in these classes than in most classes in the same content areas. This record is all the more remarkable when one considers that these classes were all taught by novice teachers. At a stage when most novice teachers feel lucky simply to survive, these teachers were able to both engage their students' interest and significantly facilitate their learning.

Students from all classes also perceived their teachers as caring deeply about them and their learning. Each teacher received above average ratings on this quality on student surveys, and examples of effective teacher caring, the kind that supports students in their efforts to learn and also communicates to them strong expectations for their success, abound in the student descriptions of these classrooms. Unlike the case for so many novice teachers, this caring has not come at the expense of discipline. One of the unexpected results to emerge from the qualitative data is that students also describe these teachers as highly effective classroom managers who have developed classroom management techniques that enable them to simultaneously control and motivate students to behave appropriately. Their mastery in this area is not incidental to the subject of this study, nor is it simply because they are "good teachers." Data from student surveys show that, as compared to others in their content areas, these teachers are particularly strong in their abilities to actively engage students in learning, adapt instruction to diverse students' needs and interests, enable students to do real world, critical problem-solving, and create a caring community of learners in the classroom. In focus group interviews, students described active learning as either a major part of or pervasive within in all but one of the target classes. Adaptive teaching and critical problem-solving were described as significant or pervasive features of all the target classes. These key features of contextual teaching and learning are also identified as key needs in recent educational policy discussions, such as those around the federal No Child Left Behind act. When students are given the opportunity to do contextual teaching and learning--that is, to actively engage in critical thinking around real life problems in a collaborative, inclusive classroom community--they want to learn, and they can learn. In such classrooms, students experience little of the boredom and frustration that leads to most classroom misbehavior. Contextual teaching and learning techniques enabled these novice teachers to manage, to motivate, and ultimately to teach their students.

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**Purpose**

Student feedback is an important source of information on the nature and effectiveness of teaching practice. In studying a model for teaching practice which is intentionally student-centered, as is contextual teaching and learning (CTL), students' perceptions of their learning experiences in the classroom become especially significant data.

In Fall, 2002, five of the teachers participating in the University of Georgia's CTL novice teacher study were working as regular teachers in their own classrooms. Student perceptions of their learning experiences in a target class taught by each of these teachers were accessed in two ways. Teacher participants administered a course evaluation survey to all students in target classes, as part of their regular self-evaluation of teaching practice. In addition, focus group interviews were conducted with all students in each target class who turned in consent forms reflecting personal and parental consent to be interviewed.

This document reports the results of the course evaluation surveys and the qualitative analysis of the focus interview data. Following a brief section on methodology, a portrait is drawn of each teacher's target class, as perceived by his or her students, including the strengths and weaknesses of that class in relation to core principles of contextual teaching and learning that have been used throughout the University of Georgia CTL project (see Figure 1). A cross-class discussion follows, which includes additional findings not directly related to the CTL principles. Finally, conclusions and questions for further research are addressed.

**Methodology**

The survey and interview instruments were piloted during Spring, 2002, with two of the participating novice teachers who already had full time, regular teaching jobs. As a result, both instruments and administration procedures were slightly revised so as to ensure maximum

effectiveness in the Fall data collection. This report describes data and findings from instruments used in the final data collection.

### ***Student Course Evaluation Survey***

The survey given consisted of two open-ended questions and 18 Likert-scaled questions based on core principles of contextual teaching and learning (see Figure 1) that were adapted from the original CTL project framework (1998-2001). These adapted principles were used successfully to analyze student learning in the first CTL class attended in 1999 by many of the participants in this novice teacher study when they were just starting their pre-service teacher education program (see [www.coe.uga.edu/ctl](http://www.coe.uga.edu/ctl)). All of the CTL principles were addressed in at least one survey question; several were addressed in two questions, one stated positively and one stated negatively. This was done to avoid the development of a biased response pattern on the part of students. Two final Likert-type questions addressed students' responses to the class as a whole. To avoid transfer errors, students circled their responses directly on the survey sheets and answers were later tallied by hand. The two-open-ended questions were intended to capture any additional student perceptions of the class. A copy of the survey is attached as Figure 2.

Students in each teacher's target class completed these surveys on a voluntary, anonymous basis and returned them to the teacher, who gave them to project personnel for analysis. Classes were of different sizes, but more than 80% of students completed surveys in all but one of the classes. Table 1 shows frequencies of each response for each Likert-type question in each class, with response means for each question in each class and across all classes. All questions asked students to compare their current class to other classes they had taken in the same subject, using a 1-5 scale, where (1) = Not much at all, (2) = Only a little, (3) = About average, (4) = More than average, and (5) = A lot! Thus, for most questions, (1) is the least favorable answer, while (5) is the most favorable. Questions 7, 10, 12, & 14 were worded negatively, so that for those questions, response frequencies were reversed, so that (1) is consistently the least favorable response, while (5) is the most favorable.

In appraising these data, it is important to remember that students were asked to compare their current class *with other classes they had taken in the same content area*. Thus, their ratings do not represent a comparison to school classes across the curriculum, nor do they represent how the class might be perceived in relation to a criterion-based measure. For example, a rating of (4) (More than average) in response to Question 3 (Compared to other classes you have taken in this subject, how much time did you spend in this class working or discussing with other students?) in a math class would indicate that the student perceived himself or herself as collaborating with other students more than he or she had in other math classes, but this still might not be a large proportion of class time, given the individualistic nature of most math classes. The same answer in relation to a class in family and consumer sciences (FCS, formerly known as home economics) might reflect a far greater proportion of class time spent working with other students, while a student might answer (3) (About average) to the same question in the FCS class even though they worked in student groups most of the class time, because student group activities were the norm in the student's previous FCS classes. Thus, means across the target classes cannot be directly compared because different content areas may lend themselves more or less easily to the implementation of various aspects of contextual teaching and learning.

### ***Research Questions***

The questions of interest in this analysis are:

- 1) *Did students perceived the target classes as embodying CTL principles to a greater degree than most classes in the same content area; in other words, were novice teachers who had participated in the CTL project enabled to use contextual teaching and learning in these classes more than might be the norm in their general content area?*
- 2) *Did students therefore perceive these classes to be more interesting and more effective for their learning than typical classes in the same content area?*

### ***Focus group interviews***

One or two focus group interviews were conducted for each class, depending on school schedule constraints and how many students had returned signed parental permission slips for

each class. These interviews were all conducted by the same researcher at the students' school, but not in the target classroom or in the presence of the teacher. Students were assured of the confidentiality of their responses. The interviews were semi-structured and deliberately conversational in nature, following the students' lead in the order and depth to which various questions were addressed to allow students to emphasize what they perceived as important aspects of the class and to avoid influencing or restricting their reports through a rigid question protocol. A copy of this semi-structured interview protocol is attached as Figure 3. All interviews were audiotaped and transcribed, and transcriptions were subsequently analyzed by the author using HyperQual III (Padilla, 1991), a HyperCard-based program for analyzing qualitative data.

Initial categories for the analysis were based on 11 CTL principles at UGA (see Figure 1), with the addition of categories for students' descriptions of general classroom processes, themselves, and their classroom peers and a category for general attitudinal expressions of like or dislike for the class or teacher. During iterative analysis of the sort described in Bogdan and Bicklin (1992), the following themes emerged as additional categories: specific comparisons between this teacher/class and others in the students' experiences; evidence of class or teacher effectiveness in promoting learning; relationship between class content and local, state, or federal standards; displays or descriptions of teacher content knowledge; and comments related to classroom management. Data that spoke to more than one category were sorted into all appropriate categories; thus, the categories were deliberately not mutually exclusive, and there were no forced choices during the sorting. All data that addressed each category were included in it, whether the data spoke positively or negatively to the theme of the category.

After sorting was completed, and following another review of the data in each category and the entire transcript of each class focus group, data in the 11 categories based on the CTL principles were assessed for each teacher, and rated as fitting into one of the following four classifications:

*None* - Students describe no evidence of this characteristic in this class

*Minor* - Students describe only minor or occasional evidence of this characteristic in this class.

*Some* - Students describe one or two major projects or occurrences evidencing this characteristic but do not describe it as typical of this class OR this is characteristic of one regular feature of the class but not of the class overall.

*Pervasive* - Students' descriptions indicate that this characteristic is pervasive in this class.

A summary of these ratings appears in Table 2, while Figure 4 gives illustrative examples of data summaries that fell into each rating classification for the category "Meaningful Assessment."

In appraising these results, it is important to remember that focus groups were composed of a self-selected group of students, since only some students in each class returned the required permission forms. Also, although every effort was made to invite students to address all the CTL principles during the interviews, time was necessarily limited. Therefore, these ratings should be interpreted as minimal ratings for these classes, indicating that the relevant CTL principle was evidenced "at least this much" in students' descriptions of the class. In particular, a rating of "None" or "Minor" should be interpreted cautiously; focus group students may simply not have mentioned significant elements of the class that would have evidenced a particular principle more clearly.

Unlike the responses on the student course evaluation surveys, these qualitative ratings from focus group interviews are criterion-referenced. They do not compare each class to other more typical classes in the content area. Another difference between these two forms of ratings is that these qualitative ratings, while based on students' perceptions of the classes as they described them, are not directly reflective of students' judgments of those perceptions, as were the survey responses. Rather, they reflect the author's characterizations of these classes on the 11 CTL dimensions after listening to and reading students' descriptions of class activities and conditions. Thus, reasonable triangulation can be expected between these two ways of summarizing and rating class characteristics, as it would be odd indeed if students rated a course

as offering "above average" opportunities for student collaboration, but then described no collaborative activities during the focus group interview. However, direct correlations between these two ratings should not necessarily be expected, due to differences in their data sources and analyses.

A final caution: all of the data presented in this report must be interpreted in the contexts of the specific target classes. Class differences that may be attributable to content area focus have already been discussed above. But student populations in each class also differed importantly by age, socioeconomic status, minority status, ability level, and experience in and motivation toward class content. Not only would we expect seventh graders in a required, general-level life science course to describe and respond to instruction based in contextual teaching and learning principles differently from high school juniors and seniors in an elective engineering course with three prerequisites, but we would also rightly expect their teachers to use different forms and degrees of CTL-based instructional strategies with these different student populations. All of these limitations highlight the need to avoid using these data to compare or rank these teachers. Rather, these data can speak richly to the strengths of each class, the potential benefits of and issues surrounding the use of CTL-based strategies in various content area classes by novice teachers, the areas where future efforts supporting the implementation of CTL principles might best be focused, and the questions that arise for future research in this area.

### **Findings from the Five Classes**

#### *Sarah's seventh-grade Life Sciences class*

##### ***Students***

Although all seventh-graders in this middle school were required to take Life Sciences, Sarah told me that this was her "gifted" class, so they sometimes "got to do more" than the other classes. The school is located in a small city in Northern Georgia and serves a diverse population from the city and surrounding rural areas. Seventh-grade teams this year were tracked, with all the "low" students assigned to a different team which had smaller than average classes and used specialized instructional techniques. The "average and above average" students assigned to

Sarah's team were not officially grouped for science, but scheduling constraints resulted in all of the advanced math students being placed in this science class.

The principal requested that the course evaluation surveys be completed by only those students who had returned permission forms to participate in the focus group interviews, so only 15 of the students in this class completed surveys. Two focus group interviews were held, the first with eight girls and the second with four girls and three boys. Most of these students were Caucasian, although several were African American and one boy seemed to be of Asian or Indian ethnicity.

### *Class processes*

Students said that once or twice a week, "if the overhead is out, it probably means we are going to take notes." "She'll have everything like an outline written out on the overhead, then she'll go through it and have like specific points and we just copy it, what we feel [we need]."

But

she makes it fun, . . . like, we're talking about budding and stuff, and she'll go into certain things that have happened lately . . . like red tides. She was explaining [what] causes red tides, and how it [makes a] seafood shortage and what happens to the beaches.

They said that twice Sarah did not do the chapter notes herself, but "she divided us into groups and assigned each a section of the chapter. We'd read it and know the information really well, and then we'd [tell] about it . . . [and] that's where she would get our tests, from our notes." She had promised to do this again soon. On days they are not taking notes, they might be answering questions on a textbook chapter or "doing vocabulary." There are usually "about 30" vocabulary words to learn for each chapter. They learn them by writing out the definitions (found in the textbook glossary) and then doing worksheets or "word finds or crosswords" using the words. Tests require that they either "fill in the blanks," write the words next to their definitions, or write the full definitions after the words, although "sometimes she gives half credit for writing part of it."

The students described three "labs" they had done this semester. Their least favorite was one in which they had to classify "50 objects in the room . . . to understand classification more." In another lab activity, they made up, drew, and wrote about their "own" imaginary invertebrates that "could survive in the salt marshes." One student said hers was "half ant and half octopus," while another's was "half squid and half butterfly." But their favorite lab to date involved taking swabs in different areas of the school, including water fountains, lockers, and the boys' and girls' bathrooms. They grew bacterial cultures from these swabs, and vividly recalled how "disgusting" they were, with one that looked "like chex mix," and another a "type of broccoli," while from "the boy's bathroom there was this big jello blob." Several students said that they washed their hands much more frequently in school after doing that lab. But students also agreed that the labs were not a major part of the class.

### ***Strengths***

Students' responses to Questions 4 ( $m = 3.14$ ) and 12 ( $m = 3.47$ ) on the course evaluation surveys indicated that this class helped them connect science content to issues in the real world content somewhat better than most of their previous science classes. The focus groups specifically described some activities with this emphasis, including the "red tide" discussion and the "bacteria" lab mentioned above. On the surveys, students also indicated that Sarah cared more than the average science teacher about their learning (Q13,  $m = 3.67$ ). Focus group participants confirmed this general impression, saying

Like the first few days I was scared to death. She came across strict, but once you get to know her, and as long as you're not being completely terrible, she's a really good teacher. . . . She gives you [credit for] efforts. Say like you bomb a test, she'll let you go back and correct it. She'll explain and let you ask questions. Sometimes she'll give partial credit, sometimes not, but she always makes sure we know.

Overall, students rated this class as somewhat more interesting (Q17,  $m = 3.47$ ) than previous science classes, and clearly felt they had learned more in it (Q18,  $m = 4.00$ ).

## ***Weaknesses***

Although focus group students described some class activities and features related to some of the CTL principles, no principle was seen as pervasively expressed in this classroom. In fact, both the student survey results and the focus group comments suggested that this 7<sup>th</sup> grade life science class embodied CTL principles least of all of the five classes studied. On the surveys, students indicated there were fewer than average opportunities for group work or collaboration (Q3,  $m = 2.71$ ) and particularly little chance for self-direction or choice in their work (Q11,  $m = 2.07$ ). Focus group comments corroborated these findings. The only two group activities mentioned were the group work generating chapter notes and the "bacteria lab" described above, and even in the bacteria lab, students were told which areas in the school to swab; they were not encouraged to come up with their own ideas about possible bacteria-laden sites. Students' choices in this class seemed to be limited to whether they would copy all or just some of the notes from the overhead and which "imaginary invertebrate" they would design. Finally, in both their survey responses and focus group comments, students indicated that the class required a great deal of rote memorization of facts and definitions (Q10, adj.  $m = 1.20$ ). Students in one focus group listed the following advice for students taking Sarah's class next year: "Get ready for a different science class." "Bring packs of paper; three packs is not enough." "Be prepared for quizzes." "Don't talk, and learn your vocabulary really good." Students in both focus groups agreed they would like to do "more labs," "less worksheets," and "less bookwork."

### ***David's Manufacturing and Engineering III class***

#### ***Students***

This was a small elective class for high school juniors and seniors, most of whom had taken three prerequisite courses, Drafting and Engineering I and II. The high school serves a diverse, urban/suburban, student population in northern metro Atlanta. The one African American and four Caucasian students in the focus group were all male, as were all the students in the class. Although the high school serves a substantial population of limited English speaking students, none of these were in this class, according to the focus group participants. They

characterized the students in this class as "good," mainly students who "know what we want to do" and "have goals." Three of the focus group students planned to be engineers, a fourth wanted to be an architect, and the fifth did not indicate a career goal.

### *Class processes*

Students described this class as focused around a series of projects that required them to learn and apply principles of engineering and manufacturing in realistic contexts. For each project, first there would be an introductory session or two, where David

has PowerPoint, and he says, "This is what's happening." He'll give us specifications for the project we're doing, and the time limit, and like why we're doing what we're doing, and background info and all, and how it's used in real life.

And then we usually get a sheet, just like a job, but it's fun."

Then student teams work together to accomplish each project, which can take from "two to three days up to three weeks" to complete. Following completion, each team typically prepares a Power Point presentation for the rest of the class, showing "how we came up with our design, our problems, what everyone did to help. The problems we faced, the tools we used."

Students described two projects in detail: designing and building a boat to compete with engineering students at neighboring schools in a sort of technical regatta, and designing a prototype gumball machine and mass-producing five copies within 30 minutes. Here is an excerpt from the focus group interview in which students are describing the gumball machine project:

*Student:* We just built a gumball machine, and that lasted a long time, because that was a major project.

*Student:* We built a prototype, and then built five like it.

*Student:* We had to have drawings, and then we cut out all of the wood, and we had to figure out how to put it all together, and make sure it worked. . . .

*Interviewer:* Did all the gumballs come out?

*Student:* Yes.

*Student:* All but one. You had to shake it.

*Interviewer:* Why are you building gumball machines? What does that do for you?

*Student:* It teaches about manufacturing.

*Student:* Assembly line. We had to figure out the quickest way to put it all together and the best way.

*Interviewer:* Was the time factor tough?

*Student:* Yes.

*Student:* A lot harder than we thought.

*Interviewer:* Is there different ways you design it because you had to build a lot of them?

*Student:* Our original design was way too hard.

*Student:* We had to cut off all the fancy stuff on the bottom.

*Student:* It took longer to get all the parts ready than it did to build it. To draw the [plans] and get everything cut. . . .

*Student:* We had one day for a pilot run; we could prepare everything.

*Interviewer:* So, because of the time limit, you had to cut out a lot of the stuff?

*Student:* Yeah, we had to move from glue to screws, and that messed some things up. The glue took too long to dry.

### ***Strengths***

On the course evaluation surveys, students rated David's class above the average technical class on all questions. Likewise, qualitative data from the focus group interview showed almost all the CTL principles as pervasive in this class. Obviously, this class had many strengths from the viewpoint of contextual teaching and learning. On the survey, students gave the class particularly high ratings in the use of multiple contexts for learning (Q2,  $m = 4.27$ ), emphasis on connections to real world experiences (Q4,  $m = 4.27$  and Q12, adj.  $m = 4.33$ ), and learning that went beyond memorizing towards understanding and working with real problems (Q15,  $m =$

4.44). All of these qualities are demonstrated in the "gum ball" excerpt above. In the following discussion of the "boat" project, these characteristics are again evident, and one can also see the students' excitement. Well after its completion, the students are still actively wrestling with the problems they faced in the project, still developing new ideas and solutions. This project clearly sparked the kind of learning that becomes self-sustaining and life-long.

*Interviewer:* What were the requirements for the boat?

*Student:* It couldn't be over eight feet long, and it had to hold at least one person, no motors or anything, and it had to go and turn around and come back. Nothing can be pre-manufactured; you had to produce it all yourself, from scratch, basically.

*Student:* Some people use the...it's like plastic cardboard.

*Student:* It's not good for boats.

*Student:* Ours was made out of wood.

*Student:* Some people made theirs out of metal, but they lost. It wasn't that good. It would sink. A little heavy, not good hydrodynamics.

*Student:* There were some cool designs, though.

*Student:* Ours was pretty good. We had a whole process to building one of those. We had to bend the wood. It was probably a three-week project.

*Student:* We drew it up on AutoCad first, and came up with ideas, and did the whole problem-solving process.

*Interviewer:* Did David say, "OK, here's different things people use for boats."?

*Student:* He showed us pictures, and the basic designs, and all of that, but basically he was like, "Make a boat, under these specifications, and go!" I liked that because it let us do whatever we want. . . .

*Student:* The boat that beat us, their dad was a boat maker.

*Student:* It looked like a real boat, a little fishing boat. They showed pictures of them in the process of making it, and they were like welding it together, and

having rivets and stuff, and we were just like...they didn't even get first, they got second. They probably spent \$200 to \$400, and we spent like \$80. . . .

*Interviewer:* Did you have to finance it yourself? (They nod.) That makes a difference. So which boat won?

*Student:* We got third. . . . We sank. That was the only reason we lost; we had them.

*Student:* We started taking on water.

*Interviewer:* I was going to ask you how you sealed the seams on the boat.

*Student:* We used caulk that turned out to be not waterproof.

*Student:* It wasn't that bad until we were paddling. A lot of it was coming back over the side. It was good. I took it down the Chattahoochee about 3 times.

*Student:* You would keep a cup with you, and about every 5 minutes you'd scoop up what's in the bottom and throw it out.

*Student:* When you think about it, you could have used a metal sheet from Home Depot.

Students also rated David as caring much more than the average technical teacher about their learning (Q13,  $m = 4.44$ ). In the focus group interview, they described how he would encourage reluctant students to learn, saying, "Well, this is what you need to have, if you want to go to college. You want to do things with your life; well, here's what I'm trying to show you." One student explained how the goal of a college education is emphasized even in the room décor:

You should see in the class, there's different schools-- you cannot come to class and not look at that college board that has all the colleges on there--license plates, and little tags, a whole bunch of schools in Georgia, and different states, like Florida. It just shows that he's putting education first.

Students respond to this emphasis, even those who come into his classes without strong educational goals. One student explained how

A lot of people have electives, and they don't want to take band, or stage craft, so they just come to [David's] class, and then they learn something. I've talked to a lot of people, and they're like, "Yeah, I want to go to college for this. I want to go to college for engineering. I want to be an architect."

On the final two questions of the survey, students rated this class as "a lot" more interesting than most technical classes (Q17,  $m = 4.67$ ), and indicated they had learned "more than average" in it (Q18,  $m = 4.33$ ). One student in the focus group summed the class up by saying

We get to design it, and we get to build it, and cut everything out, and make sure it works, and it gives us free will. You know how some projects, it's like, "Make a poster of this person." So you're limited, whereas here, he's like, "Make this go."

There's not much that holds us back; we get to use our imagination.

and another added, "I love projects; it gets your mind rolling!"

### ***Weaknesses***

Though there is no doubt room for improvement in some areas, students did not identify any particular weaknesses in this class in either their survey responses or focus group comments. The only CTL principle not judged to be pervasive in the class was the principle of social responsibility. Though students spoke frequently about the importance of being responsible on the job and "making something" of their lives, they did not speak specifically about doing things to benefit the larger society.

### ***Julia's seventh-grade Life Sciences class***

#### ***Students***

Julia's class was a regular-level, required seventh-grade Life Sciences class in a middle school in that serves a primarily low-SES, minority student population in a small city in central north Georgia. Only six students in the class returned their interview permission forms, so only one focus group interview was conducted. These students were all girls, and all but one were African Americans; Julia characterized them as "average students, but hard-workers." Sometimes

the students' dialect was difficult to understand and transcribe, but none of the focus group participants was limited English speaking.

### *Class processes*

Students described covering many of the same topics as were covered in Sarah's class, but they did not seem to take notes off the overhead as often, and class was enlivened by more discussions and alternatives like "hands-on" activities, slide shows, movies, and songs. Students described how, in most classes

You take notes on the overhead. They don't let you do nothing that's fun; all you do is work, work, work. In Julia's class, she'll give you time to catch up on your work, and let you conversate as long as you're quiet. . . . She makes hands-on projects, stuff like that. The other teachers, you got to read out of the book, copy off the board, take notes everyday . . . . Most of her class didn't understand about bacteria and stuff, so we did a research project with another class. We got grouped up, and we learned how bacteria and viruses connected."

Another student agreed, saying

She does stuff like let you talk about stuff. Like other teachers say stuff like 'shut your mouths'; she let you talk about what you have to say, then she say what she has to say. . . . She has slide shows [with] directions and stuff. She shows more pictures and stuff; it's easier to understand."

One student talked about how, "Julia, she'll make up like a song or round or something that make it fun, so it make you remember, like you might have a test. She makes sure that we learn stuff," while another gave the example of "'King Phil came over for great spaghetti' . . . that be, 'Kingdom, phylum, class, order, genus, species.'" Students also enjoyed watching videos, "mostly science videos." To prepare for tests, Julia often had students,

. . . write 4 or 5 or 15 facts under a certain section and then answer the questions.  
. . . When the test comes, she gives you back the facts: then you can learn, then

you be thankful about it. If the facts ain't right, she'll tell you which ones ain't right first, [so] you can study for the test.

Students reported doing much of this work in groups.

Like she'll say "two to a group," or "three to a group," or "four to a group" and you get with whoever you want, unless you and that person be acting up all the time. Sometimes she'll give you a chance even if you all do, but if you all keep on acting up, that's the only time she put you in a group.

It should be noted that the seventh grade classes at this school use a management system in which students get punches on a "ticket" for inappropriate behavior; students receiving more than a certain number of punches in a week forfeit the privilege of participating in "fun Friday" activities--hence the references to "tickets" and "taking your ticket" in students' comments.

### ***Strengths***

As can be seen from the above descriptions of class activities, Julia's class offers students the opportunity to learn in a variety of contexts and through a variety of media. Students recognized this on the class evaluation surveys, indicating that they did different activities more often than in previous science classes (Q2,  $m = 3.59$ ). They also saw Julia as more willing or able than most science teachers to adapt instruction to diverse students' needs (Q8,  $m = 3.76$ ). Focus group participants gave multiple examples of her creativity in doing this, including several cited above and the following:

If you are failing, she'll give you some extra work or give your work back and you can redo them, and she'll make copies, and when you redo them, she'll give you your grade, and your grade goes up. . . . When you tell her what you got wrong, she'll help you with it. . . . because you learn from your mistakes.

Say like you're not doing so good, she'll put you with someone else that's doing real good, like got a 100 in the class. She'll let you team up, and you be learning, I know. Sometimes you think you just copy, but you still learn; you're looking at the answers.

She uses stuff like candy that we can have fun with. She's cool, like, she makes stuff fun. She be dancing in class; she'll be laughing, and everybody will calm down. She makes up songs about what we're doing like "My class is so bad, let's learn science, oh yeah"; she'll make cheers; she makes everything fun. She be doing crazy junk.

Although focus group participants did not mention any related examples, students in the class also rated it as emphasizing ways they can contribute to the community and society more than the average science class (Q5,  $m = 3.94$ ). Finally, students in the focus group described many ways that Julia demonstrated her caring for students and their learning. One student explained that

[Julia] don't rag all the time; she don't cut you. Like if she heard you talking about, "Oh, girl, we went to the movies, and he was doing this," then she's going to take your ticket because you're off task, but if you ask for a pencil, like "Shawna, can I get a pencil?" then like the other teacher will come over, like "Give me your ticket," but [Julia] she, like, give you a warning, or, "If you need a pencil, ask me."

While another confided that

We can go to [Julia] and talk to her about something, and she will understand what's going on, but you won't want to go talk to another teacher about it. . . . Like I had got in trouble one day, and then I was fixin' to get mad. Then [Julia] . . . she let me go on back to her room and make some little cartoons to calm down. . . . She'll let you sit in the back of her room and cool down. . . Say you get in trouble seventh period, and don't have her classroom eighth period, then while you in there calming down, she'll go tell the teacher like well, "Janeice is in the back of my classroom," and then she'll bring my work over there, like "Do this." She makes sure we get our work done, she ain't going to excuse you from no work, but she's going to give you time to cool down, too, and then do your work.

On the final two survey questions, students rated both their interest (Q17,  $m = 3.94$ ) and learning (Q18,  $m = 4.00$ ) in this class as definitely greater than in the average science class.

### ***Weaknesses***

On the evaluation survey, students reported that they spent more time "just listening" in Julia's class than in the average science class (Q7, adj.  $m = 2.06$ ). This survey result seemed somewhat contradictory to the many activities and open discussions described by the focus group students. Students' survey responses also indicated that kids in this class were "mean and nastily teasing" each other somewhat more than an average amount (Q14, adj.  $m = 2.50$ ), but paradoxically indicated that students worked well together and helped each other more than average as well (Q16,  $m = 3.94$ ). Students in the focus group reinforced the latter impression, giving several examples of helpful or harmonious student interactions and none of hostile interactions. This class had no areas of weakness that were evidenced in both survey responses and focus group comments.

### ***Cindy's high school Food Fundamentals class***

#### ***Students***

Cindy taught at a high school in north metro Atlanta which served two distinct student populations: one group of middle-class, urban/suburban, though ethnically diverse, students and one group of immigrant students, many of whom were poorer and limited English speaking. This dichotomy arose in part from the inclusion of a strongly immigrant area in the school's catchment zone and in part from the school's history; until the previous year, it had been designated officially as the "ESOL school" and had served all the limited English speaking students in the district. Although this year ESOL students were supposed to attend their local schools, those who had begun at this school were allowed to continue there if they wished to do so, and many remained. Finally, this high school offered an International Baccalaureate program, which drew a somewhat different group of international and immigrant students to the school.

Cindy had students representing each of these groups in her Food Fundamentals class, which was the first in an elective cooking sequence in the Family and Consumer Sciences

department. Most of the students in her class completed the course evaluation survey, but only four students were available to participate in the focus group interview. These students included 3 girls — one African American, one Caucasian, and one Hispanic — and one boy whose family had come from India; all of them spoke standard English fluently, without any noticeable accent. Thus, in this class, the focus group was demonstrably not representative of the complete classroom population.

### *Class processes*

This high school is on a modified block schedule, which means that this class meets for 90 minutes every other day. Students described the typical class schedule as being pretty evenly divided between "days we take notes" and "labs," with quizzes and tests occurring occasionally. They said, "At the beginning of the year it was more notes, just because we have to learn the basics before we could get into the kitchen and start cooking, but after the first two months" it was more cooking.

On note-taking days, Cindy puts typed out notes "on the overhead projector, and we just copy them. We do it in sections, where we'll copy something, and [then] she'll talk about it and we'll discuss it, . . . and then we'll copy some more, and we go like that." Usually, the note-taking will not go on for a full 90-minutes, and in the remaining time Cindy might demonstrate the cooking lab for the following day, or have students complete a worksheet or answer the questions at the end of a textbook chapter. On lab days, about two out of every five, they work in self-chosen groups of four to six students to prepare and cook one or more dishes from recipes in their textbook or provided by Cindy. Before the students start the lab, Cindy "makes sure you know what you're doing, so you don't burn the recipe. . . . She gives you pointers, that she realizes classes before have messed up on, so she tells us so we know." Often different groups are told to prepare the same food in different ways, or groups might experiment with minor alterations to a recipe's ingredients or preparation instructions.

Students particularly remembered a long-term project on regional foods in the United States.

She broke the United States up into different regions. Every group she handed out packets. Some groups got the Southwest, others got the Northeast, and she said, "If you want to, two groups can trade. . . . We researched the region, different foods from that region, and we picked a food to make from that region. We made posters. We got some other recipes, just as popular foods that are eaten in that region. . . . The history was in the book, and . . . there was a menu-type thing in our book, and that's where we were to pick the recipe for what we were going to make, but the recipes that she wanted us to get to see what type of popular foods there were, we could get off the internet, or in a cookbook, or something.

They also remembered a time when Cindy

invited a restaurant owner who . . . gave food to the poor people of Atlanta, and he came in, and we made about 300 bologna sandwiches for homeless people. So, I think that was good because we interacted with the community, because when the class found out there was a real practical use, like that somebody else would benefit from me cooking or making a sandwich, something we could do whenever we want, but they don't have the option to, I think they got more spirited in their sandwich-making. You know there are always those class clowns that don't think it's cool to make a sandwich or something, but they were really into it after that. . . . It might have been the fact that the restaurant owner was encouraging everyone, [but] I think they also felt good because they were doing a good deed, and they realized it, and they don't get that chance every day.

### ***Strengths***

Students identified the real world applicability of their learning as one of the major strengths of this class, both through survey responses (Q4,  $m = 4.06$  and Q12, adj.  $m = 4.06$ ) and focus group comments. While only one student in the focus group was considering a career as a chef or caterer, all four students enjoyed the practicality of what they were learning. One student said she likes

taking my recipes home, and trying to make them for my family, because they like to cook . . . like, "[Cindy] taught me how to do that," and it's like, "Good, cook it!" Different utensils, like some of them I never knew the purpose of, it was like, "Why do we have this?" Like a broiling pan. I have one at home, we have the bottom pan and the top thing with the slits. I never knew what it was. Now I know what that is. All the stuff I get to take home, and share my knowledge with my family, cooking stuff.

Another said

I never get to cook at home, my mom is usually in charge with that, so its good to be able to experience cooking somewhere else. . . . She doesn't trust me with the oven. She's saying after this class, she'll let me try to do a couple of things.

The boy from India said, "At my house, I cook, but my grandmother taught me, and she's from India, so we I know all this Eastern stuff, but . . . Cindy, she educated me on how to cook [American foods] like muffins."

Students also appreciated the class's many opportunities for collaborative learning (Q3, m = 3.75), feeling that most students worked well together, helped each other and "learned from our mistakes" (Q16, m = 3.71). As with the other novice teachers in this study, Cindy's students also felt that she cared "more than the average" FCS teacher about their learning (Q13, m = 4.06).

As the focus group students said

She's not like any other teacher, where she's like, "Get your work done! Do this!" She talks to you. [She] interacts with us, I mean they all do, but she interacts more like on our own level. . . . She comes to you up front. Like some teachers, they have mood swings sort of, they can get very tense and evil, sort of, but I think what makes a good teacher is that she makes it fun for you to learn, but you also assimilate the knowledge. . . . I think it's good when a teacher, when you know that the teacher likes what they're doing, they're not just there to get it over with. She likes her job, I can tell, and it makes us like it more.

On the final two survey questions, students rated their both their interest (Q17,  $m = 4.18$ ) and their learning (Q18,  $m = 4.12$ ) in Ms. M's class as well above average.

### ***Weaknesses***

The only weakness students identified on the course evaluation survey for this class was a lack of different kinds of learning activities as compared to other FCS classes (Q2,  $m = 1.75$ ). This perception might be due to students' previous classes (mostly in middle school) having been more general "survey" classes, covering a variety of topics in family and consumer sciences. Students filling out this survey may therefore have lumped all "cooking" activities together as a single learning context, perhaps not realizing that the same concept could be studied in the contexts of multiple, different foods and recipes. In fact, the focus group students described exactly such a project.

When we were learning about the dry heat and moist heat methods, she went around and every group picked out of a hat what you were going to do, and each group had a different thing. Our group had baking . . . some groups had broiling, others had stir-frying, and then we all cooked chicken and broccoli. Every group had chicken and broccoli, it was just cooked by a different method. Once it was all done, every group put it on a plate and we put it on the table and compared them to each other. You could see the difference between each method. The moist heat methods, like steaming and boiling, it keeps the color more vivid. The broccoli seemed greener. The dry heat was like dryer; it wasn't as good.

Students in the focus group also expressed a feeling that the class was not sufficiently flexible in adapting to differences in students' prior knowledge of cooking or even of American kitchen appliances. As one girl said, "Half of our class is ESL, and they needed to learn the basics of what things are and what they're used for. I wish they had more of a higher class for people who already know the basics."

### *Rhonda's Honors Algebra II class*

Only freshmen and sophomores in the Honors program at the school where Rhonda taught were eligible to take her Algebra II class. This high school is located in one of the fastest growing counties just outside of Atlanta and serves a primarily middle and upper-middle class population. Sophomores taking Rhonda's class had been accelerated one year in mathematics, having taken algebra in eighth grade and geometry as freshmen. Freshmen in the class were accelerated two years, having qualified to take algebra as seventh-graders and then taking geometry in eighth.

Fourteen students in the class returned interview permission forms, so two focus groups of seven students each were interviewed, each containing both male and female students. One group included an East Indian student, and the other included a Hispanic student. All the other students interviewed were Caucasian; there were no African American students in either group.

#### *Class Processes*

This high school is on regular block scheduling, which means that classes meet daily for a semester in 90 minute blocks. Students in both focus groups said that there was a regular daily routine in this class. First students check their homework using the teacher's manual at the front of the room. "Every day one girl goes up to the board; she's like the designated homework number checker. She writes down all the numbers people need help on, and then people who got them right [volunteer to] go up to the board and write [their problems] on the board." Students then explain how they did their problems, while the other students can ask questions. After they go over the homework, they "take notes" from the overhead projector. Students first copy each section of notes silently, and then Rhonda works one or two examples on the overhead which she explains. Students who finish copying a section faster than the rest "just make comments and have a class discussion or something. It's not like we just sit around silent. . . . (laughter) sometimes it's [about] math. We'll talk, and then when everyone has had enough time to take the notes down, then the discussion will end, and she'll explain." This goes on for most of the rest of the class, and "sometimes if a few minutes are left, she'll let us start on homework, or if we have

a test or something she'll hand those back." The homework is only collected occasionally; students realize that its purpose is to prepare them for the tests. Note-taking is also optional; although most students write all the notes, one boy shared that he never takes notes, but spends his time "read[ing] Harry Potter." He thought Rhonda probably didn't mind this. "She doesn't say anything negative. . . . I think it is OK as long as I'm doing OK, and I am."

Students also recalled doing several different activities in the class this term. One was an activity on random numbers. "She read us all this cool information about phone numbers, and like we had to find the probability of having the same last 3 digits of your phone number as your best friend, and stuff like that." Another activity was done with M&Ms, to find the probability of getting a yellow M&M from a bag. "She gave us all a big pile of M&Ms, and we got to count them out, and we got to eat them." Another time, students said

We were doing conic sessions and like she was trying to make it fun, so she made each period a cookie cake, and you had to make an ellipse. So she put candles in the cake with a string, and you had to draw the ellipse with the icing, then we got to eat the cookie cake. She really tries to make it fun.

The final activity they remembered was more of a party. They had just finished learning about using the base of a logarithm, and it was midterms, so they had an "E day. We all brought in candy or I think she brought in cookies. We all had "Es" decorated on them. . . . We reviewed during it; it wasn't just a party."

Before tests, students also play "review games." Once Rhonda made "each row a team, and one by one, you have to go up to the board and whoever finishes the problem first [wins]. Another time they worked in groups of four on problems she read out, and whichever group answered correctly first got a point. "Once we went around with a partner, and she had questions and answers on the wall and that was fun. You had to do a question then go find the answer around the room."

## *Strengths*

In both their responses on the course evaluation surveys and their focus group comments, students indicated strongly that Rhonda was better than most math teachers at adapting to different students' needs (Q8,  $m = 4.08$ ). In addition to her flexibility on note-taking, students felt a good deal of freedom to ask questions during the homework reviews and lectures. They emphatically agreed that, unlike Rhonda, many other teachers "get annoyed" when students ask questions. They said that Rhonda also makes herself available to help students in the mornings before school and on regularly scheduled afternoons.

Students appreciated the clarity and depth of Rhonda's explanations and the notes she gives them. They felt that her explanations actively engaged them in learning and critical problem-solving (Q1,  $m = 3.83$  & Q15,  $m = 3.67$ ). A girl in the first focus group explained, "Rhonda is very, very good. . . . I've understood every single thing that we've learned this year. . . . Like when we learn an equation, we know why that equation is how it is." Another added, "It helps me learn better. If you know why stuff is that way, it's easier to learn." Students in the second group said similarly that, "usually when she works an example, you can understand it and why it happens."

Students survey responses indicate a high degree of comfort with both their fellow students (Q14,  $\text{adj. } m = 4.50$ ) and Rhonda (Q13,  $m = 4.42$ ). They see her as caring both for their learning and themselves as individuals. A student in the first group said, "I like Rhonda; she's really great," and the following conversation ensued:

Student: She's just so casual about it. She lets me sit at her desk because the chair's so comfortable; not too many teachers would do that. She has a person every period who sits at her desk. She gives up the desk for the whole day because we like sitting there.

Student: The thing I always like about Rhonda is she treats us more like equals. I really have a problem with teachers who are condescending and treat you like, "You're my student, I'm the authority figure; you must do what I say." Whereas

even while maintaining that effective authority she still treats us like we are people.

Student: Rhonda obviously realizes we are people, too. I don't think she has ever gotten mad in our class.

Student: That was what I was going to say. One time, like if I get in trouble, she won't give me a detention, but she'll like take me outside and that makes me feel so much worse. She's like, "You betrayed me, and I trusted you."

They also were happy that

She's not completely out to destroy our grades. . . . I've had teachers tell me they don't want anybody with an A. If you have an A, you should be in a harder class. . . . I mean, she really does understand that if we really do understand this material, we should have an A, and I really appreciate that. She really does get excited when like 15 people get A on the test. . . . That says stuff about her."

On the final two survey questions, students rated Rhonda's class as somewhat more interesting than most math classes (Q17,  $m = 3.58$ ), and students believed they had definitely learned more than in the average math class (Q18,  $m = 4.17$ ).

### ***Weaknesses***

Students did not perceive many real life connections to much of the material in the class (Q4,  $m = 2.96$  and Q12, adj.  $m = 2.83$ ). Nor did they see how their learning of this material might eventually contribute to society (Q5,  $m = 2.67$ ). They saw the extra activities more as "little fun projects." One girl said, "I probably prefer doing actual math problems and then explaining them . . . 'cause I don't really feel like a lot of the stuff connects very well. I think it's just kind of like busy work." Another agreed that, "It does seem a little superficial sometimes to do these other things, playing with M&Ms." A third partially disagreed, saying

I just think that they are fun, fun. I think that the labs are like good, and things like that, but sometimes the questions that follow just don't, [they're] weird. You've learned things already, and the questions are just kind of boring, writing random

procedures down and everything. It depends on the lab; sometimes they help and sometimes not.

One student thought Rhonda "did a good job of giving us real life examples where [she] can find it. It may not pertain to everyone's career choice," but another replied, " After hearing the real life applications, it makes it seem more ridiculous than if there were actually no applications. The applications are so absurd, like you would never do that." One student in the first group said, " I tried to do a combination the other day just to figure out my chances for doing something," but added, "I do math a lot. I'm the kind of person who enjoys doing my math homework." When directly asked, no student in the second focus group could think of any time or place they might use knowledge from the class, except maybe in "Science Fair," while they were still in school.

Finally, when asked how they would change the class if they could, students said they would prefer fewer notes and more opportunities to work out example problems, possibly with other people in the class. But they wouldn't like having to figure out how to do new types of problems themselves; they wouldn't like it if Rhonda didn't explain how to do the problems first. One student said, "I would cry," and another said

That was like our geometry teacher. . . . We used to like, you'd look over the section, and do a couple of examples she put on the overhead, and then we go through it, and I thought that was kind of a waste of time because I need things explained to me. So it was just wasting like half an hour with us just sitting there trying to do it, and really not getting anything done. I like the way [Rhonda] does it.

### **Cross-class discussion and conclusions**

Although the classes had varying strengths and weaknesses, a review of the data from student course evaluation surveys across all classes (Table 1) reveals an impressive record. On all but three of the survey questions, students rated these classes as embodying CTL principles to a greater degree than most classes in the same content areas.

In addition, students clearly and consistently rated these classes as more interesting (Q17, overall  $m = 3.97$ ), and they felt strongly that they had learned more in these classes than in most classes in the same content areas (Q18, overall  $m = 4.12$ ). Every one of these five classes was rated above average by their students on both of these vital qualities. The individual frequency totals tell an even more impressive story: out of 81 total respondents on these summary questions, only 10 rated their class as less interesting than the average class in the same content area (Q17), and only 5 felt they had learned less than the average amount for classes in the same content area (Q18). This record is all the more remarkable when one considers that these classes were all taught by novice teachers, two by second-year teachers and three by teachers teaching their very first semester in the schools. At a stage when most novice teachers feel lucky simply to survive, these teachers were able to both engage their students' interest and significantly facilitate their learning. Clearly, the research questions originally posed on p. 3 of this document can be answered with a resounding, "Yes!"

Another strong commonality that bears further discussion relates to Question 13, which asks, "Compared to other classes you have taken in this subject, how much did you feel the teacher really cared about you and your learning?" Again, students in all five classes rated their teachers as above average on this characteristic, and only 7 out of 81 students felt their teachers cared less than the average teacher in that content area. Examples of effective teacher caring, of the kind that supports students in their efforts to learn and also communicates to them strong expectations for their success, abound in the classroom portraits described earlier in this report.

Unlike the case for so many novice teachers, this caring has not come at the expense of discipline. One of the unexpected results to emerge from the qualitative data is that students also describe these teachers as highly effective classroom managers. Consider the following excerpts from focus group interviews with each of the classes in this study:

Sarah: Once you get to know her, and as long as you not being completely terrible, she's a really good teacher. . . . she always makes sure we know.

David: We're a lot more independent compared to other classes where the teacher's always telling us exactly what to do and always on us. . . . He teaches us the basics, but then he lets us go off, and I really like that. . . .most of the teachers wouldn't even let us use those tools. He let us. We have two or three days when we go in there and he teaches us, like, "This is what you're supposed to do," and safety, and by the time we're getting it, we're actually safe.

Julia: She'll be laughing, and everybody will calm down. She makes up songs about what we're doing like "My class is so bad, let's learn science, oh yeah"; she'll make cheers; she makes everything fun. She be doing crazy junk. (*Interviewer: But do you all behave for her?*) Yeh, because she's nice, we like her. . . . Like, if you gives us that, you get it back. We give her respect, and we get it back.

Cindy: I think she has control, but I think one reason why she does have control is maybe we can get along with her so well. We respect her more than a teacher who acts superior to you and puts you down and stuff. [People] like her, and so if she asks you to be quiet, they're going to be quiet.

Rhonda: She has really good control. I mean it's like an open class; it's not, nobody feels like if they do something they are going to get in huge trouble or anything, but at the same time, everybody behaves. . . . I don't know if we didn't behave if she would be more strict. She's pretty open, so it kind of makes you want to do what she tells you to.

These novice teachers seem to have mastered the single facet of teaching that is most challenging for novices and most often leads to teachers quitting in their first or second year of practice: they have developed classroom management techniques that enable them to simultaneously control and motivate students to behave appropriately. Their mastery in this area is not incidental to the subject of this study, nor is it simply because they are "good teachers." Data from student surveys (Table 1) show that, as compared to others in their content

area, these teachers are particularly strong in their abilities to actively engage students in learning (Q1), adapt instruction to diverse students' needs and interests (Q8), enable students to do real world, critical problem-solving (Q15), and create a caring community of learners in the classroom (Qs 13,14,15). Focus group data (Table 2) confirm these teachers abilities in these specific areas. Students described active learning as either a major part of or pervasive within in all but one of the target classes. Adaptive teaching and critical problem-solving were described as significant or pervasive features of all the target classes. In all but one class, the teacher's caring for students and student learning pervaded the class. All of these are key features of contextual teaching and learning, and they are also identified as key needs in recent educational policy discussions, such as those around the No Child Left Behind act.

The findings of this study suggest that these teachers' understanding and implementation of these key features of contextual teaching and learning has enabled them to gain their students' "cooperation" in both behavior and learning, what Woolfolk (2001) calls the "essential" task in classroom management. Simply put, when students are given the opportunity to do contextual teaching and learning--that is, to actively engage in critical thinking around real life problems in a collaborative, inclusive classroom community--they want to learn and they can learn. In such classrooms, students experience little of the boredom and frustration that leads to most classroom misbehavior. Contextual teaching and learning techniques enabled these novice teachers to manage, motivate, and ultimately teach their students.

### **Further questions**

Closer comparative analysis of the cross-class student data summarized here leads only to new questions about the conditions under which novice teachers can implement the various principles of contextual teaching and learning most effectively in public school classrooms. For example, the two classes that were rated highest in both the quantitative and qualitative analyses were electives in career and technical education areas, rather than traditional core academic subjects. Is contextual teaching and learning easier to do in elective classes (a reasonable possibility)? Or is it easier to implement in career or other electives, rather than required classes,

perhaps because students in the former have chosen to take those classes? Students in both seventh grade Life Sciences classes tended to feel that they spent a lot of time memorizing facts and sitting and listening to the teacher. Does this finding simply reflect these teachers' professional styles, is it just the nature of beginning classes in Life Sciences, or is it somehow related to the age of the students? All of these questions and many more will provide material for significant future research in this area.

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## **Core Principles of Contextual Teaching and Learning**

Active engagement: Students are actively engaged in constructing knowledge and solving problems. (Resnick & Kopfler, 1989)

Multiple contexts: Learning in multiple contexts gives students experience in using what they have learned to identify and solve problems in new contexts (transfer). (Hatano & Greeno, 1999; Winne, 1995)

Student collaboration: Students learn from one another through cooperation, discourse, teamwork, and self-reflection. (Vygotsky, 1978)

Real world connections: Learning is closely tied to "real world" issues through outside-of-classroom experiences and simulations. (Cronin, 1993; Newmann & Wehlage, 1993)

Prior experience basis: Students' prior experiences are valued and seen as fundamental to learning. (Greeno, Collins, & Resnick, 1996)

Adaptive teaching: Teaching is flexible and adapted to the needs of diverse learners. (Sternberg, 1997; Stodolsky & Grossman, 2000)

Social responsibility: The ways in which students can contribute to the improvement of society through their learning and resultant actions are emphasized. (Bilig, 2000; Wade et al., 1999)

Meaningful assessment: Student learning is assessed in multiple meaningful contexts. (Darling-Hammond, Ancess, & Falk, 1995; Shepard, 2000)

Critical problem solving: Higher order thinking and problem solving are emphasized above meaningless memorization and recitation of facts. (Anderson, 1993; Bruner, 1990)

Self-direction: Students are encouraged to make choices, develop alternatives and be self-directed, sharing with the teacher responsibility for their own learning. (Ames, 1992)

Caring classroom community: The classroom context evidences the kind of caring, respectful relationships between teacher and students and among students that are conducive to learning. (Noddings, 1995)

\*(adapted from the University of Georgia CTL Conceptual Framework, 1999, [www.coe.uga.edu/ctl](http://www.coe.uga.edu/ctl))

**Figure 1: Core principles of Contextual Teaching and Learning (CTL)**

### Your comments count!

Directions: This survey is anonymous & voluntary. You do not have to fill it out, and it will not affect your grade or my opinion of you in any way. To keep it anonymous, please DO NOT put your name on it.

I am asking these questions because I am working with some colleagues on some new ideas about teaching, and I am really interested in your impressions of your experiences in my classroom this term. So, please CIRCLE THE RESPONSE THAT HONESTLY REFLECTS YOUR PERSONAL IMPRESSIONS OF THE CLASS, and take some time to make comments at the end.

THANK YOU for your input—this is one of the ways I try to become a better teacher every year.

1. Compared to other classes you have taken in this subject, how much time did you spend in this class actively discussing, working on things or solving problems?

*Not much at all*                      *Only a little*                      *About average*                      *More than average*  
*A lot!*

2. Compared to other classes you have taken in this subject, how many different kinds of activities did you get to do in this class?

*Not many at all*                      *Only a few*                      *About average*                      *More than average*  
*A lot!*

3. Compared to other classes you have taken in this subject, how much time did you spend in this class working or discussing with other students?

*Not much at all*                      *Only a little*                      *About average*                      *More than average*  
*A lot!*

4. Compared to other classes you have taken in this subject, how useful do you feel what you have learned will be in your life outside of school?

*Not useful at all*                      *Only a little*                      *About average*                      *More than average*  
*Very useful!*

5. Compared to other classes you have taken in this subject, how much did this class emphasize ways you can contribute to your community or society as a whole?

*Not much at all*                      *Only a little*                      *About average*                      *More than average*  
*A lot!*

6. Compared to other classes you have taken in this subject, how much were you encouraged to think about your own prior experiences, in and out of school, to help make sense of what you were learning?

*Not much at all*                      *Only a little*                      *About average*                      *More than average*  
*A lot!*

7. Compared to other classes you have taken in this subject, how much time did you spend just sitting and listening to the teacher?

*Not much at all*                      *Only a little*                      *About average*                      *More than average*  
*A lot!*

8. Compared to other classes you have taken in this subject, how much was the teacher able to offer extra help or adapt activities to the different needs or interests of different students?

*Not much at all*  
*A lot!*

*Only a little*

*About average*

*More than average*

9. Compared to other classes you have taken in this subject, how many different or unusual kinds of tests or activities did you do that counted toward your grade in this class?

*Not many at all*  
*A lot!*

*Only a few*

*About average*

*More than average*

10. Compared to other classes you have taken in this subject, how much memorizing of facts did you have to do in this class?

*Not much at all*                      *Only a little*                      *About average*                      *More than average*  
*A lot!*

11. Compared to other classes you have taken in this subject, how much choice did you have about which topics you studied or the way you did projects, assignments or activities in this class?

*Not much at all*                      *Only a little*                      *About average*                      *More than average*                      *A lot!*

12. Compared to other classes you have taken in this subject, how much of what you learned seems pretty useless outside of school?

*Hardly any useless stuff*                      *A little*                      *About average*                      *Mostly useless*  
*Almost all useless!*

13. Compared to other classes you have taken in this subject, how much did you feel the teacher really cared about you and your learning?

*Not much at all*                      *Only a little*                      *About average*                      *More than average*  
*A lot!*

14. Compared to other classes you have taken in this subject, how much were kids mean or nastily teasing to each other?

*Not much at all*                      *Only a little*                      *About average*                      *More than average*  
*A lot!*

15. Compared to other classes you have taken in this subject, how much did you go beyond just memorizing facts, toward understanding and working with real problems in this class?

*Not much at all*                      *Only a little*                      *About average*                      *More than average*  
*A lot!*

16. Compared to other classes you have taken in this subject, how much did kids work well together or help each other?

*Not much at all*                      *Only a little*                      *About average*                      *More than average*  
*A lot!*

17. Compared to other classes you have taken in this subject, how interesting was this class?

*Not much at all*                      *Only a little*                      *About average*                      *More than average*                      *A lot!*

18. Compared to other classes you have taken in this subject, how much do you think you learned in this class?

*Not much at all*                      *Only a little*                      *About average*                      *More than average*  
*A lot!*

19. Please tell me about any ways you feel this class was different from most you have taken in this subject, or at this school.

20. Please tell me anything else you want to say about this class.

## Student Focus Group Protocol

(NOTE: This is a semi-structured interview protocol. The questions below are intended as a guide for the conversation.)

1. Your teacher, Mr./Ms. X, is taking part in a project studying different ways to teach in schools. You've been in Mr./Ms. X's class for about a semester now, and I am really interested in how you see your experiences in the class. To start off, could you describe how your teacher teaches in a typical day in the class?
  - P: Get pattern of activities and their participation
  - P: How did kids respond to the teacher's strategies in the class? (e.g., cooperation/collaboration, interest, conflict, teasing?)
  
2. What would you say was the best part of the class (or thing about the class) for you?
  - P: Why was it the best?
  - P: What did you do?
  - P: Why do you think Mr./Ms. X had you do that?
  - P: What did you learn from that?
  - P: Do you think other kids in the class felt the same way?
  
3. What would you say was the most important thing you learned in the class?
  - P: Why was it important? (look for connections to real life)
  - P: How did you learn it?
  
4. Did you do any (other) special projects or activities in the class? (if Yes) Tell me about them?
  - P: (if they can't think of any)
    - P: Did they go any where outside of the class?
    - P: Were there any special speakers or guests?
    - P: Did they talk with anyone outside of the class, like interviews or surveys?
    - P: (Mention known projects from case study.)
  - P: (if yes to any) What was that like? Why do you think Mr./Ms. X had you do that? What did you learn from that? Would you like to do something like that in another class (why or why not)?
  
5. Were there any parts of the class you would have changed if you could?
  - P: How would you change them?
  - P: Why?
  - P: What about other kids in the class; what do you think they would say?
  
6. If friends of yours were thinking about taking this class from Mr./Ms. X next year, what advice would you give them?
  - P: Would you tell them to take it? Why or why not?
  - P: What would tell them about the class?
  - P: What advice would you give them about getting the most out of the class/doing well?

**Figure 3: CTL focus group interview protocol**

Table 1: Student Survey Adjusted\* Frequency Table, with means

Principle	Q #	Teacher	Gr., Subject	Response Freq.					N	$\mu$	$\mu$ all classe	
				NA	* 1	2	3	4				5
Active engagement	1	Sarah	7th, Science			1	8	4	2	15	3.47	3.68
	* 7	Sarah	7th, Science		1	5	4	3	2	15	3.00	2.89
Multiple contexts	2	Sarah	7th, Science			8		7		15	2.93	3.16
Student collaboration	3	Sarah	7th, Science	1	2	4	5	2	1	14	2.71	3.43
Real world connections	4	Sarah	7th, Science	1	1	4	3	4	2	14	3.14	3.56
	* 12	Sarah	7th, Science			3	4	6	2	15	3.47	3.54
Helping society	5	Sarah	7th, Science		1	3	8	1	2	15	3.00	3.41
Prior experience basis	6	Sarah	7th, Science		1	3	5	5	1	15	3.13	3.51
Adaptive teaching	8	Sarah	7th, Science			6	5	3	1	15	2.93	3.66
Meaningful assessment	9	Sarah	7th, Science		2	5	3	3	2	15	2.87	3.28
Critical problem solving	* 10	Sarah	7th, Science	12	3					15	1.20	2.76
	15	Sarah	7th, Science		1	4	6	1	3	15	3.07	3.59
Self-direction	11	Sarah	7th, Science		6	3	5	1		15	2.07	2.90
	13	Sarah	7th, Science			2	4	6	3	15	3.67	3.98
Caring Community	* 14	Sarah	7th, Science		1	1	7	2	4	15	3.47	3.57
	16	Sarah	7th, Science			4	4	4	3	15	3.40	3.74
<i>General-interest</i>	17	Sarah	7th, Science		2	2	1	7	3	15	3.47	3.97
<i>General-learning</i>	18	Sarah	7th, Science			1	3	6	5	15	4.00	4.12
Active engagement	1	David	HS, Engin'ring II			1	1	6	3	11	4.00	
	* 7	David	HS, Engin'ring II		1	2	2	5	1	11	3.27	
Multiple contexts	2	David	HS, Engin'ring II			1		5	5	11	4.27	
Student collaboration	3	David	HS, Engin'ring II				2	6	3	11	4.09	
Real world connections	4	David	HS, Engin'ring II				2	4	5	11	4.27	
	* 12	David	HS, Engin'ring II	2		1		3	5	9	4.33	
Helping society	5	David	HS, Engin'ring II				2	6	3	11	4.09	
Prior experience basis	6	David	HS, Engin'ring II				2	5	4	11	4.18	
Adaptive teaching	8	David	HS, Engin'ring II				4	3	4	11	4.00	
Meaningful assessment	9	David	HS, Engin'ring II		1	1	2	6	1	11	3.45	
Critical problem solving	* 10	David	HS, Engin'ring II	2	2		1	3	3	9	3.56	
	15	David	HS, Engin'ring II	2			1	3	5	9	4.44	
Self-direction	11	David	HS, Engin'ring II	2	1	1	1	3	3	9	3.67	
	13	David	HS, Engin'ring II	2			1	3	5	9	4.44	
Caring Community	* 14	David	HS, Engin'ring II	2	1		3		5	9	3.89	
	16	David	HS, Engin'ring II	2		2	1	2	4	9	3.89	
<i>General-interest</i>	17	David	HS, Engin'ring II	2			1	1	7	9	4.67	
<i>General-learning</i>	18	David	HS, Engin'ring II	2		1		3	5	9	4.33	

\* In this Table, response frequencies for Qs 7, 10, 12, & 14 have been reversed, so that (1) is now consistently the least favorable response, while (5) is the most favorable.

This was done to make question means more easily comparable.

Table 1: Student Survey Adjusted\* Frequency Table, with means (p.2)

Principle	Q #	Teacher	Gr., Subject	Response Freq.					N	$\mu$	
				NA	* 1	2	3	4			5
Active engagement	1	Julia	7th, Science			5	3	3	6	17	3.59
	* 7	Julia	7th, Science		7	5	3	1	1	17	2.06
Multiple contexts	2	Julia	7th, Science		1	4	2	4	6	17	3.59
Student collaboration	3	Julia	7th, Science			3	7	4	3	17	3.41
Real world connections	4	Julia	7th, Science		2	1	7	3	4	17	3.35
	* 12	Julia	7th, Science	3	1	4	4	4	1	14	3.00
Helping society	5	Julia	7th, Science			3	1	7	6	17	3.94
Prior experience basis	6	Julia	7th, Science		1	3	5	3	5	17	3.47
Adaptive teaching	8	Julia	7th, Science			3	4	4	6	17	3.76
Meaningful assessment	9	Julia	7th, Science			5	3	4	5	17	3.53
Critical problem solving	* 10	Julia	7th, Science	2	1	5	4	4	1	15	2.93
	15	Julia	7th, Science	1	3	3	2	3	5	16	3.25
Self-direction	11	Julia	7th, Science	1	2	4	5	2	3	16	3.00
	13	Julia	7th, Science	1	1	4	3	5	3	16	3.31
Caring Community	* 14	Julia	7th, Science	1	7	2	2	2	3	16	2.50
	16	Julia	7th, Science	2	1	1	3	4	6	15	3.87
<i>General-interest</i>	17	Julia	7th, Science	1	1	2	1	5	7	16	3.94
<i>General-learning</i>	18	Julia	7th, Science	1		2	3	4	7	16	4.00
Active engagement	1	Cindy	HS, Food Fund.	1	1	1	6	5	3	16	3.50
	* 7	Cindy	HS, Food Fund.	1	1	3	4	6	2	16	3.31
Multiple contexts	2	Cindy	HS, Food Fund.	1		4	2	5	5	16	1.75
Student collaboration	3	Cindy	HS, Food Fund.	1		2	4	6	4	16	3.75
Real world connections	4	Cindy	HS, Food Fund.	1	1	1	2	4	8	16	4.06
	* 12	Cindy	HS, Food Fund.	1		1	4	4	7	16	4.06
Helping society	5	Cindy	HS, Food Fund.	1	2	3	2	5	4	16	3.38
Prior experience basis	6	Cindy	HS, Food Fund.	1		4	2	4	6	16	3.75
Adaptive teaching	8	Cindy	HS, Food Fund.	1		3	5	5	3	16	3.50
Meaningful assessment	9	Cindy	HS, Food Fund.	1	2	1	6	4	3	16	3.31
Critical problem solving	* 10	Cindy	HS, Food Fund.		1	2	8	6		17	3.12
	15	Cindy	HS, Food Fund.		1	1	5	8	2	17	3.53
Self-direction	11	Cindy	HS, Food Fund.		2	2	9	3	1	17	2.94
	13	Cindy	HS, Food Fund.	1		1	3	6	6	16	4.06
Caring Community	* 14	Cindy	HS, Food Fund.		1	1	9	1	5	17	3.47
	16	Cindy	HS, Food Fund.		1	2	4	4	6	17	3.71
<i>General-interest</i>	17	Cindy	HS, Food Fund.			1	3	5	8	17	4.18
<i>General-learning</i>	18	Cindy	HS, Food Fund.			1	5	2	9	17	4.12

\* In this Table, response frequencies for Qs 7, 10, 12, & 14 have been reversed, so that (1) is now consistently the least favorable response, while (5) is the most favorable.

This was done to make question means more easily comparable.

Table 1: Student Survey Adjusted\* Frequency Table, with means (p.3)

Principle	Q #	Teacher	Gr., Subject	Response Freq.					N	$\mu$	
				NA	* 1	2	3	4			5
Active engagement	1	Rhonda	HS, Alg II (Hon)			2	5	12	5	24	3.83
	* 7	Rhonda	HS, Alg II (Hon)		2	4	15	3		24	2.79
Multiple contexts	2	Rhonda	HS, Alg II (Hon)			4	10	10		24	3.25
Student collaboration	3	Rhonda	HS, Alg II (Hon)			7	7	9	1	24	3.17
Real world connections	4	Rhonda	HS, Alg II (Hon)	1	2	7	8	2	4	23	2.96
	* 12	Rhonda	HS, Alg II (Hon)		1	10	6	6	1	24	2.83
Helping society	5	Rhonda	HS, Alg II (Hon)		2	7	12	3		24	2.67
Prior experience basis	6	Rhonda	HS, Alg II (Hon)		4	5	5	7	3	24	3.00
Adaptive teaching	8	Rhonda	HS, Alg II (Hon)			1	3	13	7	24	4.08
Meaningful assessment	9	Rhonda	HS, Alg II (Hon)	2		5	7	10		22	3.23
Critical problem solving	* 10	Rhonda	HS, Alg II (Hon)		1	4	13	6		24	3.00
	15	Rhonda	HS, Alg II (Hon)		1	1	8	9	5	24	3.67
Self-direction	11	Rhonda	HS, Alg II (Hon)		2	5	12	5		24	2.83
	13	Rhonda	HS, Alg II (Hon)				3	8	13	24	4.42
Caring Community	* 14	Rhonda	HS, Alg II (Hon)				1	10	13	24	4.50
	16	Rhonda	HS, Alg II (Hon)			2	8	6	8	24	3.83
<i>General-interest</i>	17	Rhonda	HS, Alg II (Hon)		2	2	5	10	5	24	3.58
<i>General-learning</i>	18	Rhonda	HS, Alg II (Hon)				4	12	8	24	4.17

\* In this Table, response frequencies for Qs 7, 10, 12, & 14 have been reversed, so that (1) is now consistently the least favorable response, while (5) is the most favorable.

This was done to make question means more easily comparable.

Table 2: CTL-related characteristics of classes, as described by student focus groups

Principle	Sarah (7th, Science)	David (HS, Eng. III)	Julia (7th, Science)	Cindy (HS, Foods)	Rhonda (HS, Hon. Alg.II)
Active engagement	Some*	Pervasive	Some	Pervasive	Minor
Multiple contexts	Some	Pervasive	Pervasive	Some	Minor
Student collaboration	Minor	Pervasive	Pervasive	Pervasive	Minor
Real world connections	Some	Pervasive	Some	Pervasive	None
Helping society	None	Some	None	Some	None
Prior experience basis	Some	Pervasive	Some	Minor	None
Adaptive teaching	Some	Pervasive	Pervasive	Some	Pervasive
Meaningful assessment	None	Pervasive	Minor	Some	None
Critical problem-solving	Some	Pervasive	Some	Pervasive	Some
Self-direction	Minor	Pervasive	Pervasive	Pervasive	Some
Caring Teacher**	Minor	Pervasive	Pervasive	Pervasive	Pervasive

\* Descriptive ratings of each teachers' class in relation to the 11 CTL principles, based on compilation and analysis of all related focus group interview comments, were assigned as follows:

None - Students describe no evidence of this characteristic in this class.

Minor - Students describe only minor or occasional evidence of this characteristic in this class.

Some - Students' describe one regular feature OR a major event or project evidencing this characteristic, but their descriptions do not indicate it is pervasive in this class.

Pervasive - Students' descriptions indicate that this characteristic is pervasive in this class.

\*\* This characteristic was altered in this analysis from "Caring Community" because focus groups discussed only caring or noncaring teacher behavior; no students discussed peer caring or hostility.

## Examples of Focus Group Summary Descriptive Ratings

In classes embodying the CTL principle of *Meaningful assessment*, learning is assessed in multiple meaningful contexts. According to the focus group interviews, this characteristic varied greatly among the five classes in this study. To illustrate the bases of the different summary descriptive ratings, each rating category is described below, followed by examples of the data that lay behind the assignment of that rating to the class(es) to which it is assigned.

***None - Students describe no evidence of this characteristic in this class.***

Example - Rhonda's Algebra II class

If we have a test or something she'll hand those back, like, if we had a test or quiz the previous day. (No other forms of assessment were mentioned.)

Example - Sarah's Life Sciences class

(Interviewer: What do you have to do on the quizzes?) Sometimes she'll give us fill in the blanks, half fill in the blank, and half the definition, and on the last one she made us do the whole definition. (No other forms of assessment were mentioned.)

***Minor - Students describe only minor or occasional evidence of this characteristic in this class.***

Example: Julia's Life Sciences class

If you are failing, she'll give you some extra work or give you work back and you can redo em and she'll make copies and when you redo em she'll give you your grade and your grade goes up.

We have to do facts sometimes, like we have to read, like, section three, then write 4 or 5 or 15 facts under a certain section and then answer the questions. . . . when the test comes, she gives you back the facts, then you can learn. . . . You can study for the test. . . . Sometimes it counts for a grade, and if you do it you get extra points, but if you don't do it then you get a zero.

***Some - Students' describe one regular feature OR a major event or project evidencing this characteristic, but their descriptions do not indicate it is pervasive in this class.***

Example - Cindy's Food Fundamentals class

(Interviewer: Is that what your grade is based on, the quizzes, and the tests?) And the labs. (Interviewer: In the quizzes or tests, is there something you have to do in the lab, too; do you have to demonstrate anything?) Sometimes there's questions that pertain to the lab.

***Pervasive - Students' descriptions indicate that this characteristic is pervasive in this class.***

Example - David's Engineering III class

We just built a gumball machine, and that lasted a long time, because that was a major project. We build a prototype, and then built 5 like it. We had to have drawings, and then we cut out all of the wood, and we had to figure out how to put it all together, and make sure it worked. . . . (Interviewer: Then the test was, you had to mass-produce 5 in a class?) Right.

(Interviewer: What are the requirements for the boat?) It couldn't be over eight feet long, and it had to hold at least one person, no motors or anything, and it had to go and turn around and come back. Nothing can be pre-manufactured, you had to produce it all yourself, from scratch, basically. . . . (Interviewer: So it was a race, too?) Yes. . . . We got third.

Almost every project we've done, we've done a PowerPoint for it, and that just shows him what we learned. . . . The group does one, and we put how we came up with our design, our problems. What everyone did to help. The problems we faced, the tools we used. It's like you would get on a program that you would look up on the computer.

**Figure 4: Examples of Data Underlying Summary Descriptive Ratings of Classes, based on Focus Group Interviews**