# PROJECT CIRCLE

# (Grant # R215D30195)

# SECOND YEAR EVALUATION REPORT

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## I. INTRODUCTION

### A. Project Overview, Goals, and Objectives

Project CIRCLE was initiated in October, 1993. The project was established as a cooperative between the University of Texas at Austin College of Education, the Austin Independent School District (AISD), and the Eanes Independent School District (EISD). The broad goal of the project was to establish a model collaborative, teacher training program to enhance technology infusion into the secondary schools. Specific program objects were established in three areas:

1. Development of the CIRCLE model training program as follows:

   -Identify state-of-the-art computer technologies, innovative software, and telecommunication capabilities which could significantly impact teacher-training and promote effective technology infusion into classroom practices.

   -Develop and implement school-wide teacher training programs at Travis High School in AISD and Westlake High School in EISD to train teachers in the use of state-of-the-art computer technology for teaching in the subject matter areas.

   -Train students at both sites to serve as student mentors to provide active and effective support for teachers in the integration of technology into their classroom practices.

2. Establishment of a collaborative community of teachers and students in the schools as follows:

   -Create collaborative knowledge-building communities among secondary students, teachers, administrators, university faculty, and university students to explore and model innovative constructivist uses of technology in the classroom.

   -Use interactive database networks and new telecommunication approaches to connect participants to each other and to mentor/experts locally, nationally, and internationally.

3. Development of a self-sustaining program of training and technology infusion in the schools as follows:

   -Design and implement a teacher-training model using integrated computer technology that is both generative and self-sustaining within both participating schools that promotes an emerging technology-rich teacher culture consistent with best-use practices, recommendations from the SCANS report, and the development of national curriculum standards in the academic disciplines.

First year activities were targeted primarily at the first two of these areas and focused on providing initial training for teacher and student participants, installation of the technology at the two high school sites, and implementation of the student mentor model. Second year activities were targeted primarily at the third area and focused on extending the training and collaborative communities to a larger number of teachers and students within each school.

**B.    Overview of Evaluation Goals and Objectives**

The Project CIRCLE outcomes evaluations have two broad goals for examining the effectiveness of the project in meeting its stated objectives:

> -Determine changes in teaching practices and computer utilization by teachers who are trained in the CIRCLE model.

> -Determine the effects of the implementation of the CIRCLE model in classrooms on student learning, performance, behavior, and attitudes.

These goals served both formative and summative purposes.  Formativly, as teaching practices and effects on students were determined, this information was shared among the CIRCLE participants and used to inform the on-going development, planning, and implementation process during the grant period.  This allowed for continual refinement of the CIRCLE training and learning models.  Summativly, documentation and assessment of teaching practices and technology utilization in conjunction with student outcomes, will allow identification of those practices that have the greatest effects, on both teachers and students.  These data provide the base for future replication and dissemination of the CIRCLE model.

The project evaluation plan as specified in the grant proposal established six areas of data collection and evaluation related to the general evaluation goals.  These relate to the project objectives as follows:

1.  Development of the CIRCLE model training program:

    -Determination of the effectiveness of the teacher-training model and strategies for facilitating teacher integration and utilization of computers in instruction.

2.  Establishment of a collaborative community of teachers and students in the schools:

    -Examination of the effects of use of collaborative learning strategies and computer-based software tools on student cognitive learning in core subjects.

    -Examination of the extent of after school use of computers by students, teachers, parents, and adult learners.

3.  Development of a self-sustaining program of training and technology infusion in the schools:

    -identification of the capabilities, limitations, and successful strategies for effective use of the prototype knowledge-building software tools within the core curriculum areas.

    -examination of the goals within participating schools for the use of computer-based tools for collaborative learning and knowledge-building within and across the core curriculum areas.

-examination of the extent to which computers were effectively integrated into the core curriculum areas and classroom activities in schools.

During the first year, evaluation activities were focused on the formative aspects of these project goals. For the second year, evaluation activities were focused on the more summative aspects of the CIRCLE evaluation goals. We were specifically interested in determining effects in the following areas.

For teachers:

1. the effectiveness of the CIRCLE training model in providing technology training and on-going support to teachers.

2. the effects of the project on their classroom teaching practices and curriculum, particularly on the implementation of collaborative, knowledge-building communities in their classes.

3. the effects of the project on their perceptions of technology and knowledge-building processes.

4. their perceptions of the potential sustainability of both the training and learning models in their schools beyond the end of the grant period.

For Students:

1. the effects of the implementation of the CIRCLE model on their perceptions of school, learning, and classrooms.

2. the effects of the implementation of the CIRCLE model on their perceptions of themselves as learners and their approach to learning.

3. the effects of the implementation of the CIRCLE model on achievement in subject matter areas.

## C.    Second Year Evaluation Activities

Second year evaluation activities were focused on the summative aspects of the project goals. We implemented procedures to obtain data concerning teacher's implementation and utilization of the CIRCLE technology, teachers' use of the training and perceptions of training effectiveness, teachers' integration of the learning model in their classrooms, teachers' perceptions of the sustainability of the training and learning models, students perceptions of the classroom and their own learning activities, and students' academic achievement. Specifically, the following data collection activities were undertaken during the second year.

1. Interviews were conducted with all participating CIRCLE teachers during May, 1995. The interviews assessed implementation and use of the training model and learning models, as well as perceptions of the sustainability of these following the end of the grant period. The

interviews also address teacher perceptions of how the CIRCLE learning model and use of the CIRCLE software affected their students' collaboration and learning.

2. The survey instrument developed during the first year assessing students' perceptions of the classroom in relation to collaborative knowledge-building processes was administered in April and May, 1995 to all students in classes being taught by the CIRCLE teachers at both high schools. The data from this administration were used for three purposes. First, further examination of the adequacy of the instrument and its measurement properties was done as a continuation of the reliability and validity analysis conducted during the first year. Second, assessment of the effects of the implementation of the CIRCLE learning model on students' perceptions of the classroom and engagement in knowledge building and intentional learning was done. Third, examination of the relations between student knowledge building and intentional learning and their course achievement was conducted.

## D. Overview of This Report

This report will be based on the data derived from the evaluation activities described previously. First, we will report findings from the teacher interviews organized into a section concerning the training model followed by a section concerning the learning model. Next, we will report results from analyses of the student perceptions survey, first addressing the continuation of instrument development; second, addressing the effects of differential teacher integration of the learning model on student perceptions; and third, addressing the relation of student perceptions to course achievement. Then we will discuss the evaluation results as they relate to specific second year evaluation objectives and questions. We will end by drawing final conclusions concerning the overall success of the project and making recommendations based on the evaluation findings from the two years.

## II.  RESULTS OF TEACHER INTERVIEWS

### A.    Introduction and Interview Methodology

Interviews were conducted with 20 project CIRCLE teachers, 8 at Westlake High School and 12 at Travis High School.  The interviews followed a structured open-ended question format with a predetermined set of questions.  Interviewers were instructed to follow-up any answers that seemed to warrant further elaboration.  Teachers were also allowed to provide elaborations or additional comments as they desired.  Each interview took approximately one-half to one hour to complete. Interviews were transcribed verbatim.  The transcribed answers were then summarized and grouped.

The interview itself was organized into two topic areas.  The first contained questions the CIRCLE model training program that addressed the following project objectives:

1.  Development of the CIRCLE model training program.
2.  Development of a self-sustaining program of training in the schools.

Within these objectives, the questions focused on two second year evaluation goals:

1.  Determine the effectiveness of the CIRCLE training model in providing technology training and on-going support to teachers.
2.  Determine teachers' perceptions of the potential sustainability of the training model in their schools beyond the end of the grant period.

The second contained questions relating to the CIRCLE constructivist, collaborative learning model that addressed the following project objectives:

1.  Establishment of a collaborative community of teachers and students in the schools.
2.  Development of a self-sustaining program of technology infusion in the schools.

Within these objectives, the questions focused on three second year evaluation goals:

1.  Determine the effects of the project on teachers' classroom teaching practices and curriculum, particularly on the implementation of collaborative, knowledge-building communities in their classes.

2.  Determine the effects of the project on teachers' perceptions of technology and knowledge-building processes.

3.  Determine teachers' perceptions of the potential sustainability of the learning model in their schools beyond the end of the grant period.

For each of these two topic areas, we report the results derived from teacher interviews.  Tables of the responses to each question are provided which report the grouped summaries of responses and the number of teachers responding to each question, where appropriate, along with a listing of relevant teacher comments.

### B. The CIRCLE Model Training Program

#### 1. Teacher Collaboration on Training and Software Operation

The CIRCLE model training program was developed based on a collaborative framework. Once initial training was done to familiarize teachers with the software and classroom implementation ideas, the main ongoing training and support was designed to be done through between teacher collaboration, where teachers could draw on each other's expertise to learn more about the software and get help with technical difficulties. This was particularly true in year 2 as there were fewer formal training sessions conducted. Also, it was expected that the teachers who had been in the project during year 1 would be available as a resource base to the new year 2 teachers. Collaborative support was designed to be provided by both fellow teachers and by student mentors. In this section, we report on the teachers' responses concerning between teacher collaboration. In the next section, we will report on their perceptions of the effectiveness of the student mentor approach.

Teacher responses about how much between teacher collaboration they engaged in concerning training and use are summarized in Table 1. All but one teacher reported doing collaboration, with approximately one-third of the teachers reporting some or a lot of collaboration. Teachers' comments (Table 1) suggest that the collaboration that did occur was informal with no real systematic routine for collaborative training or support. Also, collaboration appears to have been primarily one-to-one, except for the collaboration during formal training sessions at the University of Texas and some collaboration within the English department at Westlake. Low levels of collaboration seem to be coupled with low levels of use of the software. This would suggest that collaboration was initiated on an as needed basis. This is not a problem, per se, but does suggest that collaboration was not utilized extensively to do general in-service type training. Comments also indicate that the teachers doing more collaboration were the teachers who had been involved in the first year of the project who were more experienced and, therefore, being called on for help by other less experienced teachers. This conforms to the expectation that year 1 teachers would operate as a resource base for the year 2 teachers, but it again suggests that there was little on-going collaboration for general training needs.

Teacher responses concerning the types of collaboration done also are reported in Table 1. The comments indicated that collaboration was primarily for specific technical problem trouble shooting and technical setup of programs and systems. This seems consistent with the conclusion that collaboration was initiated on an as needed basis in response to a specific problem. Five teachers reported some engagement in general training for learning software but this does not appear extensive or systematic. Eight teachers reported collaboration on software applications, however, most of this collaboration occurred in the context of either the UT training sessions or the inter-departmental English collaboration on projects at Westlake. There was a tendency for collaboration about learning software and discussing software applications to occur more for those doing more collaboration. This would suggest that collaboration about these aspects of training occurs when collaboration is more extensive. Comments about how collaboration was helpful (contained in both the specific responses to how collaboration was helpful and in the general comments about how used) focused, like use, on technical help. This reinforces that collaboration was primarily in

response to technical problems and that teachers did see this type of technical collaboration as useful.  In response to what ways collaboration was not helpful, few teachers indicated problems, and the problems indicated suggested specific problems encountered by individual teachers, rather than any systematic patterns.  Six of the teachers with little or no collaboration were asked why they didn't collaborate more.  Their responses indicated a variety of difficulties, again with no consistent pattern.  Three teachers indicated problems with technology installation or access and two indicated difficulties arranging time to collaborate.

Seven of the teachers with low reported collaboration were asked what things would be needed to allow them to do more collaboration.  Additionally, three of the teachers with some or a lot of collaboration also provided answers indicating needs.  These ten teachers overwhelmingly indicated time as the major need.  Remaining needs tended to be scattered, although both technical support and more hands-on technical training were mentioned by three teachers each.  These responses are consistent with the first year of the grant where time was also the most mentioned need.

## Table 1
## Teacher Responses About Their Collaboration on Training and Use

**How much collaboration did you do with other teachers, either in your school or in [Westlake or Travis whichever was the other school] about learning how to use the programs and getting support for their use?**

| | |
|---|---|
| None | 1 |
| Little | 12 |
| Some | 4 |
| A lot | 3 |

**What sorts of things did you collaborate on?**

| | |
|---|---|
| Technical problems and set up | 14 |
| Learning software | 5 |
| Discussing software applications | 8 |
| Not applicable or not asked | 2 |

**Comments (by response category with type of collaboration indicated in brackets):**

*Little*
Only when we were working together on the weekends at UT.  As far as implementing the program in the computer lab, I haven't had the software until just recently.  So I don't have any experience to go from.  When we were installing the software, I worked with [Teacher X] and what things they did that was a successful install for her.  And got some ideas on how she used it and that sort of thing.  So the collaborative network is in place.  It's just a matter of I've got to get on the bandwagon. [Technical problems and set up]

None with Travis, other than the days at UT we didn't have contact with Travis.   With the teachers here, [we would turn to each other] if there was some problem, if this didn't work or that didn't work or why won't the modem come on. [Technical problems and set up]

I'm very busy.  I don't have a conference period because I teach 4 small classes instead of 3 big ones and so that's a lot of it.  I'm just not available to collaborate with, I think that's just a problem. Every time we talk about pedagogy that involves the teachers collaborating, there's no time.  We're just too busy during the day. [NA]

Not much this year. A little bit because we did the SME project, but really not much this year. [Discussing software applications]

Not as much as I would have liked to, but I can remember two specific examples. [Technical problems and set up; Discussing software applications]

At Westlake, none. At Travis, almost none. The only thing that I got from here at Travis would be if I went to [Teacher X or Teacher Y] and asked "how can I do this?" [Technical problems and set up]

Well, I certainly think at the UT sessions [we collaborated]. I think that there was a feeling of learning something together, helping each other out on how to do things. This is also true of a session we had a couple of weeks ago. You'd just be sitting next to somebody and say, "I'm having trouble doing this" and they'd say, "Well, try doing this" And that sort of thing. But that's within a training session. I think there was a lot of collaboration within a training session. And partly because I think we all got along well. As far as what we did outside the training session, when we were actually doing it in the classroom, like when I was using it in the classroom, which I didn't do very much. When I did use it in the classroom, there wasn't another teacher around to collaborate with. That was our biggest problem....that we were stuck with technological problems, glitches and stuff. We didn't know it well enough that we could operate it in the classroom, taking care of something that might come up at one of the terminals and still be in charge of the other students. That made it hard. I don't know what the solution to that was....We collaborated on the preparation on the two units that we did. It wasn't that we weren't in a mode of collaboration, it comes down to...you're assigned to a classroom of students and their assigned to a classroom of students and collaboration requires that you be together. [Technical problems and set up]

Very little collaboration was accomplished with the teachers at Travis high School, however, [Teacher X] was available to answer questions concerning Daedalus if needed. [Technical problems and set up]

I would say minimal to moderate. Certainly in the fall semester more .... In the beginning I consulted with [Teacher X] quite a bit ...I did not really collaborate much with other teachers. As far as the training goes, for me it was much more a learn as I go, learn by doing sort of thing. [Technical problems and set up]

As far as learning to use the software, I was taught [at UT] how to use it, but I work with my colleagues here in planning lessons to implement it. So that is when I learned more, and spending hours after school trying to set up a lessons. So that is what I was mainly involved in as far as collaboration is concerned...I never worked with anybody from Travis High School. Mr. X was over here a couple of times but he was never involved in the projects I was involved in. [Ms. Y], our technical coordinator here at Westlake helped me run some of my lessons. [Discussing software applications]

I did [collaboration] with [Teacher X]. I'm very dependent on [him]. Fortunately, he's right next door. I don't know-- an hour, two hours. I spent some time with [him] trying to set up a time where I could put stuff into the computer and then roll them in here and roll them out. [Technical problems and set up]

I had to use collaboration because I had never used Daedalus before....[Teacher X and Teacher Y] would come in and help me set it up and sit in on my class. Those are the only two people that I went to for help. They helped me with setting up the Daedalus interchanges. [Teacher X] [helped] maybe twice and [Teacher Y] [helped] maybe two or three times. And by then I felt like I could set it up myself. [Technical problems and set up; Learning software]

***Some***
I would say we did some. I didn't collaborate that much on projects but they were always,...I had a lot of times where teachers would send me a note saying "please send me such and such student. I'm confused about this." or "Something needs to be set up." [Also] I've gone and helped some teachers. [Technical problems and set up]

Learning how to use the programs.... a fair amount. Technical learning... none what so ever... and that was a real problem because I always felt as though if something were to collapse I would have to run and find someone... I felt powerless where that was concerned, so I didn't feel like I could do any of the trouble shooting. And that is an area that I would like to become more literate in so I didn't feel like I was totally reliant on a student mentor to help me with that

sort of thing.  As far as what you can do with the software we did collaborate with that.  [Learning software; Discussing software applications]

Between [Teacher X] and I, we both learned a lot about HyperCard.  I have not had the hands on experience that he has but I'm becoming more aware of its capabilities and I hope to become more technologically capable of teaching students how to use it.... [Teacher Y] has helped me with that in the lab with the networking in our computer lab up here…Well, [she] has been with our computer lab since its inception so she understands the basics of how the operation works, how we can store information and recall it later, how we can compact the communications and she helped me with that…[Teacher Z] helped me to set up the Daedalus conversation about poetry and that was very helpful.  Helped me in reviewing the process of setting up the assignment which we of course were taught in our days at UT, but unless you repeat that process, it tends to escape you with everything else that we're trying to do around here.  [Technical problems and set up]

Almost none with Westlake.  Within Travis I probably fell on the side of doing the consulting  rather than being consulted because I had a sufficient Macintosh background to understand the platform and all of that so I answered a lot of questions. Occasionally I would have to ask questions on how to run Daedalus as that was not a piece of software for which I was familiar with, but most of the other stuff I understood and therefore, would answer questions.  So there was some degree of collaboration there.  I think the model works best when there is a continuous spread of experience rather than having, as I think we did particularly at the beginning, a large group of people with almost no knowledge and very few people with some knowledge. [Technical problems and set up; Discussing software applications]

*A lot*
The people at UT  helped me a lot with trouble shooting and how to do things although I need more training and trouble shooting because there are so many things that go wrong that I don't know how to fix and even our star mentor doesn't. With Travis and Westlake teachers I have been more in a teaching role this year just because I had exposure to the software and training last year and so I was mostly trying to help with the other teachers get familiar with the various software this year...When we were setting up some of the software like the Daedalus interchanges for the English poetry exchange we did do a lot of collaboration getting everything on there, everybody trying to figure out how it works and things like that.  And as other teachers became more comfortable with it we really helped one another…Trouble shooting things see like there were problems or other malfunctions.  There have been collaborations just on getting the printer, my printer has been out of commission all semester its been in the repair place, so we have had to reroute everything we needed printed from my room to another room put a lot of work together getting that going and working. [Technical problems and set up; Learning software; Discussing software applications]

I thought the collaboration was good.  In fact.... I was kind of the, well, I'm the co-administrator of the grant with [Dr. X].  So I had an opportunity to work with most of the teachers.  I had a lot of input, working with the teachers using the different segments of Daedalus, for example, Claris Works.  We also had good support from UT.  [Mr. Y] came out a number of times to help us.  And [Mr. Z] came out.  We had, I think, very good technological help. [Technical problems and set up; Learning software; Discussing software applications]

The only times that we talked at all, or I talked at all with the people from Travis were on the days that were provided with the in-service with UT.  We met either at the University or at Travis.  We haven't met here this year so I did, on TeachNet, converse a couple of times with them, but I never made any contact with the teachers other than the in-service times and at Travis…We mainly talked about ways they were using it departmentally.  What kinds of interchanges they were doing departmentally and how that applied to our department.  When we would get in small groups with them the main thrust of the discussion was always, from my situation, the English department, that kind of thing.  Of course there was some learning involved during the collaboration of the 8, was it 8 sessions, I don't remember.  But during the whole hour where someone from Travis would make presentations of how they had done it in the class, well that's certainly information that's received, but it wasn't one on one in a situation like that.  With the teachers here, is that the next part of the question?  There was a lot of collaboration.  We started in August, well, actually the end of July, [Teacher X] had several meetings here at the school.  We began to just learn how to use the software.  Some day/morning sessions and afternoon sessions.  Then from that time on, of course, the training we do  together at UT we would collaborate.  We had 2 days that our district gave us that were off days where a sub was provided and we made actual unit lesson plans and then we have, 3 of us in the project CIRCLE have similar off-periods that we talk about Project CIRCLE so there was a

lot of collaboration. [Learning software; Discussing software applications]

**In what ways was this collaboration helpful?**

**Comments**

Very helpful in that I would probably not have been able to run the programs without him…So it was helpful to collaborate with [Teacher X] in that I would have never had computers in the room probably if I hadn't had the assistance of [Teacher X], but when you become dependent on somebody, that can hurt you when you then try to go out on your own.

Two heads are always better then one. It's always helpful to have someone to commiserate with when things are going wrong and it would really be extremely difficult to do in isolation, anything technical, for most of us.

I don't know that there was anything that wasn't helpful about what we did…I think that there's no end to the possibilities there…not to mention the understanding of human beings that comes along with the acceptance of others and the understanding that people at Westlake are really like the people at Travis and those kinds of serendipitous things that come along with the technology. I'd really like to see more of that happen.

It was obviously helpful because the only time I would go to them is if I had a specific problem.

It was a matter of if the following things came up, run next door and ask them what you do now.

Well, for us we knew every moment of the lesson plan that we were going to do. We had the project very carefully outlined so that the systems were set up. We knew exactly what kids were going to be on computers at what time and how they would rotate, what the people at the desks were going to do, so it was just like planning a class lesson. The collaboration also helped cause it was just intellectual stimulation between that many people talking about, "oh well then yeah and next year we can do that because they'll have that background" and it was just planning.

One was that it was helpful in that it let us know, particularly the people that didn't understand, that they were not alone and that is a reassuring aspect because very often teachers think they should understand when in fact they should not. There was no reason why they should. The other thing is that during the technical consultation it would often turn to pedagogical questions, that is "how do we use this now that we have it?" and that kind of time was very valuable.

**In what ways, if any, was this collaboration not helpful?**

**Comments:**

If I were going to criticize it at all, sometimes we felt over saturated…So much, that at one time we sometimes lost the trees for the forest. [Interviewer: Do you think it would have been better if it had been interspersed like focused on one particular program first?] Yea, I think we tried to do that to some extent but there were so many segments of Daedalus that probably what would have been helpful is to use a segment until it became more familiar. We tended to move from one to the other. I honestly don't know if you could do that any better. It just takes practice. I think that we did it probably as well as we could have. at the time

Well sometimes we found that among all of us who are teachers we did not have the skills necessary to fix whatever problem we were working with and so the collaboration wasn't helpful when we maxed out on our expertise and had to call [Graduate Student X] in the middle of the day or get [Student Mentor X] out of class or something like that.

When you don't have time to do stuff and people come to you and say, "please come to my room and help me with something."

The only instance I think I could think about that would be, at one point during one of the sessions at the University. And I believe it was like this summer on the second day maybe of the training, there was a long period of time where there were teachers who were talking to an extent about their own personal gains that were not real helpful.

**For teachers indicating no or little collaboration: Were there any specific reasons why you were not involved in more collaboration?**

**Comments:**
There appears to be some differences between the Macintosh and IBM version of this software. As of the end of the 1994-95 school year, there are only two teachers with the IBM version of Daedalus. [Teacher X] had the software installed during the latter part of the spring semester, therefore, no contact was made.

The main one was that there were technical difficulties in the first semester that precluded my collaboration with other teachers. For instance, the, we didn't even have the network computers in [Teacher X's] room, [Teacher Y's] room, or [Teacher Z's] room until close to January, it seems like. The teachers on this side of the building with the networked computers weren't really using them that much and therefore, there was not much potential for collaboration. Now, I may be, I don't know if I'm understanding. Maybe if you're talking just specifically about training, if I had questions, I could always go to [Teacher X]… Well for starters, it was clear that there were only one or two teachers who knew as much or more about the computers than I did and that was [Teacher X and Teacher Y]. Therefore, I consulted [Teacher Y]. [Ms. X] who is our coordinator of technology for the school, I certainly went to her whenever there were problems but she was also basically learning about the software and about the computers themselves. So really I sought out [student mentors] more than anyone.

Largely because how long it took the networks to be put in. I had my network installed and then it took another 2 months to get a plug to run those three computers.

I'm very busy. I don't have a conference period because I teach 4 small classes instead of 3 big ones and so that's a lot of it. I'm just not available to collaborate with, I think that's just a problem.

It was very difficult to get it involved with the math. I'm having a hard time, except for doing the, I didn't have the time to sit down and figure out and no one has done that. So I had everything that I needed for English and the social studies and Science even, but for math there was nothing figured out. And I taught a new program, Algebra/Geometry and so I was real tied up in trying to get that one going really strong and I was hoping I would be able to use it in that course. but I didn't, I couldn't figure out, the kids weren't as easy on the computer and it was much more difficult to figure out with freshmen then I thought it was going to be.

I don't think any of us really thought that learning how to trouble shoot was what we were supposed to be doing. I think we thought we were there learning how to use the software in the classroom and not to be the technicians behind it all so that really never entered my mind, to collaborate about those issues. When I had a problem I would rely on a student mentor. If we had some training as far as that stuff was concerned perhaps we would have collaborated on it as well.

**What things would you need such as time, school support, technology availability, etc., to allow you to be involved in more collaboration?**

| | |
|---|---|
| Time | 8 |
| More technical support | 3 |
| More hands-on technical training | 3 |
| Access | 2 |
| More computers | 1 |
| Not asked | 10 |

**Comments (by teacher with coded category(s) indicated):**

As mentioned at the end of the 1993-94 school year, time has always been a factor. Planning collaborative activities to be included in the curriculum, in addition to regular planning for classroom activities, etc., is very difficult to complete during the school year. [Time]

One of the things that I would like to see happen would be more short substitute days. That is, instead of having an all-day session, have 1/2 days or one block program. And just have teachers released for a block, say, have teachers released everyday for a week, have substitutes everyday for that block for a week where they could get training and practice with the curriculum. [Time]

The main thing is access to the computers during the day. As it is now, each of the project CIRCLE classes with networked computers are basically in use or there's a teacher in each of those classrooms throughout the day so there's really little opportunity for us to go in during the day and prepare some sort of computer assignment or just deal with the computers so I think it would be great if during some off-period or during each period, that there were at least one of those classrooms free for teachers or Project CIRCLE teachers to be able to go in and work on them. Otherwise, it's always after school and you're just bogged down with, I don't know. It just seems like we need more access. And I also feel that the in-service we had with the people with the project from the university has always tilted heavily towards philosophy and not so much hands on. There's been a little hands on but I sure wish there was more in-depth hands on, trouble shooting and stuff cause most of us, when something goes wrong in the classroom, we feel completely helpless. For starters, it would be nice to, we've never been told about the server and all that sort of stuff. Technical aspects, I think have really not been dealt with and I personally would like to know. Well they may not want us dealing with the server but at least I want to know what the server does, what can go wrong with it. I want to know how it's connected to the computers. I want to know what is the modem, what does it really do, etc. etc. All that stuff, that sort of technical training has really been minimized. [Time; Access; More hands-on technical training]

Unfortunately there were not enough common time slots that we could sit down and problem solve or brainstorm or plan together about how we could do some interdisciplinary or multi-age kinds of units. ..[Also] we haven't had enough modems where we could offer that to a large portion of our population. I would hope that at some point we would be able to offer that inter-school communication. [Time; More computers/ technology]

Just time. I would like to use leapfrog next year and I would like to work on a project I saw in the Teachers Talk magazine where by students edit each others papers on computers using the interchange, for an assignment. I need to study this and I will probably use it next year. [Time]

Here at school it was frustrating because we could not get the modem up and running and count on it staying up and running. [Teacher X] was convinced it was maliciously done. Somebody would go in there and do something to destroy it. It happened so often that it couldn't have been accidental. So that was frustrating. Due to someone not being there to monitor the lab and the equipment. The fact that the modem ended up stolen was definitely that same thing. Those are frustrations and discouraging ones too. [More technical support]

One thing that I think would have helped, you know last time we had one of these meetings where we gathered, we talked about, I talked to [Graduate Student X and Teacher X] and people about this and we thought it was a good idea was that they would come to the school and we'd get subs and kind of trade them around so that everybody would get at least an hour and a half or some time to get in there with an expert. I never have done that. I never have been in that lab. I mean my mentor had done some things and we had tried some things but it's usually by me having to write late passes for him for another class and me having to leave my class and that's untenable and so we just sort of gave up on. And I kept thinking after we get our subs and we get in there with [Graduate Student X or Teacher X] or somebody and I'll know how to do this and I won't have to pull my mentor out of class but they never have….Yeah, I think that's what we needed is another session where we were actually working in the lab. Because we had the one time that we had to go into the lab with a bunch of people and begin to learn how to do it and those computers were all different. I mean we walked in here and some kid stole the modem and then they said they were broken and it was just completely different and very tough. Because we had the one time that we had to go into the lab with a bunch of people and begin to learn how to do it and those computers were all different. [Time; More hands-on technical training]

All of the above. I really think this type of network needs a person whose job it is to support this network because you have all these people using it who don't know what they're doing. Every hour 300 new users. Can you imagine the stuff that can be done to that network in that time? It's a full-time job pretty much. Number 1 would be a network support person and that would be someone we could use in the classroom when we're trying to use the technology. That's wrong, number 1 was getting the network. Now that we have that, I would say that we need that person. And then time. The other problem that we had this year, in the interest of putting the network to its fullest use, they scheduled these classrooms every hour. And they had all these teachers traveling. That means, if your classroom is scheduled every hour, you can't ever get in it, except after school when you're too exhausted and you have all this other stuff going on. Or before school when you're trying to get ready for school. That's the big deal. Time and the classroom is the big deal. I would say. [Time; More technical support; Access]

I don't know I don't think any of us really thought that learning how to trouble shoot was what we were supposed to be doing. I think we thought we were there learning how to use the software in the classroom and not to be the technicians behind it all so that really never entered my mind, to collaborate about those issues. When I had a problem I would rely on a student mentor. If we had some training as far as that stuff was concerned perhaps we would have collaborated on it as well. [More hands-on technical training]

It's just a problem when you get new software, there always seem to be some very important information, some small piece of information that's either only mentioned once in an exercise or not even mentioned because the person writing the manual assumes that you already know... It seems like there were small things like that. Like I had a student that could not even log on because they had forgotten their password. And it seems like we should have anticipated it, or someone should have anticipated it but someone should have a record of all those passwords. I had students, spending 25 minutes, trying every possible password they could imagine because they couldn't remember.... Like last time we used it, the printer was down. I didn't know that the printer was down in the room and it was actually supposed to be switched to another printer in another room and I didn't know how to switch it….Stuff like that. It's not something that you'd know to ask at a training session. But maybe it's more, like maybe some of that stuff could be printed out and have like some instructions for trouble shooting next to printer or... There should be some way to get around it. Those small problems... It's easier for me to just completely give up on it. Especially when you're working with a whole class….It seems like someone should think, "What could possibly go wrong and what should a teacher do, or a student do" I mean they have that on the back of, like when you buy a new stereo. It seems like that would be a good idea…. If you're really gonna have something happen collaboratively, the only way to do it is to have some sort of off period together. Cause you can't do it after school. [More technical support; Time]

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## 2. Teacher Utilization and Perceptions of Student Mentors

A key aspect of the CIRCLE model training program was the use of student mentors [students trained in the software] to provide on-going training and support to teachers and other students. The concept was that the student mentors could help teachers learn the programs and can do technical things such as set up programs, help with operation, etc. The student mentors, therefore, were a resource, available in the school itself, for teachers and other students. Because there were fewer formal training sessions in year 2, it was anticipated that student mentors, like between teacher collaboration, would take on a larger role in training and support in the second year. Teacher responses to questions concerning the student mentor model are summarized in Table 2.

Of the nineteen teachers questioned (one teacher trained the mentors so did not use them himself), approximately half (10) made fairly extensive use of the mentors and half (9) had no or only limited use. Responses to how mentors were used, suggest that relative to year 1, the mentor role expanded. Like year 1, the most frequent reported use of the mentors was to do technical assistance. However, more teachers than in year 1 indicated using mentors for helping with teaching

or for training or assisting other students in use of the software and doing lessons. The use of mentors for these other activities beyond technical assistance was more likely to occur for teachers who reported more use of mentors. Also, the use of mentors for all activities, but especially for activities beyond technical assistance, was more likely to occur for teachers who reported having mentors in their classes full time. Mentor use was also associated with software use, with those teachers who used the programs more reporting more mentor use of all kinds. These trends suggest that mentor use, at the first level, is associated with software use. This is not surprising, as use of the software would seem to be a prerequisite for needing mentor assistance of any kind. What is also seems apparent, however, is that the more involved teachers were with using the software and the more involved they were with their mentors, the more uses they found for mentors.

This appears to be mediated by mentor access. Teacher's responses strongly suggest that perhaps the most critical factor in use of the student mentors was access to them full time in class. Those teachers indicating the most and most diverse uses of mentors also indicated that they had mentors in their class, either a formally designated one or an informal student who could serve as one. Also, when asked what problems were encountered, the most mentioned difficulties were in scheduling mentors to come to the class. As well as the specific references to scheduling, access difficulties were mentioned as an aspect of two other problems, under utilization and mentors not showing up, and mentioned in comments by teachers who did not use mentors about what they would need to allow them to use them more, specifically the references to a need for better recruiting. All of these responses point to access as critical for the use of mentors. Access difficulties do not occur if the mentor is available in the class full time. Besides scheduling and access difficulties, the remaining problems that teachers indicated did not conform to any clear pattern.

**Table 2**
**Teacher Responses to Questions Concerning Use of the Student Mentors**

**In what ways did you utilize the student mentors to assist you or your students with learning how to use the various computer programs or operating the computers or programs?**

| | |
|---|---|
| Did not use | 4 |
| Very little use of mentor | 5 |
| Some use of mentor | 6 |
| Frequent, regular use of mentor | 4 |
| Not relevant because taught mentor class | 1 |

**Ways student mentors were utilized.**

| | |
|---|---|
| Technical assistance | 10 |
| Helping with training, assisting students | 6 |
| Assistance with teaching | 3 |
| Learning software | 1 |

**Comments (by response category with type of utilization indicated in brackets):**

*Did Not Use*

I haven't really...I just haven't gotten started.

I had a student mentor the first semester.  She went to one meeting at UT and then she transferred out of my class. You see the trouble with that was, even when [she] was here, she was interested, but I had a lot more expertise than she did. So, you know, we have two kids here that are real geniuses with computers and they're real helpful to the teachers when they're having problems. And certainly if they'd been there with me that would have helped. I don't know.... I never really got keyed into that student mentor thing...It wasn't that I had a bad one.  I just didn't have one.  I had no one.

This semester I did not have a student mentor.  Last semester, [Teacher X] had assigned me a mentor who never came into my room at all.  The previous year when I was not part of the CIRCLE grant he assigned me a mentor, but that mentor never came and asked anything or showed me any part of the software or anything else.  So in that respect, I guess I got zero help from the mentors.

[Student X] was the only student who made himself available to assist me during his personal time.  There were times when I could have used him during his CIRCLE class time; however, his instructor indicated on several occasions that he had an incomplete project which required him to remain in class.

### Very Little Use of Mentor

I had one really good student mentor who would come into my class and occasionally help me direct the kids through the lessons.  But I am not in a classroom, I am a floating teachers and therefore I think that has defiantly had an impact on my use of the computers.  It was difficult for me to feel real comfortable, in fact I am only in three rooms with computers during the day and I have four classes.  So in one class I would have to switch rooms with another teacher in order to use the computers.  But I did use the mentor once to help me direct the kids…She directed the kids she did not help me set up anything.  But I know there were some kids in the mentor club that typed in names… I felt more comfortable with the software and directing so I didn't use her [mentor] as much.  I felt badly about it because I knew she enjoyed it, she wanted to be more involved then she was  She was a mentor last year and she did a very good job. I think she really wanted to be involved more. [Assistance with teaching]

I didn't really use the mentors because most of the things we did with the computer did not require setting up special programs or assignments or anything like that.  I did, of course use students, there were always students in each of my classes who could help or assist other students.  They were not necessarily chosen mentors.  And to be perfectly honest, I was using primarily Daedalus and by November, most of my students were fairly fluent with the Daedalus and required very little assistance. [Helping with training, assisting students]

I attempted to use my student mentor last semester, but I saw him once during lunch and that was it…Then I never saw him again period…My present lab management student was in it last year so he was real familiar with stuff.  So I would talk to him, but he didn't have a class (CIRCLE class) or have extra time to come in to help me really…It was nice to have my lab management student in my class because I could to tell him to monitor the other students while they were doing it and help them out when they need it because he knew what was going on. [Helping with training, assisting students]

The most successful thing we did,  you know I generated all the questions and he put them in and then we spent a lot of time actually getting on the computers.  The kids enjoyed it.  It was fun.  But it was a lot of effort on his part to set it all up and get it started.  [Technical assistance]

I hope to become more technologically capable of teaching students how to use it.  Right now I'm going to have to ask them to teach me how to use it and [mentor] has taught me a few things… There are a number of students who know more than I do about how they work and how to get them to do what you want them to do.  They're not all involved in the CIRCLE grant but wherever I find them, I utilize them.  I can't think of any specific individual at this point.  Oh, [mentor] in my 4th period class has been helpful to me and to other students as we've been working with word processors and she's been very helpful. [Technical assistance; Learning software]

### Some Use of Mentor

The seniors when they did their own book project wanted to scan pictures into their books and [mentor] attempted to help do that….She wanted to do that on her own book. She was helping at least 2 or 3 other students who wanted to do the same thing…. I did have a sophomore student in my 4th period class and since that was one of my most difficult classes to teach, I always appreciated the fact that he was there because even when we went to the computer lab just to do word processing, he was always there to help others and I continue to see that they are wonderful about helping one another. [Helping with training, assisting students]

[Mentor] helped me on this computer sometimes. Sometimes with simple stuff like transferring grades. Then I had my own personal computer crash during the semester and he helped me with cables. He was very helpful with the technical stuff… [He] just has more technical knowledge than I have. I'm a computer user, but I'm not a programmer so there are definitely times when I get frustrated with it and that's when you want to go to a whiz kid who really plays around with computers and knows things. That's what [he] is. Usually in every class, I'll have one or more kids who really knows things. [Technical assistance]

You could usually find them out there somewhere in somebody's room they could come and see why this wasn't working or to fix it. [Technical assistance]

I used them primarily to set things up. If I needed to set up something in Daedalus I would have them enter in all the class names set up the classes, set up how we would enter in the passwords, but as far as the actual lesson posting the assignments and that stuff that is stuff we learned how to do that's stuff we were trained in so I didn't need them to do that sort of thing. Other then that I really didn't really… If there was a problem. If I thought something might have crashed ... I could pull them out of class and they could make it OK again. How they did it I don't know. They could fix it and everything would start working again. You know they helped set up a book talk conference on TeachNet and that sort of thing. [Technical assistance]

I did ask a couple of the mentors and they helped me with a few things, mainly the hardware and the software of the computers, just making sure I was doing the right thing with Tenet and other things… No problems and they were always extremely helpful and they always came...Usually it was I didn't hook up something right or I hadn't understood some instruction correctly and they were very patient and they never made me feel that I was as stupid as I was. And they seemed to get a charge out of being able to help someone who was supposed to just help them. The roles were reversed and they seemed to really enjoy that. [Technical assistance]

Basically, our network maintenance person was a student mentor. Thankfully, we had him because we probably would have never had this network running if we hadn't. So we all used him constantly. And then I personally used my mentors mainly when we were doing the SME project and actually talked. I mean I had this going on over here and the mentors sat on the computers and taught people how to get on-line and how to communicate on-line. That was really kind of the extent of it this year. My understanding is next year they're going to create a class. And that's going to help us because then we will have a certain time of the day every day with all those kids together. We can go to them and say "I'm going to be doing this unit on this. I need you to go and set up my interchange, etc." I think that's going to be helpful. That's a good step. [Technical assistance; Helping with training, assisting students]

### Frequent, Regular Use of Mentor
Well they were invaluable. I wouldn't have been able to it without them really. We had a problem at Westlake where the wiring was not put in with the phone lines until January and we really did not get the computers until the end of October so my mentors, I had 2 mentors- [Mentor X and Mentor Y] who have been wonderful. They helped pull the computers out of the boxes from the word go, got them set up, plugged in. They were both very knowledgeable. Then Mentor A and Mentor B, who are, I guess, beyond anything you could ever imagine with their computer knowledge have really just kept those whole systems running for us all year. They come in after school, they're here every Monday afternoon for mentor meetings. Anytime we need them we can pull them from another class. We sort of have that agreement with the people from the project and they can come in and help us with any trouble shooting that we need. I think they were just wonderful and I really saw how kids change their whole attitude about computers just being for nerds as a result of how the mentors worked together so they were utilized on a daily basis…One thing is that when we would start the project, if we were going to do an interchange that day we'd let them be free to walk around behind people and just say, "[Mentor Y], will help [if] you need it", as a teaching aid service. The other way is that they made

themselves available.  We tried to give them a week's notice if there was something that we wanted to do or set up and they would make themselves available in the afternoon and come with us after school because I remember one day we were here very, very late and the next day we just simply asked "can you come in and help us?" and we accomplished the work in a third of the time that we needed to do.   [Technical assistance; Assistance with teaching]

The mentors did everything from formatting disks for other teachers to setting up class names, rosters, and topics on the computer they set up every student in all of our classes, every one in the CIRCLE project classes, and the at easy set up and in the Daedalus and LeapFrog, or Co-Learning setups.  They managed the accounts that we were working on TeachNet, our conferences that we did for our research they were moderating all the conferences and days that things were locking up we would meet after school and they would try to debug those and get things fixed up.  They made banners for the teachers related to the research, they have done a number of things for the teachers what ever the teachers have asked for they have done. The most significant thing was just last week they planned a presentation which was very professional, they did a beautiful job.  And the set up here and got an LCD panel to work that hasn't worked in two years and planed this whole presentation and made handouts, went over it three or four times, we sat up here till eight o'clock two nights last week and got it just fine tuned, so they could teach, these were mostly freshman and sophomores, so they could teach seniors to use the Co-Learning software, and even though it crashed today the presentation was wonderful it was excellent. [Technical assistance; Assistance with teaching]

When I used the computers in the classroom, the students who were mentors proved to be extremely helpful because they would be the ones who would jump right in and model the correct usage for the other students who would then become comfortable enough to not need the mentor's help. But that certainly, as an icebreaker, was invaluable… Again since I had very little problems with either the technical Macintosh platform and very few questions on using the software, I didn't have to go to them as a support structure.  I believe other teachers did and so my knowledge kind of biases me against needing that particular resource which was constructed. [Helping with training, assisting students]

There were a lot of  times when the mentors came into  the labs and helped with a problem and then they monitored other students. When the students were first using the software a lot of the mentors were kind of lab techs. They kind of moved among the students and showed them how to operate the systems.  So they were very helpful in that respect. [Technical assistance; Helping with training, assisting students]

**For those teachers indicating little or no use of the student mentors: What things would you need, such as time, school support, technology availability, etc., to allow you to use them more?  [Four teachers responded]**

**Comments:**

*Better Recruiting*
I need the right kind of students and I need the system to work.  We're just now getting to that point.

Well, I don't know.  I tried to sell this thing to students, to be mentors, and none of the students seemed very interested.  And yet other teachers were very successful in getting students interested in being mentors.  I think that might be partly because I wasn't clear exactly what the mentors did. [Teacher X and Teacher Y] had a very clear idea of how their mentors would work.  I think that the recruitment of mentors should have been by people who had a clear vision of what they were supposed to do. If [Teacher Y and Teacher X] had come in and talked to my class, they probably would have gotten a whole bunch of kids to be interested.  And it wasn't like I wasn't trying hard.  I was!  I just couldn't explain it.

*Better Training*
They definitely have to have training before they help us not while they are attempting to help us.  Whether or not this is feasible, I don't know.  But I think that would be the most helpful.

Student mentors must be accessible and must be knowledgeable about the software, regardless of the type of hardware used.  My experience has been that student mentors are misinformed about the use of the IBM; therefore, they are not being exposed to both systems.

**Were there any problems with using the student mentors? [11 teachers indicated problems, one teacher's comments in previous question]**

| | |
|---|---|
| Hard for teachers to relinquish control | 1 |
| Mentor not showing up | 1 |
| Fixed problems but did not train teacher | 1 |
| Inadequate mentor skills | 2 |
| Scheduling | 6 |
| Mentor competition | 1 |
| Under utilization | 2 |

**Comments (Type of problem indicated in brackets):**

One problem may be that there are other teachers who feel as I do. You are always nervous when you relinquish control into the hands of a student. Now, I am a big fan of the student mentors. I know they know twice what I do, but I'm not always sure that they have the writing and reading skills to go along with it… That would be one of my nervous feelings about student mentors, but on the whole they are remarkably adept and they are wonderful as backup. [Hard for teachers to relinquish control]

One of them is assigned to me but he never comes to school. Bad choice. [Mentor not showing up]

I must say the mentors I chose did not work out real well. They did not end being involved project CIRCLE mentors. So I ended up not relying on them a whole lot. I actually used the more visible mentors such as Mentor X or Mentor Y something like that….None, no they were great. I guess I might have said that a little quickly. The only thing I would have like better, this doesn't speak for all of them but some of the mentors are so adept at what they are doing they do it so quickly that they forget that they need to do it. So abracadabra its all done but I am still a little foggy about how its all being put together. that's difficult. Making them really aware that they have to really slow down when they are dealing with someone who is illiterate as far as most of this stuff is concerned. [Fixed problems, but did not train teacher]

I felt like his skills were even less adequate than mine. I knew more about using the computer than he did, and when I asked for some of his input on what kinds of things do you think would be good for my students to do or what kinds of programs should we try, he didn't really have any…. also maybe I misunderstood what the CIRCLE grant class was set up for, but I was under the impression that they would be helping us during that time or they could come work with us during that time which it didn't happen at all….But I really didn't get anything out of my student mentor. It was nice to have my lab management student in my class because I could to tell him to monitor the other students while they were doing it and help them out when they need it because he knew what was going on. [Inadequate mentor skills; Scheduling]

…In the spring semester, he [mentor] was not in my class anymore, so then it became more difficult to use [him] because I didn't see him everyday. It was more difficult to use hem when he wasn't physically in my classroom. [Scheduling]

I don't think any of the problems we had were because of the mentors. The mentor program is one of the strongest things, in my opinion. It has been both years. So I don't have any problems with the mentor program. The only thing we would run into is we get them and train them for every class period the first semester and then they change their schedule and you end up with no mentors in one class and another class where you have four. That's our only issue. [Scheduling]

Since our mentors are not in a group they are just randomly picked out of classes and since they weren't always in my room. Just if there was a problem we would try to find them. You could usually find them out there somewhere in somebody's room they could come and see why this wasn't working or to fix it. But as far always having one when ever the kids used the computers, there wasn't always one in my room as far as actually training other people they didn't do a whole lot. [Scheduling]

I also think that the students were to a limited extent, and this is where they could have been used much more, is as a

critique of our own usage since they understood what could be done with the software. They were in the perfect position to be able to comment to the teachers as to what was appropriate or inappropriate, good or bad usage of it, and I don't think we used them that way. Another, I want to avoid being, I want to be critical without criticizing others, but the way in which at Travis, all the mentors were funneled through one course meant that there was very little, I wouldn't say none, but very little interaction between the student mentors extensive efforts and the teachers' extensive efforts. They almost worked in separate spheres. They did not interact and I realize that it was very difficult for [Teacher Y], in addition to teaching them software to also make sure that they were interacting, but I would see that as one area in which we failed to do what we should have done. There was a world of student mentors and a world of teachers and never the train shall meet. It just didn't happen very often and I think that was very frustrating for teachers who were new. And I don't know how we could have gotten around it , but that's something we'll need to change…Other than having to pull them out of class, their own classes, which can be very frustrating for teachers not involved with CIRCLE, that is I would walk in, or say [Teacher X] is doing something, I was teaching a class so I would want a student mentor to help that teacher. I would go and pull them out of a math class and that math class would have nothing to do with CIRCLE, and that math teacher would understandable say "well why are you pulling this student from my class?" They, as students, their primary responsibility is to continue to learn and be in class and though they enjoy it, it was inappropriate at times to pull them away from things so that was the only problem. A minor one, and one that I don't see a way around, but that's what I see. [Scheduling; Under utilization]

I think at Travis it was not as successful as we would like to have had it be. It was not the fault of the mentors. It was the fault of teachers who quite often didn't call on the mentors and use them. That's said as a general concept. We did have a number of student mentors who were really active in the program and helped teachers who specifically wanted that help….I think it was just that we had a number of teachers in the CIRCLE program that really, only sporadically used the technology and they had students in their class that have, you know, used it. There really weren't that many serious problems. They just didn't, um. They would call upon one of the other teachers usually, like my self or [names other CIRCLE teachers] to help them set up the programs rather than calling a student. Some times we did that because it was a short time though. [Under utilization]

The biggest problem was competition among the mentors they all want to do it their way and they have a lot of trouble delegating responsibility and dividing it up and so sometimes I would have to separate them and say "you're in charge of this and you're in charge of this" or not let them work together on various things because they all want to do it their own way they all wanted finder access. That was kind of interesting it was a lot of conflict management in some of our mentor meetings about things like that. [Mentor X] would want to configure the server in a certain way and [Mentor Y] would say no we want to do it in another way and so we would get into this long argument about which was the better way to configure something-or-another, and it was so technical I usually didn't know what they were talking about but they had strong opinions about the way it should be done. [Mentor competition]

## 3. Teacher Perceptions of the Self-Sustainability of the Model.

### a. Strengths and Weaknesses of the Model

The CIRCLE model training program was designed to ultimately become self-sustaining. As conceptualized, the initial group of CIRCLE teachers and student mentors would form a core group, who could expand the training, through collaboration and use of student mentors, to other teachers and students in the school. Teachers were asked their views on the viability of the self-sustaining aspects of the model and whether they believed the model could continue after the grant itself ended.

Teachers were asked what they perceived to be the strengths and weaknesses of the CIRCLE training model. Their responses are summarized in Table 3. Teachers expressed a variety of strengths. The most mentioned were the two primary aspects of the model: collaboration and the involvement of students through the student mentor program. Teachers also saw the model fostering spread of technology and increasing technology availability in their schools, as well as fostering innovation and generating excitement. Most of the strengths mentioned were consistent with the goals of the CIRCLE project to increase collaboration, involve student mentors in training, and increase technology use in the schools. That teachers saw these as strengths suggests that the training model was successful in producing at least some of the hoped for changes.

Teachers identified a variety of weaknesses. Most weaknesses identified, however, dealt with specific details of the implementation of the model rather than with the general framework of the model itself as a way to do training. Three indicated weaknesses stood out. The first was training thoroughness. Teachers perceived a need to have more thorough, in depth training. The training model envisioned formal training sessions as providing an introduction to the software and teaching approaches with the details filled in through collaboration and student mentors. The previously discussed responses to types of collaboration and use of the student mentors, however, indicate that most of the follow-up to the formal training sessions dealt with lower level technical aspects and trouble shooting. Thus, it appears that collaboration and student mentors did not fulfill the role of expanding on the training as effectively as hoped. As a result, teachers saw a need for more of this technical detail and thoroughness in the formal training. Second, teachers, as in year 1, also indicated lack of time as a significant weakness, suggesting that the training model did not build in sufficient time for collaboration and the more in-depth training aspects envisioned. The third weakness dealt with a more philosophical issue. Teachers saw a need for overcoming established practices and ways of doing things in their school before the model could spread. The model did not specifically address these institutional change aspects and teachers perceived a need to perhaps more aggressively confront established views and do more to make the program more visible in their school.

Fourteen of the teachers were asked how the training model compared to other more traditional types of technology training they might have received. Five of these teachers indicated having had no other type of technical training to compare to. This left only nine teachers who were able to comment, therefore, their responses should be treated cautiously since a majority of the teachers did not respond. All but one of those responding thought that the CIRCLE model training program was superior to traditional in-service types of training, with most citing the hands-on aspects of the training and continuation of the training in their classrooms as reasons why it was better. Although

based on a limited number of teachers, these responses do suggest that teachers have positive perceptions of the training model relative to conventional training methods.

**Table 3**
**Teacher Responses About the Strengths and Weaknesses of the Training Model**

**What are the strengths and weaknesses of the CIRCLE training model of collaboration and student mentors as a way to do technology training and support in your school?**

**Strengths [15 teachers responded]:**

| | |
|---|---|
| Collaboration | 7 |
| Student involvement | 6 |
| Increases spread of technology knowledge | 5 |
| Increase technology availability | 3 |
| Fosters innovation | 3 |
| Excitement | 2 |

**Comments (by teacher with coded category(s) indicated):**

Certainly you have more eyes and hands and brains to put out there, to get the information out. It's the same kind of thing we do in our classrooms with collaborative learning. Sometimes it's easier to learn from a peer because you're more willing to ask them questions and you're not as afraid to that. And just the fact that we're close to where education happens. Teachers are close to where education happens and we know really where the students are and what the needs may be so we can more specifically direct the teaching to those needs. I think that's helpful and we can talk teacher to teacher to see what those needs are and how we can best address them. [Collaboration]

I think that [collaboration and student mentors] would work…I liked the fact that there was not an awful lot of pressure put on us. I thought that was handled very well. That it was supposed to be very experimental and it was see what you can do with what you got um. I think for the purposes of what we are trying to do here, I think that Travis is set up quite differently than we are, you know in some ways you look at that and say this is a good way to find out what works and what doesn't because our set up is different then theirs. [Fosters innovation]

The strengths are that it really does begin to permeate what's going on and I think other teachers watch the mentors, the teachers working together and the classes involved and they become interested and want to participate…Because I think when students are involved in a project like this and once they see that it is fun, that they can say some things that they might not say aloud in the classroom, that they're able to have an interchange and get feedback on something that they think is very exciting, then they begin to believe that this is an important thing. And when students collectively are feeling that way, then students in other classes want to participate in it and it's, it's something that if you're not a part of it, you know you're missing out and I think teachers have begun to feel that way too and that wasn't the feeling last year when the model was, a lot of us said we were willing to do it and we're willing to give up something in order for it to happen and people began to look at it and see the excitement and what was going on and so, I think that's the positive part of it and it creates an interest, a lot of change. [Collaboration; Student involvement; Increases spread of technology knowledge; Excitement]

The strength is without other teachers and students around here, I never would have had computers in my room in the first place. So obviously, you have more access to technology when you have other people helping you. [Collaboration; Increased technology availability]

There was some excitement in actually being involved even when there were some problems. [Excitement]

I think it's real strong in terms of collaboration. I am not, I do not completely buy into the constructivist model of learning and so I am going to have some philosophical differences in how people learn than what constructivism does. But where I agree with it is that people rebuild models of reality. I don't think it's as isolated, perhaps, as some of the constructivists do.. I'm more of a social constructivist. And in that sense there is a strong support between the

constructivist model of learning and what happened here because in the end the teacher was left alone in a room with a bunch of computers and students that didn't know what they were doing and they had to build how this class, how this event was going to occur. And every teacher had to come up with unique solutions even though they had common training. And that is crucial. They have to reach a level of comfortability, level of comfortableness, that is for them. And if they never reached being comfortable with the software and the hardware they simply stopped using it. I do think that probably happened some but that was not the vast majority. I think most of the people did reach that level of being comfortable. I tried to address both of them. The strength is that teachers do have to construct what they're doing so the model is appropriate. [Collaboration; Fosters innovation]

Some of the strengths are that it involves kids. It involves teachers collaboratively, it allows teachers and students to have a voice in the type of training that we have. And it allows us to play around with the software in the way that we feel is appropriate for the different classes and curriculum. [Collaboration; Student involvement; Fosters innovation]

The strengths -- I guess it would feel more like we are doing interdisciplinary things if we could get more involvement of the students and teachers collaborating from the different areas. Not just the science but the social studies and the computer department. That is one of our goals at Travis to do more interdisciplinary stuff and I think that would be real effective for that. Also to increase our ability to use technology and to be aware of what technology is available here. Which is still pretty limited here at Travis. I think that is a big strength. [Collaboration; Student involvement; Increases spread of technology knowledge; Increased technology availability]

I think I've already mentioned what basically the strengths are. You get peer teaching. [Collaboration]

I think it will continue here. I think that speaks for the strength of the program because the more familiar we become with the software, the more we'll use it. I just think it takes a lot of time to get it started and to get teachers feeling comfortable using it. [Increases spread of technology knowledge]

I think if the teachers and the kids are sold on the idea, yes it will keep itself going. Every piece of software I use in here, if the kids like it they pick it up from each other and from me and learn it and it keeps sustaining itself. [Increases spread of technology knowledge]

I think that's really ultimately the only way things spread and especially technology. [Increases spread of technology knowledge]

I think it's fantastic and I really think it's good …I like the student mentors because they really know more then we do and I have always used the students to help with picking up things 'cause they pick it up faster they are more in tune to computers then we are. [Student involvement]

Our students here, with limited technology have got a lot more than many schools because of the grant because of trying to build technology. Our kids, having the CIRCLE grant, has made them a lot more technologically advanced than some of the other schools in richer districts. We have some kids here that are doing computer design that is beyond college level. [Interviewer: So you feel that one of the strengths is just what the kids get out of it and their own learning?] Just using technology. Even if its' only a mobile lab, or using Claris Works to write papers. I have kids that are getting experience using computers for daily tasks that a lot of students don't get. That's one of the serendipitous result of the grant. When the it wasn't being used specifically for teaching, or Daedalus, it was available for these kids to use. [Student involvement; Increased technology availability]

I think the strength is getting the kids involved. I mean that's the whole point. Putting them in somewhat authoritative roles, I mean we're there helping to develop and define what Project CIRCLE is going to do and I like that idea. I like the idea of students helping other students. I mean that can apply to any learning activity. That's the sort of thing that's useful. [Student involvement]


**Weaknesses [17 teachers responded]:**

| | |
|---|---|
| Training not thorough enough | 7 |
| Insufficient time | 6 |

| | |
|---|---|
| Getting commitment-overcoming existing practices/priorities | 6 |
| Lack of technology access | 3 |
| Not enough technology expertise | 2 |
| Did not train with students | 2 |
| Insufficient incentives | 1 |
| Lack of reflection | 1 |
| Mentor - teacher relationships | 1 |
| Lack of collaboration opportunities | 1 |

**Comments (by teacher with coded category(s) indicated):**

I think common time is probably the biggest problem we have. Time in common and the need to prioritize this above some other things that are going on. It's sometimes hard to make that commitment, to say we're going to let something else go. Or we're going to let several other things go and we're just going to focus on this. That's tough to do. I would say those two things. [Insufficient time; Getting commitment-overcoming existing practices/priorities]

I think that inertia is one of the major detriments. We've been doing things the same way for so long that teachers have their lesson plans developed for so long and to, I mean, even though they went to the training and got paid for the training and they were given some really excellent opportunities, when it came down to using the time, their professional time to develop lesson materials, it was a burden. And so consequently many of them only did the superfluous kinds of veneer kind of things…To be perfectly honest with you, I think the draw back for teachers is that even though the teachers were paid for the training, teachers are professionals and when you ask teachers to devote time you need to be able to compensate for that. And that's one of the things that if the grant had a weakness, that's probably it…People need to be paid for professional work. And I don't think that anybody would disagree with that. But we are just now going to do that as kind of a conclusion to the grant. I think in the long run it will pay a great dividend. [Insufficient incentives; Getting commitment-overcoming existing practices/priorities]

The weaknesses of that, in our particular situation, the overcrowding situation, the sharing of rooms that we've had to encounter here. As being a member of Project CIRCLE you had to be willing either to not have a room full time or you had to be willing to share it with someone. And that has been a weakness. Time for planning, I think there needs to be more time. Students at this time are willing to give up some time after school and go to those meetings. Our district has been good. The strength of it is that we were given 2 days to plan, but it's still not enough time and a lot of teachers are hesitant and I think students too because of the pressure of everyday responsibility. Am I willing to give up that time or not? [Insufficient time; Lack of technology access; Getting commitment-overcoming existing practices/priorities]

The weakness I would say is if you don't have time on Saturdays that is set up for you to go learn programs and you don't have a specific time set aside to do the work then I can imagine it wouldn't get done. Even with those Saturday sessions, I still don't feel that I'm completely familiar with Daedalus and a couple of other programs because I use it a lot less frequently than MS Word which I probably use every other day. [Insufficient time; Training not thorough enough]

The problem with spreading it is not that teachers won't spread it, it's time to learn it and time to teach it, and it's availability of equipment. If I'm a teacher across the building and I have such a huge workload, I'm not going to put a lot of time into learning technology that I don't have access to. This year we went for 2 teachers to 18 or however many. So we had this growth explosion this year and I think we haven't quite caught up with that. I think we need another year to ease into that before we start trying to spread it among other people, although we are adding a teacher next year who will be the mentor's computer ed. teacher. I think the kids naturally spread it among themselves. I'm not sure that we have used all of the technology enough to be able to convince other teachers that its really worth investing in. I think we need another year to kind of learn it ourselves. We haven't had our networks this year so we haven't had a good opportunity. And once we have some time to do that, then I think definitely it will spread that way. [Insufficient time; Lack of technology access; Getting commitment-overcoming existing practices/priorities]

The weakness being, there was no point at which the teachers, in conjunction with the students, were forced to reflect. All reflection was removed from the classroom setting to weekend workshops, whether it be at UT or here. I don't see the physical setting as important as it simply was not what they were doing in the classroom. It is one thing to be with

peers. It's quite another thing to be alone with 30 students and only 12 computers, or something else. [Lack of reflection]

My only comment is: When are we supposed to have time to do this?…The only comment I have to CIRCLE is we haven't had enough chance to try it or try it with an expert around. I don't have a very high opinion of the mentor thing just because the mentors that I was assigned never came to me. But I also feel that in my case, except for 1 or 2 special programs, I knew more than the mentors did. For teachers who had no or very little computer experience, the mentor part probably worked fine, but I can't speak for them. As far as more training, I want more Daedalus time, but I want it to be thorough enough that I feel confident when I walk out of there. [Insufficient time; Training not thorough enough; Not enough technology expertise]

My only problem is that I was the only person in math and nobody seems to be able figure out how I could utilize it so I had to come up with all the ideas myself. In the first year I just did not have it together enough to come up with them. Now all year I have been looking and thinking about every time I covered something "how could I utilize Daedalus?". And so if I had thought about this last year "How could I utilize Daedalus?" then probably for sure I would have been prepared and had some ideas and would have been able to ask the right questions. This year I didn't even know what questions to ask. [Lack of collaboration opportunities]

But a really big weakness as far as I am concerned and it's being self sustaining this is going to be a big problem is that the mentors pretty much know the same thing the teachers know like how to log in or how to set things up, you know basic software functions of the, the application, and we really do need, and you know this is just, we absolutely feel strongly about this, that we need an on-sight Labby or something, a lab assistant, someone who knows more about the computers then the average mentors or teacher who really is a technical person and can trouble shoot things like this. Because the teacher who tried CoLearning today, for example, said "If this weren't the end of the semester I would have to, you know, this would totally mess-up my lesson." she said "we go at such a pace that we can't stop for technical problems like this. I would immediately throw this out because we can't waste time waiting to see if this will work or not." We all feel that sense at school that our jobs are to teach and we have a lot of stuff to cover and if the computers are going to screw-up then we don't have time to fool with that we don't have the training the know-how, we are subject matter teachers. And so unless there is some more technical support I don't see it being a good self-sustaining model. …The fact that it is long session you know a whole day or a half-day and that we are with experts from UT. The kids, it's the only problem and I understand, you know because it's a space available issue, is that the kids are trained separately from the teachers and the one time we got together with the kids we were all at such different levels it's really hard to get that many people in a small room and all be working on different things but more of that is precisely what we need. You know, we have so many different kids some many teachers with different preparations planning things that we need to be allowed to work on it play around, specialize, involve the kids and do a lot more that we feel that we can actually take back to our classrooms. If we just have a general here's Daedalus thing it's not as helpful as saying what can we do with this, you know in curriculum and how can the students help and exactly... lets sit down and plan all this. And so it was a problem to go to UT and have a training session and come back here and not have any time to practice on it or meet with the kids or other teachers to actually implement it. [Training not thorough enough; Not enough technology expertise; Did not train with students]

The weaknesses, I think, because it wasn't until Jan or Feb that we could really get started going. I don't think there was enough initial enthusiasm. I mean there was enthusiasm but because the technology was not there, it was not in place, I think the enthusiasm may have waned. Whereas I think if the technology had been there in the beginning, with the computers all working, up and running, that we could have maybe built on that a little more, but since it was January or February before [Teachers X, Y, and Z]could even really use their computers. See that's the irony of this whole situation. [Teachers X and Y] really are two teachers who one know the program really well and are interested in integrating them into their curriculum and yet they couldn't because they didn't have their computer. And I think they're probably more interested than anyone in using the mentor program and they were unable to because they had no computers. Next year hopefully that'll be different. I mean that'll be different next year. [Lack of technology access]

I think what we are doing would have to be made more visible to the rest of the school so that people could become excited about it and want to become a part of it. Because I think in order for them to dedicate the time to sit here after school and learn to use the equipment they have to see wow this is exciting stuff and I can see how to use this in my classroom and what I think - showing what can be done in the English classroom is great but I think teachers would need to be shown specifically to their subject area how all this stuff could be used in their subject area. …. One thing I would

say about that training (at UT) that could be improved on is  - I felt, similar to what I just said about what other teachers would need, I don't think we as teachers coming into the Project CIRCLE thing had enough, maybe it's because we were the first people doing it, I know actually we weren't the first people using Daedalus or CoLearning or anything like that I mean that software has been out there, but it would have been really helpful, in some of those sessions, to me to see a lesson completed from beginning to end and to see something concrete in front of me rather than being told how to set things up and theoretically one could do this and theoretically one could do that it was very, very abstract. Having some concrete models to follow would have been very, very helpful.  Completed lessons where you see it working.  The training itself would have been better had it perhaps been more frequent and for less hours. Because I think what tended to happen for some of the sessions you know it tended to be a lot of theory and then some hands on stuff. And then we would especially the first time we went away and we were supposed to try to use the stuff in our classrooms and it was really a very long time before we had any training and I had not had enough training, myself, to feel comfortable doing much of anything in my classroom. So I would really, I think a better way to go about that is more frequent training for more hours and something really set up were you set yourself a goal during that first training session and you say your going to work on this lesson and when you come back your going to all sit around and report on how that lesson went in class and we are all going to show what we did and share what we did and then go back and do the next step and we are all going to come back again and show the steps you went though and what you did.  Because I really felt like I didn't get a whole lot out of the training. [Getting commitment-overcoming existing practices/priorities; Training not thorough enough]

I felt like I was spinning my wheels at first just playing with some of the stuff.  I was real confused about how to use the software or how to create lessons using the software because it was constructivist type of mold where nothing was constructed for us, we were supposed to construct, but it would have been nice to see some samples, that's all. [Training not thorough enough]

I still feel that we're not close enough to the students. I believe only once last fall did the teachers and the students from the same show meet together and train together.  I really feel that maybe we ought to do more of that.  Once we're caught up in the chaos of teaching, it's very hard to keep in touch, for me at least, with students….I would have appreciated this semester had the student mentor come and just checked with me on a regular basis.  What do you need …?  What projects are your classes working on?  How can I be helpful?  It would have been a way of keeping me looking for that opportunity to use the technology in a natural way.  Not just sitting down and dreaming up something because it would use the technology and I feel I should.  But if that reminder were there on a regular basis, it would feel natural and it would just become part of my regular planning mode to think about doing that.  Consequently, I didn't do as much as I would have liked this spring. [Did not train with students]

Weaknesses first.  I guess if I don't feel real comfortable with my own knowledge about it yet then it makes it real difficult for me to train others, but I know there are people here now who can help me like [Teachers X, Y, and Z] and then eventually I could help train others.  But I feel like my own understanding and knowledge on how to do this stuff is fairly limited so that would impede any training I might do…As far as the student mentors.  I don't see really any weaknesses to that model of having the students working with teachers to try to incorporate others.  I don't see any weaknesses. [Training not thorough enough]

But the focus was on, "You're gonna all be able to get on and talk to each other.  It's gonna all be set up for you. " Then you get back here, and there's tiny differences in how you log on, how you use it here. And there's these little tiny things.  And so even though we knew that there was this sort of neat thing that could go on here, it wasn't very clear to me, I wasn't confident in how to turn it on and get to that point.  It seemed like the training was focused on flash and not how we really go about doing it, in order to really implement it in the classroom itself.  At lot of the initial steps we went through really fast….I just feel like I'm being really critical.  It just seems like there were differences.  Maybe I'm not even right abut that.  But it seemed like when we got back here, things were slightly different.  And the manual would say, now go down the such-and-such menu to this and it wouldn't be there.  You know?  And other people who are more involved in it would say, "Oh, of course that means this."  But it just wasn't there like it was in the training.  That was a problem. [Training not thorough enough]

It's up to the student and the teacher.  The biggest problem that we had was the teachers.  I mean I had some students who tried to meet with their teacher the whole semester, but actually only met with their teacher only once because the teacher never had time for them.  It could be that they didn't see the advantage of even knowing how to use the technology.  Some of these were very computer illiterate teachers…The disadvantages are the time aspect and there

needs to be funding. [Insufficient time; Getting commitment-overcoming existing practices/priorities]

I think that one problem, and I didn't have it with my mentor, but I know it was a general concern was that so many of these kids are really technological whizzes and they really want to get a CD ROM and they think we're really stupid. "I mean you went to the workshop, don't you know how that works?" (both laugh) and so I think there's a pedagogical problem with having 15 year olds in charge of teaching 50 year olds. [Mentor - teacher relationships]

**How does the training model compare with other types of training and computer support that you receive?**

| | |
|---|---|
| Better | 7 |
| Somewhat better | 1 |
| Different | 1 |
| No Other Training | 5 |
| Not asked or no answer | 6 |

**Comments (by response category):**

*Better*
I like it a whole lot better. It's interesting and there's a lot of interest in it.

Well there are workshops and then there are workshops. I think any hands on, real time experience that you can get with a model that you're going to teach, or that you're using, or that you're facilitating is going to be ultimately more helpful than to sit in a chair and listen to how it's supposed to work in theory. I think that's a real strength of the type of training we've had. We've always been encouraged to get in there and try it. I would say do more of that. Do more hands on, maybe even have some formally assigned partners. I think it would have been good if I had, and perhaps I could have done this on my own. But said, "OK, this is my partner at Westlake and this is my student mentor" and maybe try to stay with a certain team over a year or two so we could have a direct dialogue within that small group or 3 or 4 people over a long period of time and we might have been focusing on a particular activity or we might simply have been reinforcing what each other was learning during that time, but I think that would be a really helpful thing to do would be to have an assigned team or a self-selected team to do it- to stick with over a period of time. I just think that would have been helpful. [Interviewer: It would have encouraged you to learn the software more or?] Yes. I think it would have reminded me that I was responsible for someone else's learning which would have kept me focused on some of the activities and working on them and trying harder to fit them into what else I was doing with teaching.

Well it's far superior because it's designed so that it becomes an application that's constructive. Other types, I've never really had any other type of computer training other than how to run software. I think it is really good.

The worst thing you can possibly do is do it in inservice in a coercive kind of way. I think people need to be receptive, they need to be willing because it's a big investment in time and energy. It's a new way of teaching and you have to have willing participants or its not going to be worth trying. I think its really the only way to do it is to let it spread out.

Much better. Much better. I mean so often the computer training that we receive is lecture and this is not a topic which one should be doing via lecture. So therefore, I find the model work much better. It was a much more realistic. It addressed in a linear fashion, or in a spiral fashion, not so much a linear fashion, but a spiral fashion, the way of learning a skill, applying a skill, refining the skill, learning another skill, etc. and I think that model worked well.

Most training on computers here is again, where teachers can chose what they'd like to learn but it's very short, maybe an hour session or two hours, and a lot of it's hit and miss because we don't have the software in our classrooms to practice on and this has been nice because what we've learned at UT we can come back here and work on when we have the time. That has been a problem this year since the classrooms are occupied every period we have not had the chance to get on and practice. And so that's something that could be improve here at the campus level we could not schedule every period full of a class every single period. But I think it's true that this training has allowed teachers to have a lot of input and say "well we need more time to study Daedalus." or "We need a day to just poke around and see what we can with what we know" and that has been really nice.

It's much more effective than an in-service or anything like that because usually you go and have your lessons on the computer and then don't touch the computer for months. You have them during the summer. This works a lot better because the students are available to be asked.

*Somewhat Better*
I do think that the only way thing to learn about computers is to get on the computer and DO IT. You know with someone there to keep asking questions and get answers from. I don't think you can learn out of a book. It's gotta be in the lab. I also think there's gotta be specific to the computers that we're actually going to have to deal with is a problem. I think there was a transfer problem for me. The little bit of introduction for a few hours that I had at UT in that lab (?)… kinds of computers and kinds of problems that kids can have with the computer.

*Different*
It's very different in that you are doing it with students. I've done other programs in the summer and during the school year, but those are almost always completely teacher-oriented so you're just dealing with other teachers. So probably too the technological aspect is different too. You're trying to deal with the machine where other things I have done are book-oriented. This is different in that students were involved and you were dealing with machines.

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### b.    Viability of the Model

A key second year evaluation concern was how much teachers saw the training model as a viable way to continue doing training in their schools. A goal of the CIRCLE project was that the training approach of collaboration and student mentors would become self-sustaining so that it could continue after the end of the grant. Teachers were asked about their views on the viability of the training model as a way to do technology training in their schools, what they would need to continue the training model, and whether they saw a need for continuing some of the more formal in-service aspects of the training model, such as the classes at UT. Their responses to these questions are summarized in Table 4.

When asked if they thought the model was viable as a way to do the ongoing technology training in their school, eighteen teachers responded yes or yes, conditionally, with continued time, money, and school support seen as necessary conditions. Only one responding teacher saw significant problems with the model being viable, citing insufficient time and school support as significant impediments. Their responses indicated that teachers, in general, are positive about the training model as a viable way to do technology training and do see the model continuing in their schools in some form. When asked what types of support they thought would be needed to continue the model, teachers, as in year 1, overwhelmingly indicated time as a necessary support. They recognized that collaboration and use of student mentors for training were dependent on having the time to collaborate and the time for mentors to be available. Teachers also strongly indicated more technology availability as a key need. Lack of technology was seen as both an impediment to training opportunities as teachers couldn't train if they could not get access to the technology and as a disincentive, because if teachers did not have easy access to computers in their classes they could not take advantage of any training or collaboration that did occur. School support and money were also mentioned frequently. Teachers saw a need for their schools to commit to continuing the project and that part of this commitment entailed monetary expenditures for things like more technology and substitutes to provide time off for teachers. A majority of teachers also saw a need for continuing some sort of formal training structure such as the UT in-service parts of the grant project or a class for training student mentors. Teachers saw a need for continuing the formal

structure on two levels.  First, they saw the more formal training as a practical method for introducing new technologies that teachers might not be aware of on their own.  Second, they saw the formal training at UT as something that build collegiality and helped build excitement for the program by making the CIRCLE participation something special.

Overall, like the first year, teachers were positive about the CIRCLE training model as a viable way to do technology training and support in their schools.  But, like year 1, it was clear that viability was seen as conditional on school support, in particular, the provision of time for training and collaboration and the provision of technology.

**Table 4**
**Teacher Responses About the Viability of the Training Model**

**Do you think that the CIRCLE training model of collaboration and student mentors is viable as a way to do the continuing, ongoing technology training and support in your school?**

| | |
|---|---|
| Yes | 12 |
| Conditional yes | 6 |
| Conditional no | 1 |
| Not asked or no answer | 1 |

**Comments (by response category):**

*Yes*
Yes, but you also have to understand that most of the teachers don't have a room full of computers like I do and most of the teachers don't have the modem line in their room like I do.  I think your idea will get around more [by the kids coming in and using the computers on their own.]  I think kids are getting much more technologically literate, whether it's because of CIRCLE or word of mouth, I think your CIRCLE stuff will spread the same way.  I guess when you come right down to it, as I feel more comfortable with it and use it more, it will spread.  I know that's part of the reason that it wasn't used this semester is because I haven't broken down and used it.  It's just a matter of getting the teachers literate with the software and instilling that same confidence in the kids.  Every time we use a piece of software or the computer in our assignments, they either have to make time to have the computer labs or send their kids to where there is a computer.  They also have to change their lesson plans and allow for all of these things to happen.  Some of them quite frankly don't like to do it.

I think the basic structure is fine… Well, there are plenty of us.  There's an unending supply and we were cheap for the most part.  I think that most teachers are really excited about what technology can do in terms of education.  We may not know everything we'd like to know about how to use it, but I see it as a real benefit as adding to our tools as educators and it's just exciting to most teachers.

Yes I do.  I like the idea of getting the kids involved with the training aspect…Often the kids know more about the computers than the teachers do and they're often times more enthusiastic and they're often times are more creative in how the computers can be applied.  They seem to be more in tuned to how the computers can be used for teaching.

Yes.  Just I see that the students would have to continue the mentoring.  I know there are some students who have done it before, second time mentors or whatever it is called.  That is really important.  Maybe it was my personal experience, but it was very difficult to have a student that didn't have much knowledge to help you and then he is done with the course and someone else comes in with no knowledge then that is fairly difficult.

It's the only way I can see at the moment.  I don't know how students are going to get involved but I know increasingly they have to get involved.  I know they respond easiest and best when they have a student who knows and they know he knows because he wears a mentor hat.  He is a CIRCLE grant mentor and that means something.  I think that it is viable

and I think students can teach students much more effectively than teachers can. I can't think of another way to do it frankly.

I definitely think it's a great idea because you see with the younger generation that computers aren't as frightening to them….I think the teachers helping each other too….I definitely think having other teachers that are willing to work towards getting more technology in the classroom also makes it work.

I think it's a good basis. Yes. And I'm looking forward to learning about new ways to, I guess make it easier. I think as we have meetings or as we talk we realize that there are still some glitches in the system and most of those revolve around time constraints. I think we'll all miss having the opportunity to meet together in large groups or to go and get hands on or have people talk to us. I foresee, and the others have said to, that it's going to become, now, an individual responsibility to design, opportunity for that to happen. [Interviewer: So you think a lot of the collaboration is going to disappear once the grant ends?] I don't think the collaboration is going to disappear on this campus with this particular group of teachers because we've seen what can happen and we're committed to continuing that to happen. I think we'll miss the stimulation of getting off the campus and go and talk about that.

Yes. I think teachers know better what teachers need in their training than do administrators or anyone else. And it's the same for students really. The student mentors can do that too because they can figure out what the students need in terms of basic technology and things like that sometimes better than what the teachers can….So I think it's a very viable model. I think it's the only model. I don't see another option, another way you could do it.

I think we're going to try to continue that. When you say, "Is it self-sustaining?" I think that yes, the teachers that are involved in the CIRCLE project now for the summer, if we get this curriculum thing going, I think you're going too see that growth. And if [Techer X's] class continues, we're going to keep training kids. Teachers are going to be using these mentors and I think it will be self-sustaining. It will have peaks and valleys but it will work as long as the momentum is there.

I do. I just think it's going to take some time. Honestly, we only had one semester and with all these new people, it just takes time. And maybe with this new computer class, the mentor program will even have more advantage of being more successful.

### *Conditional Yes*
The training model of having teacher collaborate on training and operation support and having student mentors assist the training and support of teachers and students can be self-sustaining, only if our campus is supportive in being flexible enough to allow time that does not take away from regular planning for the classroom. Our principal is very innovative, she loves change, therefore, we find it quite challenging each school year just to maintain our classes, in addition to addressing the areas of implementation that appear on her agenda for the academic year.

If the computers stay congregated in the rooms of the two people involved with this then I would think "yeah it would continue to function". If the computers are spread all over the schools probably not.

If there are incentives added. No, that's wrong. There were more than sufficient incentives to learn it. The problem was that there was no repercussion for not learning it. So the carrots were there but there was no whip pushing people ahead and I do think that is needed. I think the, I hate to use this term, but the punishment phase of learning is just as important for adults as it is for children and there were almost no repercussion for those who fell drastically behind everybody else or for those who did not put it in to the classroom and I would like to see that kind of incentive, that negative inducement be there because otherwise I think that people are going to become far too casual in their usage.

It will be viable only if some funds are available to keep the teachers meeting. I'm going to keep doing it cause it's a part of my class. I just have it as a grade students do. They adopt a teacher and meet with them, once a month maybe, or something like that. As for otherwise, I don't know.

…if you had at least one teacher in the school with the sort of expertise that [Teacher X or Teacher Y] has or someone like that, then we could organize an in-service around that and who is also a kind of master teacher then that would keep it viable and keep it going. I think if you let it dissolve into sort of this little, you know there's a few seniors left and 2 juniors left, I think it'll eventually go away. I think teachers need to have the time given to them by the school to keep it

going because I can see these kids graduating in 2 years or three years [need them ?] or someone around with that computer expertise or it's going to be gone.

*Conditional No*
It's not very feasible to expect it to self-propagate and to continue. We need to get more teachers and more students because teachers don't have the time. At least that's what they say. Instead of trying to do something extra to what their normal workload would be. It's like "I don't have time for it." Busy all the time. You have to sacrifice to get into some extra programs. We do it. I run a program with NEA(?) where we transfer data, brainstorming data between 149 different locations in the United States, schools, universities, research labs, that sort of thing, we get all kind of feedback and information through that. We were all trained on this 3 or 4 years ago and now nobody remembers. Except me and I keep it running but I can't get any interest going because the teachers are just too busy. This is traditionally a cop-out. Teachers always will pull this. Teachers just love to get organized and be able to shut their door and not have the outside world bother them during their class. It's sad, but true…The school has to push for it. The school has to want it from the top down. If they say "I want every Daedalus lab to be used every period for Daedalus", then we do it.

**What types of support do you think will be needed at your school, such as time, school support, technology availability, etc., to allow the process to continue? [17 teachers responded]**

| | |
|---|---|
| Time | 12 |
| More technology availability | 10 |
| School support | 7 |
| Money | 5 |
| Technology/administrative support person | 4 |
| Process of personnel replacement | 3 |
| More training | 2 |
| More collaboration | 2 |
| More structure | 1 |
| More incentives | 1 |

**Comments (by teacher with coded category(s) indicated):**

Money would be one. Not that money is the key to everything, but it would be more incentive. Probably time is the greatest thing and you have to have teachers that are willing to commit their time to it, but I'm sure you would. Time and/or money would be the best two things. The one thing I would really love to have is one student per computer. Otherwise you have to have half the class doing one thing and half doing another… So I think you need time that is set aside where you go and you do the training and you learn how to use the programs. If it's going to be continuing, there has to be time set aside at some point to allow the teachers and students to learn the programs or it would probably fall by the wayside.  [Money; Time; More technology availability]

More time. I would like to invite the cooperation of the administration at this school and on some of those occasions when we have had quality circles and faculty meetings which really unnecessary wastes of time. I think the people involved in the CIRCLE project should be excused to go to the labs and talk to each other and do that kind of sharing that we never seem to have time for. Even last year, we sacrificed lunch times and met a few times. Early last fall we did this. But it's frantic, it's short. If we knew in advance that a faculty meeting were called, we could be excused from that meeting and could meet instantly and one lab site or another. I think that is valuable time for us. I think it would facilitate our keeping in touch and also being aware of what we're trying. I don't think anybody elsewhere in the school, except for [Teacher X], knew what I was trying and I certainly didn't know what they were trying. Those things just didn't seem to come up on the CIRCLE Bar and Grill. That covered other issues. Basically, I feel like we need more time, teacher to teacher, and I really think that the students should be directly involved with the teachers more. [Time; School  support]

All of the above plus money from the legislature. More modems, more opportunities for students to interact with other students at this school and other schools and maybe more specificity of responsibility so we're not just doing lots and lots of chatting  which is OK to an extent but maybe work towards having a little more focus. [Money; Time; More technology availability; School support; More structure]

I think the biggest thing we need is just some good months with our network up and running to learn it well ourselves.  I think that's the biggest thing we need is to master it ourselves and then we'll start seeing how it can be useful to other teachers too…. The problem with spreading it is not that teachers won't spread it, it's time to learn it and time to teach it, and it's availability of equipment. [More technology availability; Time]

I think the technology has to be there otherwise it doesn't do any good to learn it because if you can't use it you are going to forget it.  The students, I like the student mentor part, I really do, I think that's where our key is because unless the teachers are real young and even a lot of the teachers coming out of the university are not that familiar with technology, they just don't get it in college that much.  And the kids who we find here in high school are going to be in college, because they are smart enough but they are probably going to go into a technical and they aren't going to go into education.  So we are still going to loss that edge of some one who is real familiar with computers and so if we don't tap into the students we are not going to have experts. [More technology availability; Process for personnel replacement]

We'd like to have the communications tools like more phone lines, things like that.  And also, I would really like to see the district put more money into technology.  I submitted a proposal hoping that the  district would front the money for teachers to buy a computer.  And buy en mass a really good computer.  [Interviewer: To use at home?] To use at home.  Teachers would be able to learn computers as a productive tool for their administrative, lesson planning, tests, letters, all kinds of.  Once teaches do that, then they'll incorporate technology in the classroom. [Interviewer: Do feel that there is still sort of a phobia of computers?]  No doubt about it.  And that's one of the big drawbacks.  See I think you'd make a giant leap forward if you gave every teacher a laptop, and  they'd earn that.  I haven't finished my spiel.  I think that you should give every teacher a laptop, a printer, software, and they they'd earn it by spending 80 hours in [computer] training.  They'd spend 80 hours of instructional time of how to use the software…They're [teachers] not receiving what I think would be just compensation for their time.  And another thing is if the district would put in some assistance with substitutes. [More technology availability; Money; School support]

My only comment is: When are we supposed to have time to do this? [Time]

Technology availability is probably the big one.  We have these 12 computers that you can move around, but it would be nice to have a computer area in each department.  Having the technology would be most important because it doesn't do us much good if we can't use it.  Then getting more training in using it. One thing that was difficult for me since so many people who were in it from Westlake last year were English and social studies teachers was getting ideas on projects that I could do.  It was really difficult because I was trying to make stuff up on my own.  I'm not that creative so it was difficult to come up with good things if many things at all.  So that would be helpful if there was some kind of data bank or more people from my area who could share some ideas of what we could possibly do for activities with the technology.  [More technology availability; More training; More collaboration]

I think as a program, it needs incentives for using it which are more than what's there - the benefits of the classroom, the interest level of the students- but there is still a huge change necessary to use it in the classroom and a lot of teachers, as with most people, are reluctant to go through that fundamental change with, just for a good reason.  That is, they must be escaping a negative as well as gaining a positive in order to really buy into it.  Otherwise it continues to be a peripheral, and not a core element of their class.  And whether that negative inducement comes from UT or other peers within the school or the administration is something to be debated.  I mean I don't have a clear vision as to how that would occur, but I do think that it should be there…. My snide remark would be more hardware.  We simply don't have it in the public schools.  I also get frustrated by the fact that education is at least 10 years behind business and by the time teachers learn and become comfortable with the technology that's being presented, it's almost uselessly outdated because when we started to learn it, it was on the way out.  And that's why it was given to education.  I think other future models might want to begin on the other end.  That is starting with the cutting edge technology. And then by the time teachers are comfortable with it, it then becomes mainstream.  And that's much more expensive and much harder to do because it involves making an evaluation of which is the cutting edge technology….Well, the school support for one thing.  How many administrators did we have at any one of the CIRCLE meetings?  There was no feedback to those teachers who did put a significant amount of time into experimenting that this was in any way valued from the administration level.  It certainly came from UT and it certainly came from other teachers within CIRCLE but that's a very difficult question.  That kind of administrative support, the financial support was a huge incentive for people.  I know because I can remember people saying "Well, I got my check." That was the big thing.   And they were more than willing to stay on

Saturdays and stay however long it took for them because it coupled money and interest and that's a great, it's hard to beat that combination. Let's see, what were the other ones? Time, school support and technology? I think I addressed it all. [Time; School support; More technology availability; More incentives]

[Interviewer: What other types of support, I mean you mentioned, having time with the kids, having training with the students, you also mentioned being able to get the computers, is there anything else that you think would help you to continue the program?] A huge thing that would help, and I don't know if this is in the realm of anybody involved would the project, would be administrative support. You know we have [Administrator X] as our advocate over at the central office, but the fact that paid-for-phone lines weren't installed until February and that the network was not up and running until late January is really an indication that no matter what the teachers and mentors are trying to do we can't do it unless we have administrative support. And I am not sure quite how to go about solving that since [Administrator X] has said even, she is in a power making position, a decision making possession, and hasn't been able to make the changes that she wants to. And so it took an act of the board to for us to be able to install wires in the outside walls. It's that kind of stuff which totally held us up it increased the frustration around here tremendously, the mentors felt underutilized they kept saying "when are we going to do something?" "What are we going to do?". and many of them dropped out from lack of engagement. The teachers were thinking "Well this is just way to much trouble." because we were labeled trouble makers by the administration because we kept asking for this or that. It's just, I think a project like this, even though one of the points, which I think is wonderful, is that it bubbles up from the teachers I think that somebody in the project, maybe [Dr. X, UT PI] or somebody that's got some clout needs to go in administratively and say look the teachers won't be able to do this without some support…we really do need, and you know this is just, we absolutely feel strongly about this, that we need an on-sight Labby or something, a lab assistant, someone who knows more about the computers then the average mentors or teacher who really is a technical person and can trouble shoot things like this [Time; More technology availability, School support; Technology/administrative support person]

The training model…can be self-sustaining only if our campus is supportive in being flexible enough to allow time that does not take away from regular planning for the classroom...Each campus must take responsibility of making sure there is support available. In addition, just as students are mobile, teachers are as well; therefore, there needs to be a process of replacing teachers who may have transferred to another campus, etc. [Time; School support; Process of personnel replacement]

…There needs to be funding… It will be viable only if some funds are available to keep the teachers meeting…You need the time for the meetings too, it builds momentum when you have students come to the meetings and the teachers. You need some kind of money for somebody to have a third off to be able to manage the thing [Time; Money; Technology/administrative support person]

If you had some in-service at the beginning of the year and you could get some other teachers involved in it or some kind of program like that. If you had the principal behind it where you could have the in-service, that would probably be the best thing. I think it's very important that we continue to educate teachers because it is a marvelous program. Daedalus is marvelous as a way for students not only to interact amongst themselves in a room , but with another lab, Westlake or some of the other schools. And they can do that. I'm getting involved in a network and we're going to place here next year that will allow us to do that. Talk to schools down in the Valley and San Antonio and all kinds of schools. And just chat back and forth with them. Anything we can do to knock the walls of school down, the better off we are. That's what this is doing. [School support; More training]

Time. I'd just like to know what other schools are doing. More information, more ideas. I don't know why we have to re-invent the wheel if somebody else is already doing this kind of stuff. [Time; More collaboration]

Continued use of time off to plan and I think we're being supported in that way. Money for phone lines, that's a big issue right now. There's been some conflict, as recently as about 2 days ago about whether or not we're going to be able to continue to afford to have those lines. I didn't realize that it's expensive as it is, but we understand from our management person, our technology management person, that it costs $87 a month and we've been told that we have to cut the budget so drastically in our district that we're not even sure where that money is going to come from so we just need continued support of things like money and time. [Time; Money]

I think teachers need to have the time given to them by the school to keep it going… I don't think you can leave the training that's involved to kids who are busy and are graduating to understand what we understand anyway. I just

don't think that works.  I think there needs to be someone who's given that responsibility or some one to take on that responsible for having meetings with the mentors (?) or planning, and you know just dealing with it cause there's so few of us.  When we get to school to keep these things going.  I can see in three years there wouldn't even be people around.  I mean it's not just that it would be disorganized.  You wouldn't even have them… To remain [current ?] in the school in the upgrading, hardware arrangement and things like that.  [Time; Process of personnel replacement; More technology availability; Technology/administrative support person]

I could go for more networked computers.  We need a real server, we need more telephone lines.  Is this a wish list?  For instance one of the main problems is logistics.  I've got small classes and I don't know how the larger classes do it, but you've got 20 kids in a classroom with only 6 computers so obviously, not everyone is going to be able to be on a computer so you have to have the other kids doing something else so you get those kinds of problems.  It would sure be nice if we had more computers.  Also, we need more modems because we have one net modem and all it takes is one person being on that and no one else can get on line and therefore, that really hampers any kind of use of TeachNet or Tenet or that sort of stuff.  And I didn't have so much problems with that, but I know the Global Voices people definitely, just trying to get all their kids logged in to TeachNet was a nightmare because we only had one or two modems so trying to get so many kids, 200 or so, logged in was a logistical problem.  We were sending them down to the library so more telephone lines would be great… Oh absolutely, we need someone whose sole job is to oversee Project CIRCLE computers, I mean who takes care of them-some sort of coordinator, some sort of trouble-shooter, someone so that we don't have to be constantly looking for [Student Mentor X] or getting him out of class or sending off a frantic note via TeachNet to [Graduate Student X], or that sort of thing.  It would be nice to have someone at the school. [Ms. X] has tried her best, but in fairness to her, her job is to oversee all of the technology here at Westlake and not just Project CIRCLE.   So we really need someone to deal with that.  If we do get this new grant, I mean I don't know what they put in, but certainly some sort of salary for someone to do that would be great.  I think that's the main thing. [More technology availability; Technology/administrative support person]

**Do you think that there is a need for continuing some of the formal structure such as training or collaborative workshops at UT or a formal class for student mentors in order to keep the training process going?**

| | |
|---|---|
| Yes | 9 |
| Conditional yes | 4 |
| Conditional no | 1 |
| Not sure | 1 |
| No | 2 |
| Not asked or no answer | 3 |

**Comments (by response category):**

*Yes*
Yes.  I think that's the way to do it.  The incentive is there.  You've got the interested teachers and they'll be able to stand with it.

Yeah.  I do think there is some need for formal training.  I also think that there is a need for either other teachers or people from UT to go into a classroom and let us, here I'll pick on [Teacher X] because she's worked so hard at it.  Let's say [she] is giving a class.  I think at least one of the training session should have included a relative expert going to her class with her students in there and helping her run it.  As opposed to always expecting them to take that very big leap from the hypothetical, theoretical construction at UT to the reality of the classroom.  They need,  I think there could be a bridge built there.  That is some sort of medium experience that she would have some help in the classroom and there would be students there instead of always separating the help you get from the students you teach.

Yes.  If you want it to be as strong as it is now, I think you need some type of formal structure because it's much harder to do it if you don't have time set aside to do the program.  The reason I knew how to use Daedalus before I joined the CIRCLE grant was because I happened to know Jay and he happened to have more free time last year.  But if you don't train teachers, then it's not going to be nearly as strong because they're not going to have the time, who are they going to learn from?  Without some kind of external pressure on the teachers, I think it would be harder to continue the program as strong as it has been here.  I think you should definitely have formal classes at least to teach the teachers how to use the programs and the kids, too.

Oh yeah I think it will fall away if you don't. Everything goes unless you really feed it. Even something which really works well. When I leave then their is not going to be anybody really perpetuating it. Even if I leave somebody who may know about it then that person may leave and then you have the chance of it not getting it perpetuated that way. So it does need structure.

Yes. I think I've already answered that in a kind of negative way. I'm afraid that it can't do as well on its own. I think we do need to continue outside training. I think we ought to foster even more esprit de corps… I think that that outside support, the training, even though it's on Saturdays and it's hard for the kids, it's hard for the teachers, I still think that it needs to be there.

I think it helps for people who haven't had any access to it before. I think so. I also think there is a sense of excitement for the mentors as far as UT is concerned and being associated with that that's kind of attractive.

In order to continue the training process, UT should continue monitoring the CIRCLE teachers periodically in order to see if the software is being utilized for collaboration.

*Conditional Yes*
I think all of us, of my level, and I've only been involved for a year really, feel like we have a lot more to learn. I don't know that it would have to be done through UT but I do hope that we would continue to have some leadership there in terms of continuing to keep an eye on the project and monitor what's going on, encourage teachers through some kind of gathering together a couple of times a year and saying "you know what's going on in the world of CIRCLE grant?" or however you want to do it. Maybe have a science fair or a CIRCLE grant fair and show off some of the things we've done. I don't know. I still think we need leadership from UT, yes, but whether that means meeting every 6 weeks or 3 months or whatever, I'm not sure.

That would be nice but it would have to be funded. I think it would be helpful. But you would have to pay the teachers for their time. They're professionals and they deserve to be paid.

I don't know about the things at UT. We could, we have mentor meetings here every single monday, and we have a class that made, I wrote a proposal for a class and it made two sections so we will have a class next year that will be a headquarters for this. So I guess really, on-site help things are what we would need.

No. We don't have a formal class for mentors now. They have a club, they meet after school. As far as keeping them interested in participating yeah, I think that a least club format or a class is good, because if there's not there is no incentive for those kids to be involved in it, there is no place for them to get together and work together, then their not going to be involved. So their needs to be a class or a club format like they have now.

*Conditional No*
I'm not sure that need is the right word. I think it can be done. It's just nice if we could have that addition help and stimulation and reinforcement and just the reminder of what is our purpose and where are we going with this, just the collaboration that happens when people come together with shared interests. That would be good.

*No*
I would rather have more training here at the schools with the computers. More absolutely on-hands and less philosophy.

*Not Sure*
If possible, if the funds are there. [Interviewer: Do you think that not having it will be a barrier?] I don't know.

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## c. School Support for the Model

Teachers viewed the viability of the training model as dependent in a large degree on school support.  This suggests that whether the model is sustainable following the end of the grant is a function of how much school support will be available.  Teachers were asked their feelings about how supportive their schools were.  Their responses are summarized in Table 5.

The majority of the teachers did view their schools as supportive.  They expressed that their schools looked favorably on collaboration between teachers, were supportive of using students for training, and that they saw broadening recognition of the project model within their schools.  Some of those who saw their schools as supportive did express reservation with how extensive the support was, mentioning in many cases that they did not see their schools as being hostile toward the process, but also did not see much indication that the school was actively supporting the process either.  Those teachers who expressed reservations about school support or thought their school was not supportive focused primarily on the issue of how much verbal support would translate into tangible support.  They saw their schools as expressing support in principle, but did not see or felt uncertain about how much actual support in terms of time, money, technology, as so forth would actually be forthcoming.  Teachers expressed similar sentiments when asked whether they thought the training model could be continued at their school even if they did not have outside grant funding.  All teachers indicated that they thought it could continue in some form.  They thought that if the existing technology was still available and as long as some of the CIRCLE teachers were there, the model would continue.  They expressed reservations about how extensive the model could spread and saw the continuation and spread as contingent on the same factors that they expressed about what they saw as needed for the process to continue, time, school support, and technology availability.

As in year 1, teachers were positive about the support they saw within their schools and the prospects for the model continuing in their schools after the end of the grant.  Also, as in year 1, they saw support as somewhat conditional on the translation of expressed support into tangible support and the continuation of the training model as dependent on whether this conditional support was realized.

**Table 5**
**Teacher Responses About the Sustainability of the Training Model in Their School**

**In your view, do you perceive your school as being supportive of the CIRCLE training processes of teacher collaboration and the student mentors?**

| | |
|---|---|
| Yes | 9 |
| Conditional yes | 6 |
| Conditional no | 2 |
| No | 2 |
| Not asked or no answer | 1 |

**Comments (by response category):**

*Yes*
Yes.  There is never a question, if you need to take off a day to go to UT, fine you can do that.  As far as allowing student mentors to, allowing us to get them out of other classes there is never a problem with that.  The support that allows us to do what we need to do with it.

Definitely. [Principal] pushes for collaboration in everything and just like some of the examples I gave before, some of the teachers whether they have computers in the classroom or not, their kids definitely know they're available. I encourage it my classroom. If we can change an assignment to match another one, or you can turn in the computer part to me and the English part to the English teacher, etc. I think it's working. You can see it from class to class. Collaborative things are going on.

Absolutely. We have a very supportive, very innovative philosophy.

Yeah, I think so. I've never heard any grumblings about "why did they get to do that?" I've never heard anything negative at all about what we're doing. There's just a lot of "how can I get involved with that?" which again makes teacher training very viable if we've already got people who are curious in saying we'd really like to use the lab and we'd really like to learn to do some of the things you're doing. I think there's an audience there already.

Yes, I do now. It's given attention. People pay attention to it when we work on a project. We have a news letter. It's printed. There's been several little things of publication about that. [Ms. X] who is our technology supervisor in the library does a really, really good job of letting people be aware of things that are going on. Our administration does that and when we have a project we'll invite them in and they come in and it makes us feel important and it makes the kids feel important. Examples are put in the hall of interchanges, things they've created, research that they do and people just know about it and they know that it's happening.

Yes. Administration is quite supportive…The collaborative idea is very supported. In fact that's an emphasis. [Interviewer: Is the school supportive in terms of collaboration and then with student mentors?] Yes, we've been doing something called curriculum alignment which is actually aligning one class with other classes so projects can be cross-curricular, so yes I think it's a very positive thing. [Interviewer: And in terms of the student mentors?] Yes, I think there's a possibility of it being even more positive and more successful. I think the organization - the way it needs to be organized and run - of possibly having them all be in a club or something and when the clubs meet, have them talk about who they mentored and could have a thing where they turned in a form and got some kind of extra credit, you know, some kind of deal.

### Conditional Yes
I think so. There was some thing that I just don't understand that happened in the fall with wiring which defiantly raise a question as to how supportive the whole school was because I think we actually had computers in our classroom early in the fall and we didn't get wiring until January or something like that. And that was someone creating an obstacle which just did not need to be created. And why that was I don't know but that does not show me support.

Definitely supportive of teachers collaborating with each other. Whether it is supportive of CIRCLE grant specifically, I don't know, it hasn't be unsupportive. I could go either way it is sort of middle of the road. Student mentors -- I guess so, but I don't know if that has a lot to do with [Teacher X] and his standing being a Christa McCaulif scholar and getting a big CD room. Which you hear about all the time at this school. So there is definitely support for anything he is doing with those kids. Which is good - there should be.

It's not non-supportive. I just really didn't get that much encouragement. You know "Why don't you take off an afternoon." or "Let me get you with someone so you can do this." No one pushed me.

I don't know. That's a good question. We have 6 CIRCLE teachers and only 3 classrooms so they had to float around. I don't think it's saying they're not supportive, but maybe it's saying that we didn't get enough support. I don't who's responsibility that really is, but it was real discouraging, particularly to the people who were not put into the classrooms.

I think that they certainly approve it. I think that they would like to encourage it, but I think that they have to be shown that more time is necessary. I think something set up on a regular basis whereby we could be excused from this meeting for this kind of training and it would simply be a regular routine rather that just catch as catch can. They need to be encouraged to give us time. Naturally, a day here and there with a paid substitute would be an incentive too. I don't know if they would go that far, but if we got our request in early enough, you never know, before all the sub money runs out.

In the sense that CIRCLE is given the resources and time to exist within the school, yes, but it always stayed as a satellite and not a core component of instructional practice and I think the fault should fall on us CIRCLE teachers that at no point did we say "OK we're now to the point that we're going to bring in more teachers." We waited for UT to say "OK we now need another group of teachers." And the same thing has happened this year. That is after we brought in our second group of CIRCLE teachers we let it stay with that population and that is not what should happen. We should be looking at expanding that population to at some point be inclusive of the entire faculty. That's not to say that you're going to get complete buy in but it should be given as some sort of in-service to everyone and I think part of the problem is hardware again in that it just doesn't exist. The English people know the English lab is there and the math people ignore the fact that they have a math lab, but that's it. There's no science lab. The business lab is basically used for keyboarding practice. The incentives aren't there to cause teachers to give up their worksheet and lecture notes. And they have to.

*Conditional No*
I believe that in theory they support it but not in practice. And I feel like they say go out and get any workshops you want to do and be on the cutting edge and learn about technology and they want to, but if we come back and we ask for something such as same group of student so we can do something collaboratively, or the wires in when they are paid for to keep them in. We are really battling right now not having these phone lines ripped out in June, and they might be gone, that's the latest right now from the head wiring guy, [Names two administrators] our campus technology coordinator, is working on that but when budgets is tough, when budget is tough, they say do what ever you want but don't spend any money, don't ask them anything, ask us of anything, don't make any scheduling waves. And so I think they'd like to be supportive there really is this, kind-of, paternalistic just keep everything going don't mess with things attitude from the administration.

I perceive my school as being supportive of it as long as it doesn't cost them anything in terms of not only money, but effort, time, scheduling, anything. They'll support anything as long as they don't have to support it. You know what I mean? As long as it doesn't really require much of them. That's the way I perceive it. Now they're very supportive as far as saying "Oh, ok Project CIRCLE paid for this so you're all going to have subs today. We'll be sure you get subs." And it's not just my school, it's my district. When it came to getting this network in, it was a textbook bureaucratic nightmare.

*No*
No…Well, for starters, is the fact that I don't have a room. If they were really going to be supportive of this project, there were three of us in the project that didn't have rooms. That right away seems like it's a problem. [Interviewer: How many teachers were involved in the project?] Oh. 12, 13. And this was the first year that we haven't had rooms. And it was because we were in this project that we didn't have rooms. Because they wanted us to circulate through the rooms that have the computers. That didn't work at all because it made it impossible to have any time to familiarize our self with the computers and there was a different set up in each of the computer rooms we'd go to. It just didn't work. It was also demoralizing. Because I just hate not having a room. To think that I'm involved in this project and therefore don't have a room, it made me feel resentful of the whole project. It didn't give me a real good attitude towards the project…[Interviewer: Do they [school] understand the problems that it caused?] I think they understand it NOW. I don't know why that decision was made but it was a real bad decision. I never did understand it. And I don't think anyone in the project was consulted about it. So, we've made some decisions. Some of us want to be involved in day-to-day use of the computers and some of us want to be involved in projects based on the computers so we've sort of made a decision among ourselves who should have permanent room. And that makes a lot more sense than having 3 rotating through. [Interviewer: So it seems like it's been somewhat resolved.] Right. But it's been through our collaboration. People who are more involved with the project are a lot more able to make those decisions. [Interviewer: So now that you've voiced your opinions [to the school], do you feel that the school is supportive?] [Teachers X and Y] would be able to answer that question better. But I don't get the feeling that the school thinks it's a neat thing to be involved in. I think the school feels more like they'll put up with it, but I don't feel support like encouragement.

No, I don't. I think our administration has no idea what we're doing. I sense that our administration thinks that we are a pain in the butt really. I just don't think, they have no comprehension of what we're doing and I don't think they really care. Since we did get the grant money, that was great. It did allow us to get some phone lines and stuff, but no, I don't think our administration does. I do think that with the exception of [Administrator X, Westlake PI], she's higher up, she's superintendent of curriculum or something. I don't know. She has been supportive certainly in the fall semester,

but her enthusiasm seems to have waned but at the campus level the administrators, I don't think, understand what we're doing and no interest.

**In your opinion, do you think that the CIRCLE training model can be continued at your school even if you don't have outside grant funding?**

| | |
|---|---|
| Yes | 10 |
| Conditional Yes | 9 |
| Not asked or no answer | 1 |

**Comments (by response category):**

*Yes*
It can, I don't know if it will. I think if the software stays on the computers that it will keep being used. I think that once the teachers are convinced that it works, they'll use it if it's available.

Yes I think so definitely. As I said what will drive that is visibility of what is done in the classroom, getting other teachers excited about using the equipment making them feel comfortable with it.

I think so. I don't know how much success it will have. I think those of us who are here and using it. I didn't use it a lot this semester, but I will definitely use it a lot more next year. But once I started on it I saw that wow it would be good for this subject or this unit or I could us it here. I think if we could implement it in other areas or with other non-Circle teachers then it could have a ripple effect and take hold without further funding.

Yes I do and one reason is that our administration is driven by impression and if they think it's cool and people are going to see Travis as a better place, just based on impression, not based on any practical need, not based on any understanding of what's happened. But it's all decoration and CIRCLE looks great for a number of reasons and one is it's a tie with UT. Two it's a tie with Westlake which is a very different socioeconomic school than us. We're talking rich, white people vs. your poor minority population, so Travis is going to buy into it just base on that alone. There is not sufficient understanding at the administrative level to say they will support it due to the technical or pedagogical concerns which is what's behind the project and so I can't say whether they will support that because they don't understand it. They're not going to spend the time to go and look it up. You know, when you talk constructivism, they think you're talking 2 x 4's. So it's a whole different ball game. But yes I do think they'll be supportive and yes I do think they'll give off time and that kind of stuff, but again it's supported as a satellite to the school and not integrating it as a core component.

Yes, I do. I don't know how structured it would be but I think most of the people involved in Project CIRCLE would certainly be interested in taking extra time for, I don't know, training maybe. I mean to be perfectly honest, the stipend they're giving here are gravy. I mean I would be doing it anyway and I think it's wonderful. I mean it's the sort of thing that I don't feel guilty about. I mean the stipends are wonderful, but on the other hand, even if we weren't getting the stipends, I probably would still do the training.

This model can be continued without outside funding; however, it is up to each CIRCLE teacher, to effectively implement the training.

Yes, but I think it would take some organizing…. It's hard to pull off.

*Conditional Yes*
Yeah I think its possible. It depends upon if the computers are truly the schools to use as the school chooses to do with them Its possible as long as you can find demand for the computers. It will continue to grow bigger and bigger. If there is an increasing demand for computers then I don't see the school allowing six or seven teachers to monopolize the computers…. It would be difficult to get more people. Because of the use of the computers it, the computers are in the classrooms people involved in the CIRCLE project are scheduled into those rooms every single day. And so for any other teacher from any other part of the building to use those computers means that they have to trade classrooms with the teacher in order to do that, which is not likely to happen real often. As far as that mentor group continuing to work with teachers in the CIRCLE classrooms, yes I think that will continue to happen. As far as that mentor group working with other teachers in the building I don't think that it will happen frequently. Because other teachers in the building

don't have computers in their rooms.

Yes, but it would be in a very limited amount. You need the time for the meetings too, it builds momentum when you have students come to the meetings and the teachers. You need some kind of money for somebody to have a third off to be able to manage the thing.

I think it's going to depend on people. If we can continue with strong leadership like we've had from [Teacher X and Teacher Y], I think it takes someone who is willing to be the "expert" so people who are not real sure of themselves can come to the expert and say "can I try this? Can you help me through this? Can you show me how to do this? or Can you give me something to read so I can know how to do this?" And of course [Teacher A and Teacher B] - as long as we have people who are willing to lend their expertise and give some time to beginning teachers to train, I don't see any reason why we shouldn't be able to continue.

Yeah, the computers are still here so I think it will continue in some capacity. As long as those computers are here and some teachers that were in on the original CIRCLE grant are here, I think it will continue. I think it might take a different form if you don't have the funding and the grant because you will have to have people who are sincerely interested in it. If the computers were to go away and all the teachers in the CIRCLE grant were to go away, then I don't think it would continue as strong.

The only thing that it would interfere with is the time. The time thing. That is the only thing I think the grant has been tremendously helpful in. Allowing us to have the time away to practice and get familiar with. And that is what I see about all technology. We have got a lot of technology in the math department and we are having big problems because none of us have the time except to use our own and most of use don't have computers at home so then it is difficult to practice at something you can only use at school.

To an extent. The hardware is here and I'm not sure how much software stays, but I think some of it. And we have teachers and students who are willing. The problem becomes we will not have any time. We will not be given any time. The problem becomes we have 2 printers that have been out of toner for 2 months and its not on anybody's budget to buy that toner. Those laser printers are sitting idle. So if something goes down with one of these computers or with the network, that's it. And then as a teacher you say, "Forget this, this is too unpredictable. I have to teach these kids. I can't worry about all these elements. I can't be concerned about the network going down or the toner." So I see that that would eventually eat away at us.

If our technology, local campus technology coordinator, could spend a lot of time with us I think it could. However, she is already maxed out with the lab she has and other parts of the building the saving part of that this year was that we did have UT people to call on such as [Names UT grad assistants] when we did have problems or concerns or things up in our wing. Like [grad assistants] got the whole mentor, I mean the SME project going, for our sophomore collaboration and that was really neat, there are so many things we could improve in that if we did it again. And yet they be moving on to other projects next year and won't be able to do those things again. And if those things are left to teachers to do, they are strapped for time and they can't just go and pound the pavement and get 50 professors lined up to do a project like that. And the worse thing is that [Student Mentor X] is going to North Texas next year, our one technical, you know, kid who knows everything and he doesn't mind helping he is so sweet, but he is going to UTN TAMS academy, Texas Academy of Math and Science, and so we are losing him. So I am very worried about the prospects for next year.

To an extent, yes. I think enough people are involved at this school now that something will continue without outside support and that doesn't necessarily have to be money. Without the outside support, I 'm not sure just how effective it will be. I worry about it. I know we're looking ahead. We're looking at the fiber optics connection. As long as [Teacher X] is here, something is going to be going on. As long as [Teacher Y] is here, something is going on. [Teacher Z] isn't here anymore. [Teacher Y and Teacher X] are at that far end of the campus and it's going to be difficult for those of us who are closer to the Social Studies and English end. I think somebody needs to be here. I know [Teacher A] is, but I'm not sure without outside support just how much will continue. I'd like to think that the students will never stop teaching each other. That's one of the most wonderful things I've seen. And I'm not sure that's entirely due to the mentoring mentality that we've fostered onto them. I think it is really inherent in computer use that people tend to help other people. I don't know if that will always be the case but I think that it certainly is now. There's lovely cooperation usually.

## C.    The CIRCLE Learning Model

### 1. Classroom Uses of the CIRCLE Software

The CIRCLE learning model was based on a collaborative, constructivist approach to learning and teaching in the classroom.  This type of learning model was to be fostered and supported by the infusion of technologies into the classroom that support collaborative, constructivist environments. Teachers were asked about their uses of the CIRCLE software, specifically Daedalus; the telecommunications programs, TeachNet, TENET, and Electronic Emissary; and connection to the Internet/World Wide Web.  Teacher uses of the CIRCLE software are summarized in Table 6.  There were different types of use in the two schools.  At Travis, teachers did most of their use independently, with each teacher using the software for specific projects in their own class.  At Westlake, teachers did most of their use in conjunction with two large collaborative projects, the poetry exchange and a research project, that involved a number of the teachers.  Part of this difference is related to the specific teachers in the project.  At Westlake, the majority of the teachers were in the English department.  This undoubtedly facilitated the collaboration that occurred on the poetry exchange and research project.  At Travis, the teachers were from different disciplines which would make project collaboration more difficult.  Use was also affected by the availability of technology.  In Westlake, the computers were not installed and available until the second semester. Also, in Westlake, teachers did not necessarily have specific assigned rooms with computers in them.  These issues undoubtedly affected use in Westlake.

Overall, there were a variety of uses made of the CIRCLE software and 15 of the teachers used the software for at least some activity (three teachers did not use any and two teachers taught specific computer application classes that did not directly use the CIRCLE software).  The amount of use by individual teachers, however, varied rather dramatically.  Compared to the first year of the project, overall use was greater, particularly at Travis, and the types of uses and types of applications were more diverse.

### Table 6
### Teacher Responses to Questions Concerning Classroom Uses of CIRCLE Software

**What uses have you made of the CIRCLE programs, Daedalus, TeachNet, TENET, and Electronic Emissary in your classes?**

**Travis Teachers Comments:**

**Teacher 1**

I've used Daedalus, I've used TeachNet.  I had used Tenet some but I now am using World Wide Web via a number of browsers that I've gone through.  Daedalus was used occasionally here talking a couple of times a month for discussions in my astronomy classes on space travel, constructing science fiction stories, things like that.  Very typical English kind of usage.  Writing basically.  Whereas in my Physics classes it was used to debate topics.  That is have an argument.  I'd split it into 2 parts basically.  That is there was one kind of usage that was basically stand alone- each individual student was constructing their own thing using the software and the other was more collaborative. That is there was interaction, some sort of dialogue going on, or being built.  those were the 2 main usages for Daedalus.  On TeachNet much more exploratory standalone kind of stuff.  Go read, send your friends mail, find out what's on there and come back to me and tell me what you can find.  Tenet, there was some usage of your user groups.  That's an incorrect name for what they're called on Tenet, but basically the discussion topics. They could go and look up news articles or various other things.  And for students that were willing to type in commands and wait for responses, that worked well.  Some of the students got very frustrated with that.

[Interviewer: How often did you use that?]

Tenet? It's been awhile because I've been using the Web for 6 months now, but I would use it with students who had finished work or were not doing, for whatever reasons - good, bad, and different - what everyone else was doing. I wanted to give them something interesting to do. I would use it as an inducement/filler. That is if you got done you could go do this, or you're done, go do this. And it would depend upon the student more what I'd have to say in order to do it. I did not use Electronic Emissary which is one big regret that I have. One reason for that is that I know a lot of physicists at UT so when I have questions I can go to them. Without that drive of me needing to talk to them, I was not as motivated to put my students in contact with someone and that as I said is a regret that I have, but that's the way it fell.

The only one I didn't talk about is the Web. Internet is appropriate. Should I talk about that some? [Interviewer: yes] OK. I feel that this is by far the best thing to come out of my participation in the CIRCLE grant. While I am greatly intrigued by the use of Daedalus as a classroom discussion- recording tool. In fact, this just reminds me of another usage I did with it that I'll have to talk about in a minute but the use of the web, first via Mosaic, but now, oh what's the other browser that everybody is so hot on, Netscape. I've been able to post a home page for the school. I posed my own home page separate from CIRCLE because being a UT student, I was able to get the space, but by combining the telephone line that CIRCLE put in for my use of TeachNet with space on a high speed server that I got via a physics professor at UT, I was able to post a Travis home page and have students use that as an interface to go out and explore the Web. And there are connections there to the city of Austin and to other schools in Austin as well as math and science resources. And they eat it up. They can't get enough of it. Even if they're reading the unofficial 9 inch nails home page. It's still good to me because they're still learning and becoming familiar with a new form of information access and so I've been, I think that's the way to go. I would stop buying textbook and start paying for hardware or software to let students use this if I were spending the money. I use it a couple of times a week instead of a couple of times a month as with some of the other stuff. There's students probably on it everyday. Whether they're doing something academic or not on it is probably debatable. It's been a tremendous asset in changing the way I think about what can be done in a classroom. It will radically shift my astronomy class for example. I'll probably shift to a completely project based course where most of the research could be done via the web, although I'm sure some of them will still use the library. But the construction of documents by taking pictures from the Web combining it with either resummarized or snippets of text from the web put together in a multi-application like Claris Works or Works or something like that is radically different than anything they do. You're talking a paper less trail of showing that they've learned something and that's really different but that's for the fall.

Well, since I only have one Web station I would often send only 2 or 3, no more than 2 or 3 students to go work on the Web and report to me on what they've done. I've had them construct hot lists as proof that they've done something and that also taught them the skill of book marking or page marking where they've been. It's hard to evaluate what exactly they were doing other than affectively because I was not giving them a task to come back with all the time. I am still trying to figure out how to use this type of stuff and it's not set up the way I'd like it to be, which is I don't have m-peg players and in order to watch visualizations of molecules rotating, you need an m-peg player and those kinds of software limitations still certainly stand in the way. Quicktime movies were able to be read whereas m-peg files were not, so there were lots of little problems like that; that I would discover as I was going through. Having 4 megs of RAM was a huge problem. It was very slow. not having any kind of video card in there also slowed things down. And the students would get caught up in those kinds of problems. That is they would miss that there was lots of interesting text and graphics in front of them even if they couldn't watch the rotating version of it or the next fancy step. Very often they would get hung up on what they couldn't do rather than what they had been able to do. yet even them coming back to me and telling me where they were running into these problems told me how far they had gotten so I was able to use that as a gauge as to how good they had gotten in exploring this stuff by knowing what they had failed to be able to do. If a student told me they didn't have any problems, then that told me something. It told me they didn't get very far. That was not the thing. The good thing was when they came back with a big long list of complaints. That is that I couldn't read this file on this page for this reason. The more problems they had, that usually meant the more they had learned.

**Teacher 2**

OK. I've had two...First I've used Daedalus quite a bit. And my students have all used Daedalus and they've all used....Teachnet. All my students in my Psychology class had a Teachnet account and they were linked to Psychoward...and they were connected into [UT professor's] epidemiology course. They were on Psychoward with Teachnet. My students were paired with her students on a research project from which my students derived resources and wrote papers, and published a booklet on psychological disorders, sociological disorders, in teams. There were a total of papers and there teams of 2 or 3 to a paper except for I had one area that started out with a team of 3 but they wrote individual papers because their research took them to different parts. And it turned out very well.. That document, each one of my students has a copy of it. They communicated with their UT representatives, advisors, in the epidemiology class across TeachNet. Some of them even met in person. Went to PCL [the University library] and worked together. And they wrote the papers, the second part of that was, after they gathered data they wrote their draft, a draft of each paper was provided for each student and they read those and made notes and commented on them on Daedalus respond, and they responded to those papers. That was saved to a disk and was given to the team, each one of those teams, and they went through and looked at the comments , criticisms, praises, corrections, whatever the students had given them and used that material to add ideas, respond to questions. After that was done, then they came in on Daedalus and just discussed their papers among themselves on Daedalus, and then they wrote their papers in Claris Works. This process went on for about 2 or 3 weeks. In my opinion, it was one of the best learning experiences. The hard part for me is I had to really glean from my psychology course what was absolutely essential so that I didn't interfere with that project. And I did that and it was one of the most rewarding experiences that I've ever had as a teacher.

### Teacher 3

Daedalus, I did two different things because I teach two different classes, government and world geography. It was much more successful with my 12th grade government kids. Now I'm sure some of that had to do with the fact that you can expect more from a 12th grader than a 9th grader. Also, my assignment was maybe a little bit better. I had my government kids do a current events assignment which they normally do on paper and they had done it all year long, so what I was giving them was not something totally new in terms of the physical assignment. I also think that helped. They knew what they were doing before they touched the computer. What I had them do that was a little different: normally, they cut out an article from the newspaper and write a paragraph summary and a paragraph of their opinion. I still had them do that on the computer. The thing that was new was that once they had entered that, they had to read other students' articles and they had to respond to one of those articles. So the discussion turned out to be very good quality. They were having to think more, sometimes their opinion paragraphs are very short. Here, everybody else is going to see them. Just overall, I was so much more impressed with the quality of the assignment. So I thought that was very successful and I even told the government teacher next door. With my 9th graders, I had them write a short summary of some articles they had read on India. I asked them some questions and they responded to them. Their responses were a lot shorter. They seemed to goof off a lot more. I don't know if it was because it was a totally new assignment, or that my assignment was not as good or as clear or that it was just a developmental difference.

### Teacher 4

I collaborated with a teacher who is not in the CIRCLE project and she had no real knowledge about using Daedalus. She had a Freshman class doing a book project. I had a Senior class and I felt that they could become effective editors for her freshmen and we tried for ways to use Daedalus. We did do that. I am afraid that a lot of students didn't listen to directions. Didn't log in and log out. But that was the intention. After the freshmen had written a first draft and done some rudimentary editing, they had a draft which was at least typewritten. They surrendered those drafts to my students. We matched them up first with numbers. All of her first period students had a one and then a designation, a little or a number, etc.. My students attempted to edit for both her first and second period classes. But where it become most effective, this sharing, was when my second period and Ms. A's second period could meet together at the computer lab and they could be on Daedalus, in real-time with each other. It was less effective, we found out, having a conference set up for each pair, writer and editor, especially the first period group because they never actually met their editors. They surrendered their drafts. They got the drafts back with written comments on them and then they got the Daedalus conference. They had to go and just enter questions about what they're editing, what it meant to them, or what it had accomplished to them. They could ask the editor what he meant by..., or what did you mean when you said..., but it wasn't as effective as face to face. And those second period students who were edited by my second period students had a much more successful time with the book project. Their books were overall better and that was [Ms. A's] sweeping opinion. Second period did better than first period and she thought it was because of that one on one. They were on the conference directly with each

other and they were also face to face. The conferencing then just fleshed out what they were doing. I don't think again I would do it quite the same way. I would probably change and I would allow more time for not only one on one conference but more time for the Daedalus use because I think that they could get more thoughtful responses. Another thing would change is that we only did that that one time. I would arrange a time very late when the seniors had a chance to see the books before they were entirely finished and they could have a last chance to comment as editor. I also would expand their role and make some of them art directors as well as editors because I found that when my own students did the project later that they did not make as much use of their art directors as I had intended and I think that if they had done it first for someone else then they would really understand how to use the art directors for themselves.

**Teacher 5**

I used Daedalus and that's really all I've done. I had planned to do Invent and Respond but we never quite got it set up. We were going to do a persuasive essay and then had other things going on that took me away. Right now we did, in my 3rd and 4th period class, we did an interchange on poetry and that's what the transcripts that you've got in the folder, that's what that is, discussing the nature of poetry, why do people continue to write poetry, how does it fit into the culture, what does it give to the culture, what do we get from it, where do we see it, where do we find it and those kinds of things and just a general discussion of the nature of poetry and that's what that interchange was all about. [Interviewer: You had talked about using Claris Works, about the interchange.] We used the computer lab quite a bit for word processing and that's what that is. Actually I haven't circled all the times that we used it. I need to go back and circle that cause we used it for poetry projects, we used it for writing persuasive essays, we used it for several other things and I need to note in here somewhere that [Student] used the Electronic Emissary as well as TeachNet and Internet. She did a lot of research for her stack of HyperCard and she had Electronic Emissary through that program as well.

**Teacher 6**

The Internet I only used with my honors students who were doing projects. I was sending them to use the Internet to get information on different topics, to see what was out there, to see what news groups they could find that were related to the project they were doing. Daedalus I used mainly when we covered genetics and I used it to set up I guess ethics questions over several days after we had been studying for several days so they had some background in genetics. They would talk for about a half hour on various questions such as if you could would you design a perfect baby, and what implications would that have. Do you think genetic engineering is a good thing? How is it helpful, how is it harmful. That kind of thing. That is what I used it for mainly. [Interviewer: Do you think the collaboration was effective?] Yes. I think it is difficult with freshman just because they are not real sophisticated in their thinking yet, and whether they took it very seriously or not I don't know. But I do think it was helpful. Once some of my higher level thinkers got started it would trigger something in some of my lower level students who could then respond. Otherwise they would just sit there with no response. They had no idea what to say. But once they saw something then they could respond to it and that would generate some new discussion.

**Teacher 7**

It was really nothing very creative. It was just a whole bunch of review questions that could have been typed up and run off, but instead of doing it that way, we did it on Daedalus and then they got a printout of what they had done and it took several hours to get through this review and then the people who finished did some things just to talk about what they'd done. They could share each other's stuff or pop answers back and forth to see if they agreed with each other. And they enjoyed doing it…The thing that I liked about it is that I have a lot of dyslexic students with horrible handwriting and it was kind of nice to get that clean copy from them and then there are kids who like working on computers because they have so much trouble. So it was good to let them have that opportunity.

**Westlake Teachers Comments:**

**Teacher 1**

Poetry exchange
The assignments that I did with my seniors had to do with the poetry exchange that we did in multi-level form with other English classes, you know, grades 9-12, so we called it a poetry interchange or exchange. The kids wrote poetry memories into Daedalus and commented on them they wrote lines of poetry, they made found poems from a printout of that interchange they wrote, they went though the Daedalus event and respond series to answer question that teachers had made up about a certain poems and then they did a poem in imitation of that one did some other

original poems based on poems they studied on Daedalus.

So with my Sophomores work on the research topics that we came up with, which were what do you think about this current event thing, and put your opinion in, we didn't use Daedalus so much with them except with the biblio-cite function, that was really handy during the research time when they learned how to do the list cite in MLA style, and I made them show me that they already knew how to do it, but then when they actually did their final bibliograph I let them do it on the biblio-cite and they liked that a lot.

So basically I did the interchange, the biblio-cite, and invent and respond. I know some other teachers have tried the mail but I didn't use that this year.

Research project
For Teachnet we had SME, Subject Matter Experts, set up by [Names UT Graduate Students]. And we had the students log in, every student logged in, put in a password, changed his or her password, put in a resume and then posed a question under his or her conference to the rest of the conference asking for guidance or suggestion about certain research topics. And then many received answers some did not, but they enjoyed getting on their, some wrote mail to each other, private mail and we did that the biggest problem with that was access, you know, trying to get them all on, but that went really well.

The assignment was a research magazine and paper, and the students spent the bulk of the spring semester formulating a topic they were under six broad global umbrella topics and they kept narrowing and narrowing collecting articles and inputting article information into the Daedalus interchange. In the Teachnet they would write to other kids and to the SMEs about their topics asking for suggestions or refinement of the topic and they ended up using some of the SMEs statements as quoted sources of their papers, and we showed them how to document them as an interview, an electronic interview. And they also wrote a whole paper, many of them followed up on the suggestions that the SMEs made if a suggestions came early enough. And then they made magazines, and some of the things they learned just from talking to other kids they used for their little magazines items, like adds, or horoscopes, or covers, or things like that. All these little things that they made into magazines. That was all, that was the assignment and those were the advantages.

**Teacher 2**
Poetry Exchange
We only did 2 major departmental-wise grade level projects so I can talk about that. The 18th, 19th and 20th on Daedalus, we set up an interchange with students and we did a poetry unit that was focused on the semester and our aim and our purpose was at the beginning of the 6 weeks to do 3 days of Daedalus work so that juniors could do an interchange and what we did was we set the rooms up into groups and we had those color coded and we have kept on the board all semester what group you're in so that you're real clear about where you need to go and what time and we would ask a color to go to the computer and then we had an activity at the desk for the three and so we could be hands on with whomever needed us and then the mentors assisted us with that. The poetry exchange was set up the day before with ideas that students were to bring to class about, we gave them a brief mini lesson and a handout about places that you think are poetic, a place that you've been that you think is poetic. That was one possibility. A second was a favorite line of poetry that you're currently working with, maybe that you did your poetry portfolio on, or just a favorite poem you're currently working on. Another possibility was a favorite lyric from a song and actually they had about 5 examples to choose from and they came prepared on the first day of the interchange to write about those things so when they got on, they just typed about this line and then they sent it and they responded back and forth on the computer when they were there and so [Student] would write to [Student] about that and "oh yeah, I think the beach is poetic too and it reminds me of" or their favorite songs they liked a lot and then when they went to their desks, they had 3 different types of poetry to write and then we created a booklet out of that so they had the interchange that they compacted and then they had what they did at their desk and this created a, [Shows interviewer some of the interchanges]. OK here's one. Welcome to the Poetry Exchange. And [Student] would start out with my favorite poem, it's a poem about basketball and as you can see it just collectively grew as they talked with each other through each class period and we set it up so that the 7th period kids, for example, could retrieve something that the first period kids said and they liked that a lot. So that was an example of the first Daedalus exchange.

…and then the next 6 weeks we continued it.  We like to do it the first week in the 6 weeks so that they realize that this is going to be a continuing project and we did another 3 days on that and this time we had the day, the week before we had had a day off session training and the district gave us so we went in all the computers and typed in all the assignments and we put in 5 poems, I believe, that we typed on the computer.  they also had a copy of the poems at their desk and it was "I've Been Acquainted with the Night", "A Poison Tree", "In My  World", "My Parents Kept me from Children who are Rough" and "London, 1802" and those were choices we made on the junior level because they were all applicable to American Literature and the students chose one of those to respond to and the students wrote about that and those were really nice, the responses to that.  Then after they made their response or their reflection on that, they were to choose one of those as a model to do a model-like (?) so they might  write "my parents kept me from places that they thought were fearful" and we got some very beautiful poetry from that.  And they wrote them to each other and sent them and we read them and talked about them.

Those were the major projects.  Other things that are circled there [referring to the calendar] with Daedalus where people were coming in and finishing that project, and this semester, Creative Writing, in my class, did not use Daedalus.  It was only used for the writing workshops we were doing.  But it was class projects, but it wasn't any type of interchange.  Formal readings, readings that they did to the class were on the computer.  They have a periodic process so that they put the formal reading on the computer, then they print it out, they do a copy reading for each other, they give it back and they edit.  It's that type of thing mainly.  First semester we had no computers in my classroom and so I changed classrooms with [other teacher] and they did a couple of interchanges on her computers in creative writing.  I think it was "the place I've been most afraid" and they wrote to each other from [other teacher's] room to [other teacher's] room so creative writing, second semester, just did editing and that kind of thing.  And every time Claris Works is circled in the other classes (referring to calendar) it's sort of the same thing going on.  They're working on class papers for some purpose.  For English class or...

**Teacher 3**

Research project

Well in the research they were assigned to go to the SME and they.... part of their research process was to make contact with their SME and use them as a sources in their research paper.  We also did some things with current events that again tied to the research they collected articles under these umbrella topics and we built some data bases in interchanges in Daedalus were they commented on what events they would.... that fit into that categories and they had other peoples comments on what they thought went into that topics.  Those sort of things that they just did in random intervals on their own.  The can... usually a formal class period dedicated to this activity, it was "you do this so many time and when ever you had time with in you work you may go and do this.  So that's why I had a hard time marking down that kind of activity because it was not set that they do it.

Other than that the one time... there is only one time that I actually did a formal class assignment and at that point we studied French Kings and I wanted  them to evaluate what each king did and so I find them modern French characters and had them get up and discuss each king and decide who should get an award based on their contributions to the French.  It worked OK.  With limitations because the way the computers are set up there, there are only six in each classroom and so in order to get everybody to.... I had to divide the class up so that there were only six people involved with any discussion group.  But in order to get them all a chance to discuss I had to send them to the back and to other peoples classrooms to the back and doing it that way meant that I had to come out into the hall to watch and make sure who was doing what.  I my self was not able to sit at the computer and monitor the discussion while it when on.  I think that it would have been much more successful had I been able to do that because the level of discussing was very low with out me interjecting, I could prod them.  The level at which they were discussing remained just below "well I read this in the book", they didn't have to do much evaluation of it, which I think would have worked better had I been able to monitor them I could have thought out a question because I could have had them all in one classroom, even though I had set up the interchanges six people were actually discussing with each other, if I had them all together in one room and I could have set at a computer at the same time watched what they were doing, then I could have monitored their conversations and brought the level of that up a little bit I think.

**Teacher 4**

TeachNet I had my classes use.. well my ninth and eleventh grade classes, use solely on the book talk conference.  Which is were they typed in books that they read and shared those books with other people in the conference.

**Teacher 5**

I used the Daedalus quite often.  Specifically, the one we used most often was the mail.  My kids, I set up key pals first between my second and third year classes so that each of my third and fourth year students had what I call little brothers and sisters, maybe 2 or 3, in the German 2 classes that they would correspond with, so they would leave messages for each other and I would say, probably 3 times a 6 weeks, I would require that the  German 2 students would post a letter for a completion grade.  Some of the kids would check their mail everyday.  I mean I have kids who, that's the first thing they do when they get in the classroom  is get on the computer to check their mail.  Of course, you have other kids who aren't' as excited about it.  And that's been definitely on going.  And so I've got, to that extent, that particular part of the Daedalus software is used almost everyday by someone.

I also used the interchange on the Daedalus to a lesser extent but also under great relief, especially at the 3rd year level.  We would be maybe one or two interchanges a six weeks and I'd use them in different ways.  One way for instance was to do role playing.  Let's say the kids had read a story with characters and then I would put the kids in pairs and they would take the role of the different characters and I would start them off in some way to carry on a dialogue in a role-playing format.  And they really liked this quite a bit.  It's amazing how they'd stay in character.  That was German 3.  I also, with the interchange, this last semester I had them do chain stories, where I would get them in groups of 3 or 4 and I would, for instance, let's say they read a fairly tale and what I would do is I would allow them to continue the fairy tale.  I would separate them into different conferences and I would start them off with either the end of the fairy tale they had just read or maybe some new line that would allow them to continue the fairly tale or the story or whatever they had read.  And let's stay we're studying simple past, then they would have to write it all in simple past so one student would  write a sentence and another would continue the story and so forth and so forth so you get this kind of, I don't know sometimes it can be pretty funny.  The kids like that.  That was a little more difficult to keep them focused on and so I'm going to work on that more next year as far as refining that, but the chain story was really fun.

Then just for sort of Friday activities, fun activities, it's amazing how, this is why teaching a foreign language really is, teaching a foreign language allows you to make use of the software in so many ways.  It's so easy.  In a sense, as long as the kids are communicating in the target language, then you feel like they're doing something and so for Friday fun activity, during the last 20 minutes of class, I just let them get on and do an interchange and they love it.  As long as they stay in German I let them get on and start getting into a chat like they would do on America On-line or Prodigy except they're doing it in German so that would be a sort of fun and unstructured little activity that we would do.  Kids love that.

Tenet is something I want to explore more next year.  Tenet because of this listserv, for instance, a couple of months ago, I hooked up with this German teacher in a suburban school outside of Chicago and the idea being where we set up key pals between our advanced classes.  The kids in my German 3 classes would correspond via Tenet or email with his students in Chicago and he hasn't really kept up the way, I mean my students were ready and willing to do that, but he hasn't followed through.

**Teacher 6**

I marked the one time I tried to use the Daedalus interchange and it was a total flop.  I don't think the lesson was planned very well.

Poetry exchange
The poetry interchanges in the English classes were all real successful.  We had two lessons.  One the first week of the 4th six weeks and one the first week of the 5th six weeks.  The fourth six weeks, students typed into the Daedalus interchange poetic memories.  Favorite song lyrics, nursery rhymes, poems, places.  While they were typing those poetic memories into the computers, students at their desk were writing poems modeled after a biopoem or letter poem.  The assignment posted on Daedalus was "Write a poetic memory and then respond to other students' poetic memories."  That's when we got them first acquainted with the computers.  That was 3 days.  The next 6 weeks, we took the compacted interchange of the poetic memories and then the students at the table wrote found poems.  At the computers, we had a bunch of models.  We had students fill in the blanks.  But my question has always been, "Could we have done this without the computers?"  I don't know.

**Teacher 7**

We had one interchange all year.  I didn't really use Daedalus much this year, I'm sorry to say.  I think I had one

interchange. I don't even remember what it was. It was very minimal.

Research Project
We tried the SME project and actually it could have been really good. And it was good for some kids. We made a couple of mistakes. One being that we had way too many people involved at one time. But I think that could be one of our most valuable learning tools. I see a lot more value in using that than I do Daedalus. The kids who got on-line at home really started discussing their topics in new ways. This was a research thing. Not only that, but they would get into these other conversations about current events, books, and all these other things that we have set up and they're not getting any credit for doing that. That's sort of constructivist really because that is where they start saying "this is what I care about." Then as a teacher you can look at that and get all sorts of nifty ideas for teaching. I can see a lot of potential for TeachNet. I would like to see us have our accounts and modems and all that so we can use it very wisely. I also think it's a really important skill for them to learn. As a school, we should be teaching that stuff.

The SME project was set up by UT with subject matter experts and each of our 6 umbrella topic areas for our research topic. Each kid was given an account and we told them they needed to get on-line and communicate in their bulletin board about their subjects in their umbrella topic to start to get ideas to narrow their research. That was the whole goal. For some kids it worked really beautifully, some of the things that really worked was that the librarians in our school were on and saw what they were doing and had a lot of discussion with them, pointed them to books, knew what the topics were by the time we got them to the library, they just had a really solid idea of what the kids were doing. Several of them had meaningful SME discussions. Many of them had meaningful discussions with each other. Some kids who were in not in the same class period who were doing similar subjects were able to point each other to sources, etc. We allowed them to actually use that as a source. They could use their SME, they could use their TeachNet discussion as a source in their paper so that was neat. And of course they learned how to use e-mail which is a good skill. It allowed kids from every level so it allowed some good modeling. But the drawbacks were many. We had too many people at one time in too short of a time. It could of worked had it been going on all year because we didn't have time to get everyone on so many times within this 3 or 4 week period. Right when we started getting everyone on, TeachNet went down a million time. We had no way of knowing that. One of our modems ended up being bad. We didn't know that. We didn't have a network administrator, no one to turn to. The SME's were not apparently notified of the level of the students and they had unrealistic expectations, I think.

[Interviewer: Did they express that to the students?]

No, but they expressed it to the SME project coordinators. I don't think they understood that these were 10th graders. There was a big gap. One of the things we talked about afterwards, a way that it might really work is to pair our kids with undergraduate students at UT who are closer [to their age], who can provide a positive role model. There was a huge jump with the SME's using these scholarly words with 5 or 6 syllables that were meaningless to the kids. That might be a way to make it work. I still am very excited about it and I think we had the most meaningful research project I've ever seen as far as watching them narrow topics. I think the SME contributed to that.

## Teacher 8
Poetry Exchange
We just used the interchange program. The students were talking with each other. The whole thing was based on poetry and it was supposed to be based on production, rather than appreciation. The first one, we had some sort of elaborate plans for that first one and then we scaled it way back to where we just wanted the students to get on the interchange and do something. They ended up writing back and forth writing about, sort of, their attitudes about poetry and a time that they had first liked poems, or something like that. And it ended up that that was bad because students didn't care about that topic. It wasn't anything they really wanted to talk about. And so it did end up being sort of strictly get on see if you can get on, see if you can mention poetry and then be silly. That's OK too. I understand that you have to have a lot of tolerance. But we only had three days. If it had been a whole-week unit, then you could put up with a lot more silliness and that's going to go away after awhile and then we'd have some good conversations, serious conversations.

The second project was, the computer part of the second project was taking poetry and what is that called?  A response heuristic, you put the questions in and then a student goes through with a poem and answers those questions with the poem.  The trouble with that program is that there's no real reason for the students to be on the computers.  I mean we could have given them the poem and the questions and they could have written it out at their desks.  And that was the one that had to printer problems so it actually would have worked out much better if I hadn't used the computer at all!  And again, it's like it's so neat to be using the computer, and it IS neat.  I'm not at all doubting...but that wasn't neat.  Just because it's something on the computer that it doesn't justifies....  And in that case, with what we ended up doing, it would have been much better without computers.

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## 2.  Teacher Perceptions of the Effects of Use of CIRCLE Software on Students

### a.  Effects on Students' Learning, Attitudes, and Motivation

The 15 teachers who reported use of the CIRCLE software were asked about their perceptions of the effects of CIRCLE software use on students' learning, attitudes, and motivation.  These responses are summarized in Table 7.  Perceptions of effects were varied, however, the majority of the teachers did perceive positive effects on students' learning, attitudes, and motivation.  In relation to learning and performance, teachers specifically noted increased quality of discussion and improved writing.  Concerning whether students approached assignments using the software differently, teachers mentioned more excitement and enthusiasm, but they also mentioned increased seriousness on the part of students.  Concerning student motivation, teachers again indicated more enthusiasm and enjoyment.

As in the first year, some teachers indicated that they saw increased motivation and improved learning and performance for students who did not do well in traditional class room assignments and discussions.  Also, as in year 1, some teachers indicated that students who did well in the more traditional setting did not do as well and were not as motivated on assignments using the CIRCLE software.  Teachers expressed some reservations that increased motivation for using computers did not necessarily translate into increased motivation for the subject matter of the class.  Unlike year 1, most teachers who saw changes in students' attitudes and motivation on the CIRCLE assignments reported that these changes did not carry over to regular classroom work where the CIRCLE software was not being used.

Unlike the first year, where all teachers using the CIRCLE software reported similar perceptions of effects on students, in year 2, teachers were much more diverse in their perceptions.  Some of these differences in teachers' perceptions can be related to amount of use.  Teachers who made extensive use of the CIRCLE software in their courses tended to have favorable perceptions of the effects of this use on students' learning, attitudes, and motivation.  Differences in perceptions, however, were not totally a function of use, as teachers with similar moderate levels of use had varying feelings about the benefits or lack of benefits on students.  It should be reiterated that the majority of teachers saw positive effects on students, and only one or two teachers saw no or negative effects. Differences between teachers concerned the degree of effects and uncertainty about whether they were able to say for sure if effects occurred.

**Table 7**

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**Teacher Responses to Questions Concerning Effects of the Use of CIRCLE Software on Students Learning, Attitudes, and Motivation**

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**Do you think that the CIRCLE programs you used helped to improve student learning and performance on the assignments in which they were used?**

| | |
|---|---|
| Yes | 5 |
| Conditional Yes | 5 |
| No | 2 |
| Don't Know | 3 |
| Didn't Use or Not Asked | 5 |

**Comments (by response category):**

*Yes*
Yes, in fact I think it was essential to the quality of the product.

I think it was very effective in what I was looking to get out of it. What I'm looking to do when I look, let's focus on Daedalus, holding a debate about oh, the feasibility of space travel. Very often, it's hard for a teacher in a class discussion to get any depth out of student thought because when you have one teacher asking 30 students questions and taking one response at a time, in order to make sure everyone is participating you can only get to a very low level answer from each student. What I'm looking for is elaboration and Daedalus allows that to happen because there you can have N number of students, and it was never 30 because we never had 30 computers at out disposal but we did have up to 20 at any one time. Here you have 20 people working. The best analogy I can make is it's the difference between running a computer and paralleling in series. You could have 20 commands being executed at once vs. waiting for each one to be executed and go through 20. I think that's much more productive. It's much more realistic. And when the classroom experience models their own thinking, I think the students get a lot more out of it. And I think that's exactly what Daedalus allows for- that they could participate at their thinking rate rather than participating at the teacher asking questions rate. And so I find that very useful. In a physics class what it allows for is lots of feedback. If a student makes a comment, they might get one or two moments of feedback, whereas with an interactive dialogue program, they're able to get more feedback so you're able to set up that sense of argumentation. And I think that's really positive. I think that's really good. And it forces them to think about it more. Some people would say then that they're not as likely to say something because they're afraid of getting that negative feedback so there's that fear mechanism. Well that may be true but for a very limited number of students. I think most students are going to relish that. Adolescents are in general not a shy crowd. They are looking to let you know who they are. And so it works for them. And shy students can even hide, if you're using anonymous names, behind that as they participate.

The thing that was new was that once they had entered that, they had to read other students' articles and they had to respond to one of those articles. So the discussion turned out to be very good quality. They were having to think more, sometimes their opinion paragraphs are very short. Here, everybody else is going to see them. Just overall, I was so much more impressed with the quality of the assignment. So I thought that was very successful and I even told the government teacher next door.

Well, I know it improved their readability. That's an immediate (both laugh) improvement. I think it helped them to understand that this was, just as there are different levels of usage of language, this is another type of communication which has its own peculiar set of rules and conventions and I think to be able to apply that concept that in different levels of usage, different languages and different cultures have different sets of rules and conventions is one more layer of that that they learn to deal with.

*Conditional Yes*
I think that it gave the students permission to say some things that they normally don't allow... It seems that there's a real focus on the fact that there's still gender differences in the classroom whether we're really willing to recognize that or not. That girls seem to be a lot more hesitant in being assertive during discussion and I noticed that during the time that they were doing the interchange on the computers that many of the girls who usually don't talk are not allowed the

freedom to  because those boys are going to jump in there before them are being much more expressive....As far as writing, I'm not sure that it improved anything that much.   Still there's a part of me that's not convinced that doing an interchange or putting it on the screen actually improves the quality of what's being said that much, but I think it definitely does affect the  being heard part of saying something that you have permission to say on the screen that you don't say aloud.

It was fairly effective.  I think the quality might have been better because everybody had to produce.  Usually I do things like that with a number of groups.  Each had a computer and they were each responsible.  I think for my really good students it didn't matter.  I think for some of the weaker ones it did.  The dyslexia ones, I got more out of them.

Not as much as I think is possible.  Again, I see a lot of things that I would change if I repeat the assignment if I continue in the classroom and I continue to teach seniors and they continue to want to do the book project.  I don't think this first time through I saw any real, significant change.  The book project itself forces them to look at their own writing.  Even though it's very simple writing, I don't think that they can paste words to paper without looking at them more carefully.  I know one thing, they've learned the parts of a book.  They've suddenly learned what a copyright symbol is and where it is in a book because they've had to create books themselves and they've learned by looking at layout pages.  Both they and I have learned a lot.  Some goals have been met, yes, not all.  And as far as being totally effective in my own students' writing, having some sort of positive reinforcing quality, I don't see it yet, but I hope to…The collaboration on the books was wonderful for the freshmen. [Teacher X] was especially impressed by how well her 2nd period did bottom line too.  More of them completed the book than she had hoped.  More 2nd period students completed the project than in her 1st period class.  That was another mark of success, she felt, that they would complete the assignment and turn it in.  A lot are very low ability students.  I felt good about that.  I felt that collaboration went well.

In a roundabout way.  I think that using the CIRCLE programs has contributed to the inter-disciplinary curriculum.  I think that has been a tremendously successful program.  I think the kids have learned a lot more than they realized from that.  It's not necessarily because we had Daedalus or TeachNet, but it's because we were involved in this project in the first place that that whole thing could come together.

I think so in that the programs made them feel a little more official, a little more accountable.  You know some of the kids felt very stressed by having to get on there and the access was so hard to get to every kid every period that a lot of them felt like they were going to fail if they didn't logon or something and then the thing would crash and we would be behind.  But I feel like it did help them feel, like I said, official or really involved with some of the research.  Felt like it was a nicer or easier thing to do to make a bibliograph, to make a bibliography on the biblio-cite.  Claris Works, of course is very, very handy, but um I still need to practice on Daedalus to make that truly a natural use of the computer rather then a contrived one.

*No*
No, not really, 'cause as I said the discussions I had them do I felt the level of discussion would have been higher... because I wasn't monitoring their discussion... Had it been set up so that I could have monitored their discussion on computer then it would have been better because everybody was participating but the level stayed very low.

*Don't Know*
It is hard to say because I don't have much to compare it too.  This is only my second semester to teach biology so I don't have much of anything to compare it to.

I don't know whether it improved it.  I think it did as good a job as.

I don't know.  I think the kids thought they were fun.  They were silly on the interchanges sometimes, but I think that's to be expected.  As far as writing the poems at the end, I really don't know if the computers helped.

**Do you think that students approached the assignments where you used CIRCLE software differently than their regular class assignments and activities?**

| | |
|---|---|
| Yes | 6 |
| Conditional Yes | 5 |
| No | 1 |

| Don't Know | 1 |
| Didn't Use or Not Asked | 7 |

**Comments (by response category):**

*Yes*

Much more collaboration, more dignity.... I don't know any other way to explain it. There was a dignity in doing it because they were working with university students. They sensed that that was an experience that most kids in high school don't get, and they took it pretty seriously. I think they felt honored that they had a chance to do this. And they weren't going to let it become an exercise ......

I do think they did. I think they took it a little more seriously because it was new and it was unique. They were very interested just on things like "how am I going to get a grade for this?"... Also I think they were aware that "oh someone is really going to hear what I'm going to say other than the teacher" so there was very little flaming or inappropriate language at all.

I think so because it was novel. They had never ever used the computers before in here. I don't know if they have ever used them for this open ended, say whatever you want to. I'm sure they've used them to print an English paper. I don't know if they ever did something so novel or unusual.

I think they were more excited about it. Yeah I think they were excited to get on to the computers. I think they liked using the computers.

Well first of all they love going to the computer lab because it gives them a sense of control, I think, an independence, which in most of them really brings out the best in them. I love to see it. It's kind of like going to see them work at their jobs, if they work at Penny's or wherever and you see them there versus seeing them in your classroom. It's like 'what happened?' and the same thing happens in the computer lab. They get in there. They are so focused. They are so in control. They are so independent. They are so self-directed. It's like a different part of their persona emerges and it's neat.

Absolutely and here there's a few areas I'd comment on. One is they would get excited if they saw the computers in the room so there's still an initial impact - glee phase - there. "cool this isn't worksheets." The first time I used it in the classroom I'd give them no assignment. I'd just let them play, if you will. And I'd put a bunch of shareware-astronomy, physics programs on the computers so then I'd walk them through 5 or 6 of them and then I'd let them go back and use whatever pieces of software they chose. They liked that a lot. Those were good days. But it's then no different than handing them 5 or 6 different books and saying 'look at all the pretty pictures' because that's all they're doing. There's no real learning going on. Subsequent to that I was able to use each of those pieces of software as I wanted. The other thing is that, and this is on the flip side is that they would get excited. They would also get bored quicker because they had built up a level of expectation as to how interesting any assignment done on the computer would be and when it failed to meet that or it wasn't what they expected, they said "this is new. I thought it would be cooler than it is. Therefore, I don't want it anymore." Whereas with reduced expectations on textbooks and worksheets they have a longer tolerance of boredom for it. And so I do think the raised level of expectations for it led to a shorter tolerance when they didn't get what they wanted. The students recognize that computers are around yet at a school like Travis they are always a special edition and not a regular thing and I think that any real solid research base could only be generated after it was no big deal to be working on computers anymore and we're not there yet here. And the other thing I guess would be by introducing a new instructional tool, in this case a computer which leads to the instructor's expertise being lessened and brought much closer to the student's level of comfortableness. I think that changes the atmosphere in the classroom. And you could use the whole guide on the side vs. somebody standing up there and lecturing. But I saw some students respond to that real well. That is they would turn to their students and say "help me" and therefore it would become truly collaborative. And there were other teachers who became so frustrated that they would try to exert control and discipline in behavior ways. The students certainly loosened up their behavior standards when sitting around the computers vs. sitting at their desks and so there was much more of a relaxed atmosphere for them and so that would make some teachers uncomfortable. It fits perfectly well with my approach but you had to be willing to accept that. The volume level would rise. And if you don't like volume you're in trouble. So part of this whole attitude and motivation of students all gets tied into their behavior. You would get 2 students working on a computer having a discussion with other people and at the same time there was verbal comment and I think that was a very interesting point. That I was

having them take written notes at the same time they were taking electronic comments with verbal repertoire going back and forth and so you had this multiple interaction and that is interesting.

*Conditional Yes*
A little reluctantly. They found that process of logging in a little tedious and I'm afraid they were a little careless about logging out. That again is just a matter of familiarity.

The very first time they get on Daedalus and they realize somebody is talking to them live, who is not in the room, they see some name pop-up that they know is in another class, a student, they have a little bit of a rush, that's really exciting, like "oh he is not in this class" and so they get into a conversation and that's fun. But again I that's a little bit gimmicky, I am not sure. It will take me a little more practice to determine that.

The 12th graders did. They took it much more seriously.

Not all, but most. I think they're more enthusiastic. [Interviewer: When you say not all, why?] Well, you can't expect 100% enthusiasm. Some kids just aren't going to want to do anything but for the most part, getting a mail, getting a letter is kind of cool so they tend to have a more personal stake in it. If the letter is addressed to them and it's personal, they're going to be more interested in knowing what that letter says than having to read something, some dry piece of dialogue in a text book.

The ones who like computers do. We didn't get to use it enough to really get over the apprehension and the "what do I do about this kind of stage".

*No*
No. They want to know if this is for a grade, etc. It's going to be a long time before kids see that differently.

*Don't Know*
I couldn't tell. They asked me when they were going to get to do this again, so that was nice. They enjoyed it. They'd get silly, but not terribly out of hand

**Do you think that students had different attitudes about or different motivation for the assignments where you used CIRCLE software?**

| | |
|---|---|
| Yes | 8 |
| Conditional Yes | 5 |
| Yes, But Negative Effect | 1 |
| Don't Know | 1 |
| Didn't Use or Not Asked | 5 |

**Comments (by response category):**

*Yes*
The kids like it. I mean they just like it. Even though this is something they've written, I mean obviously we like to do other stuff, lots of verbal sort of stuff, but as far as writing, I haven't come up with anything that motivates the kids like this does.

Yes, even with the 9th graders you have some kids who like to play on the computers so there was an immediate attraction. So where they might not do it if you just handed them a worksheet, having software in front of them gets them more interested. I'm sure it definitely attracted more kids that it would have otherwise. Even if I wasn't as happy with the outcome, I think some of that is because I need to re-evaluate the way I approach using the computers with my 9th graders. I would probably try to do it in a way in which I held their hands a little bit more.

I think it was very eye-opening to them because it presented them with several new ways of communicating first of all. The subject area was probably not one in which they would just sit down and talk about with each other. They were more motivated to participate because of their control of the computer. Some of them like to hide behind the computer. Some of the ones who very often will not participate in a class discussion will participate on a computer. That became

very evident. In that sense of bringing out students who would not normally participate in an ordinary (FLIP TAPE) Allowing students to be a little bit freer because they're not looking eye to eye with other students. They're thinking, they've got thinking and they've got the computer so their primary concern is not how Sammy across the way is looking at them and how they're feeling about that. Their primary concern is about the assignment, the idea, the concept and how they're responding to it. It's interesting how just that physical perspective affects the outcome and affects the kind of responses you get. [Interviewer: So you kind of take out all the distracters and let them focus on collaborating.] They're still there obviously. You look at the transcript and there's some goofiness that goes on. If you knew these students as I do and you look at some of the things they're willing to say in an interchange that they're not willing to say in an eye to eye oral discussion. It was, I think, very illuminating to me and very illuminating to them too, I think... Always there are differences and depending upon how computer literate the kids are as they come into the situation. I just almost always see a more positive approach. They will ask each other questions. They tend to zero in on someone in the room who seems to know what they are doing and they go to that person. And I allow that. I encourage it because I certainly am not the computer wizard of the world and I know that there are students in my classes for the most part who know a good deal more about computer use than I do so I encourage them to find someone who knows more than they do to ask the questions so that works.

Another advantage is that the kids really felt as though they were doing real research, very officially, when they were talking to experts outside of the classroom, it did breakdown, to some extent, that traditional barrier that we have with the outside world and with higher education....and they felt that they were doing something really important and official…

Let me just say one thing about that....and this is not empirical....My sense is that from the verbal kinds of responses I got was that for some of them, it's the first time they thought they could do college work. Because of their connection with UT and going down there twice and being in that atmosphere and looking around and seeing ordinary people just like them, what it's like there. But they got that sense that these were just people. I have had a number of kids you began to ask me about applications for college.. "What if I can't get into UT..." and I told them there are a lot of colleges out there that you can get a great education, it doesn't have to be UT, that would be delighted to have you. [unintelligible] The thing I tried to do with these kids is let them know that this is not out of their reach…I had a lot of kids tell me that it was a really good experience for then, that they never worked that hard on an writing project before...I think that's an indicator.

Also I think they were aware that "oh someone is really going to hear what I'm going to say other than the teacher" so there was very little flaming or inappropriate language at all. I think that only happened twice in my class and I know it's happened, but I think they were very aware of, "we're taking this seriously. There was a lot of planning for this" so I think they approached it in a serious way.

Generally, my impression is over the two years, not specifically this past semester, that they tend to take assignments a little more seriously.

### Conditional Yes

I'm not sure they had different motivation. They definitely wanted to use it. Once they saw them in the back of the room (I had them in here a day early to get them set up) they wanted to get on them immediately even though they didn't have any idea what we were going to be doing with them. Using them was a big motivation. Once they saw my questions they were a little taken aback. It wasn't exactly what they wanted to do. But I think so -- well they had never done anything like that before so that in itself may have been enough to motivate them to do something different.

Some of the better students in the class were not. Now that is if they were academically gifted but unfamiliar with technology, they went from high ranking to low ranking in the social order and the reverse also happened. Some of the low ranking social order students would be promoted, if you will, due to the fact that we were changing medium of learning. Oral learners were probably brought down while visual learners were probably promoted. And that's the impression I get and so some of the better students did not like going to the computer so much because it meant a demotion and most, your general broad band, 60-80% and that's most of the class, I think felt good and positive, but not real strongly. That is they still knew it was work so that prevented it from being play. But they really did like it better than listening to a lecture or doing a worksheet. And then of course those who were very bad oral or reading learners loved the process. They just liked working on the computers and didn't care that they had to learn something at the same time.

They thought it was fun to type on the computers. When they started discussing and they discussed for about 20 minuets at the beginning they were enthused about it then the realized, the monitoring I was doing, as I said, walking around from room to room, there were a couple of times when the discussion was off tack, when they realized they were truly going to have to discuss their theme even though they were doing it on the computer then, no, they no more willing to do it that way then  the other way. They were excited about using the computer but not really more excited about discussing French kings.

I think some students have more enthusiasm whenever there's a computer involved.  I also think some students have a whole lot of skepticism and anxiety whenever there's a computer involved.  And this year a large number of kids have been through this.  I don't see that the computers bring a huge amount of difference except in the lowest level writers, who will write on computers far more willingly and better than they will by hand.  And computers make a big difference for those kids, but that's really the only place I've seen a difference.

I think that what I saw was that the kids who had been on computers who were not necessarily good in class felt they had something to contribute or that they could help and it was good for them so it was a real difference.

### Yes, But Negative Effect
They ended up writing back and forth writing about, sort of, their attitudes about poetry and a time that they had first liked poems, or something like that.  And it ended up that that was bad because students didn't care about that topic.  It wasn't anything they really wanted to talk about.  And so it did end up being sort of strictly get on see if you can get on, see if you can mention poetry and then be silly.

### Don't Know
I don't know.  They were very active learners, which I like.  I'd rather see them active instead of sitting listening to a lecture, although I think there's a time and place for every type of learning and teaching.  But I don't know if they were more excited about this than any other lesson to be honest.

**For those answering yes:  Do you think that any of these differences in attitudes or motivation carried over to other assignments and activities that did not involve the CIRCLE software?**

| | |
|---|---|
| Yes | 2 |
| Conditional Yes | 1 |
| No | 7 |
| Don't Know | 1 |
| Didn't Use or Not Asked | 9 |

**Comments (by response category):**

### Yes
I do because we're very, very, very heavily collaboratively based anyway in our planning.  There's so much that goes on where they get to make a lot of choices about how they want to approach things and if we give them an assignment and it's not even a research project, but a mini-research, they know they have to go and get 5 different types of technology in the library and they have to interview someone.  I think they're thinking that way already and I think having the use of the computers in the room and the CIRCLE technology just makes them realize more and more that this is a global society and this is the way we've got to learn together so I think it has a big influence.

Oh, I hope so.  Sure.  Well one thing I think they look at each other in different ways.  The guy who was the computer nerd and to be scoffed at and laughed to scorn now becomes the hero.  That's kind of cool.  I like that. [Interviewer:  So he has an increased status even in the normal classroom then.]  Oh yeah.  Oh yeah.  It carries over. Sure.  Once you've seen that someone is really good at something that you value, the minute you start to value it, he becomes a different person, or she as the case may be.  Yeah I think there are other carry overs too.  I think a sense of self-reliance, when they've done something they're really proud of, especially something on the computer which makes the presentation so much nicer or in the Daedalus, when we're having the conversations, if someone really makes a cogent point and obviously everyone is reading that and responding to it, it's like they seem to realize that, "hey, we really can think.  We really can do this."  And I think there's a sense of self-reliance and self-esteem that does carry over, that definitely does carry over.

*Conditional Yes*
There was some carry over particularly discussion-wise. That is I think you could show that after holding Daedalus conversations, there was more willingness to participate in verbal conversations or oral debates or dialogues. Though there was a half life there and a relatively short one. Within 2 days it could be right back to the same dynamic it was before that, if you didn't follow it up. If you just had an isolated event of using the computers followed up with similar activities to what was done on the computer over the next couple of days, the first day after it would be significantly different from the day before and then it would fade and so you would need to reinforce that over time.

*No*
No, I think it's because I didn't use it that much. Maybe if I had used it more there would have been more of that carry over. But I don't think I used it enough to see.... Except for maybe in my creative writing class, but in my other classes, No

I think it was just the novelty. I don't think it carried over into anything else. I wish. I wish.

I don't see a big difference really.

*Don't Know*
That's hard to say. I think my 12th graders are a little more interested in what's going on in the world, but I don't know if it's because of the computers.

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## b.    Effects on Students' Collaboration

Fourteen teachers who reported use of the CIRCLE software for content area subjects were asked whether they thought use of CIRCLE software increased students' collaboration and cooperation. Their responses are summarized in Table 8. The majority of teachers reported that they saw increases in students' cooperative learning on assignments where CIRCLE software was used. Their responses, however, were highly qualified. About half of the teachers were not sure that students necessarily collaborated more during projects using the CIRCLE software than they did in the classroom normally, with most of these teachers indicating that they did extensive collaborative work as part of their normal classroom routine. Teachers also indicated that collaboration during use of the CIRCLE software was qualitatively rather than quantitatively different, that students may not have necessarily collaborated more but they collaborated in different ways.

The majority of teachers who were asked whether increased collaboration on CIRCLE assignments carried over to assignments where the CIRCLE software was not being used indicated either no carry over or an inability to really make that determination. As with collaboration on assignments where CIRCLE software was being used, teachers most often indicated that they did extensive collaboration in their classrooms already, so they either did not see any effects or could not really tell since students were already collaborating extensively.

Overall, teachers perceived mixed effects on student collaboration. They generally thought that use of the CIRCLE software enhanced student collaboration, but were unsure whether these effects were very large or whether these effects carried over to the classroom in general. It should be noted that both schools had adopted and strongly supported a collaborative learning model for all their classes. As a result, teachers in both schools had been extensively utilizing collaborative learning practices in their classes. This general use of collaborative learning makes determining

effects of the CIRCLE software on collaboration difficult because in many respects collaborative learning was the norm in both schools.  It is important, therefore, that teachers saw the collaboration that occurred while using the CIRCLE software as being different, and in many respects more positive than the general collaboration occurring in their classes.  This suggests that the CIRCLE software may change collaboration patterns even in situations where collaboration is already extensively used.

**Table 8**
**Teacher Responses to Questions Concerning Effects of the Use of CIRCLE Software on Students' Collaboration**

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**Do you think that students cooperated and collaborated with each other more on assignments where you used the CIRCLE programs?**

| | |
|---|---|
| Yes | 6 |
| Conditional Yes | 1 |
| No | 1 |
| Conditional No | 3 |
| Yes, but Different | 3 |
| Didn't Use or Not Asked | 6 |

**Comments (by response category):**

*Yes*
Yes.  In the process of logging in/out, they're constantly turning to each other for authorization or reinforcement, "am I doing the right?"  The more they do that's unfamiliar to them, the more they are dependent on each other.  So yes, I think it fosters cooperative learning.

Oh yeah.  It was almost forced, even though it wasn't forced.  It was almost a given that they had to do that in order to succeed.

On the research stuff that they did yes.  Because that is were they shared, they were working in groups where six kids worked under a big umbrella topic and the research part that they were doing is where they shared ideas about what should be under that topic.  They didn't have any other discussion time, at least in my class, they didn't have any other discussion time to use because the grouping was done in their English class, and even though I had all six kids I did necessarily have them all at the same time. And so [?] all the work on that in my class is done though the computer because that is where they could communicate with the people in their group.

Yes, I do.  The Daedalus program makes them do that.  And there were some kids who were slow typists and some who were very fast and I saw some of the fast ones volunteer to help the slower ones type in their assignment.  I definitely saw them helping each other.  Definitely during the use of the computer, they helped each other in different ways.  Ways in which I say are OK and valid in my classroom.  But I wonder if it was the type of assignment I put on there--it was an essay type where they didn't have the ability to cheat.  It definitely created a difference, but some of that was in the type of assignment I gave them.

Well, by the nature of the interchange they did.

Yes, in so far as all of my assignments dealt with some sort of communication.  Therefore, there had to be someone on the other end.  That certainly was collaborative as well as the interchanges.  It's just them.  I certainly wasn't there.  I would go back and read what they had written that afternoon and I might make, you know "hey you need to work on your word order," but I mean it was just them.  It was pretty collaborative.

*Conditional Yes*

I don't know. We do a lot of collaborative stuff but usually when I do big projects, they somehow involve the use of computers. So I have to say yes I guess. They would collaborate more. And the SME thing was a natural collaboration. It sort of happened as an outgrowth. Some of the other activities I had where I used the computers, they probably did collaborate more.

*No*
Not necessarily. When we do lab they collaborate a lot because there is a specific end that needs to be met or an outcome that needs to be reached. So I see a lot more collaboration in that sort of traditional lab.

*Conditional No*
Not particularly. Because so much more of what we do is collaborative work that I can't really say. And especially for really good students. I don't know that that enhanced things for them. I just felt that they hurried through it and "I wish everybody else would" so they could go on, which is how they do most assignments.

Well they did for the moment they were sending something and doing the interchange, so yes they did. But whether that was more than they normally do, a little bit, but not much.

*Yes, but Different*
Yes, but more is not the only word. Differently is the word I would use. That's an important thing because they would have an extra tool that would do drawings, or presentations or text editing for them so by introducing a change of tool, you change the language that takes place.

I don't know if they do more. They might do more at a higher level and with less distraction, possibly, yeah.

Well it depends on what type of collaboration, you know technical collaboration, absolutely, they had to because they would sit down to log on to Teachnet and nobody who was doing it for the first time knew how to do it, and even though we had instructions you know a lot of them needed someone to guide them through, so the kids who had already logged on were the ones who helped the new ones. And that kind of thing was very collaborative. Also the kids who saw each others comments on Teachnet conferences, could say "oh I saw that" and add something out loud and perhaps, but they work collaboratively on a lot of assignments almost everything we do in my class, we have tables, and it is very collaborative, so I couldn't say it was more or less, but different.

**Do you think that use of the CIRCLE software led to any general increases in student collaboration and cooperation in your classes even when you were not using the CIRCLE software?**

| | |
|---|---|
| Yes | 1 |
| Conditional Yes | 1 |
| No | 3 |
| Conditional No | 1 |
| Don't Know | 3 |
| Didn't Use or Not Asked | 11 |

**Comments (by response category):**

*Yes*
Oh yeah. In fact the collaboration.... I use a lot of that in my classes. It's just common factor and expected. And they learn to resolve differences. 'Cause somebody will, get angry at somebody and I'd say, "Look, that's a problem you have to work out." They would work it out. I wouldn't take responsibility myself. They worked it out.

*Conditional Yes*
That's a hard one to isolate. I have a very interactive classroom. My biggest criticism of that would be that most of that interaction still focuses on prompts that I generate. The CIRCLE software would allow me to change that locus of control to be the point of discussion rather than the teacher leading the discussion so I liked that. And whether or not that lead to a sense of collaboration on a lab that we did the next day, I would think yes, but not due to the software. It was due to the interaction. And therefore, my opinion is that the more interaction you could generate with the students, the more comfortable they're going to feel at their next interaction. And in this case, in this class,

in this school, in this setting, that other, that further interaction was generated by CIRCLE software and so it was the contributing factor, but the root cause of it was more interaction that lead to more comfortability which would mean interactions could happen again. Though the students do still joke and talk and make comments the way students will about things that happened while using Daedalus, or using CIRCLE software, the way they will also do it about a lab where something funny happened or something so it became another contributing factor to increased socialization rather than a primary cause.

*No*
Well we already had the collaboration set up in the fall when the network wasn't working, so I'd have to say no.

No, because they're very willing to collaborate already.

No, I didn't see any real carryover.

*Conditional No*
Well (tape stopped). Only in the sense that I have kids coming and checking their mail and stuff like that but I'm not sure if it really carried beyond the actual assignments into the classroom.

*Don't Know*
Well we do a lot of collaboration. I mean that's something that we really do emphasize in this school. We do a lot of cooperative learning and I think it certainly is in keeping with that concept and that style. I don't know that it has increased it necessarily.

I don't know that we had enough use of it to make that determination.

My sample this spring is very limited and I don't think I have enough experience to answer that question. I don't think it would be fair to.

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### 3. Teacher Perceptions of the Effects of Use of CIRCLE Software on Their Own Teaching

Teacher responses to questions concerning the effects of the use of CIRCLE software on their own teaching are summarized in Table 9. The majority of teachers who used the CIRCLE software indicated that they believed it helped them meet their goals for the assignments on which it was used. Teachers, in particular, indicated that they felt that the use of the CIRCLE software allowed both themselves and students to pursue new goals focused on deeper understanding or more in-depth activity. Some teachers qualified their responses by indicated that their experiences with the CIRCLE software produced mixed results or that they could have accomplished the same goals without the software. Overall, though, teachers were positive about the extent to which use of the CIRCLE software facilitated achieving their classroom goals.

Teachers were more divided on whether they did anything different in their teaching when using the CIRCLE software. About half of the teachers indicated they did teach differently, however, there was little consistency in what teachers mentioned. A number mentioned procedural differences related to management of the computer environment. Planning and preparation were also mentioned. As to changes in how they actually taught and interacted with students, few teachers indicated any changes while using the CIRCLE software. Of those teachers indicating differences in their teaching when using the CIRCLE software, most indicated that they felt these differences did carry over into their teaching in general. Teachers indicated increased willingness to

use collaboration and allowing more student direction in the classroom. Although teachers did not necessarily perceive large changes in their teaching practices, the majority did feel that their role in the classroom was different on assignments where CIRCLE software was used. The most commonly indicated difference was a change in role from direct teaching and the source of expertise or information to more of a facilitator or mentor role. Of those who felt their role was different on assignments where CIRCLE software was used, there was mixed feelings about whether any of these role differences carried over into the classroom in general. Most felt that their role in the classroom had become more that of facilitator or more constructivist in orientation, but they were uncertain how much of this change was a result of using the CIRCLE software.

Teachers were also somewhat divided on whether use of the CIRCLE software had affected their collaboration or other relations with students. For those who perceived changes in relations, there were no strong patterns in what aspects of their relations or collaboration they thought was different. Teachers mentioned feeling less in control and being more like a peer, greater ability to work one-on-one, and more open relations, but there was no dominant theme to what teachers thought changed. Of those teachers who perceived changes in their relations with students, most reported that these changes continued on assignments where the CIRCLE software was not being used. Teachers primarily indicated that these more permanent changes centered on the development of more personal relationships with their students and to a lesser extent on a willingness on their part to let students be self-directing.

Overall, use of the CIRCLE software appears to have produced effects on teachers' classroom practices, teachers' perceptions of their role in the classroom, and teachers' collaboration and relations with students. Most teachers reported at least some change in these areas, although the amount of change was highly variable. The changes reported appear to be in the direction of the more constructivist, collaborative, student directed environment envisioned in the CIRCLE learning model, although many of the practices envisioned in the CIRCLE model were being done by teachers in their regular teaching prior to Project CIRCLE.

**Table 9**
**Teacher Responses to Questions Concerning Effects of the Use of CIRCLE Software on Their Own Teaching**

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**Did use of the CIRCLE programs help you meet the goals you had for the assignments in which they were used?**

| | |
|---|---|
| Yes | 10 |
| Conditional Yes | 4 |
| No | 1 |
| Didn't Use or Not Asked | 5 |

**Comments (by response category):**

*Yes*
Yeah definitely. I have a real easy time with it in creative writing. That's probably why I like it so much. I find it easy to come up with ideas for how to use it. It seems that it is really appropriate. I thought in English worked really well too. I think the found poetry we did from the first set of interchanges worked really, really well.

Yes, with the editorial project because I really did see success there. I saw the seniors feeling so proud of themselves and it was because they had helped the freshmen that they elected finally to do the book project themselves.

Yes, yes I definitely want them to be thinking about the ethical issues involved in genetic engineering and recombinant DNA and the implications of that.

When I used them, yes, definitely. This year I haven't had that much access so that's all I can say. When I have used them, they have helped.

Yes and I think they also, in addition to helping students somehow be motivated to reach those basic goals that we set for all of them in terms of writing, and reading, and communicating, I think it opened up some goals for the students to understand that in order to do well, I have seniors, so they're stepping into their future right quickly and I think a number of them who have not worked very much on computers began to understand how prevalent this technology really is and really got busy and developed some skills, some technological skills, so it opened up a new goal for a number of them.

Yes certainly. And I'm somewhat biased because I would design the assignment to have the software at the core. Because what I'm still doing is looking at how useful is the software. I would adapt my curricular goal to fit the instructional mode. If we were using Daedalus, I would want something which required so many, such a quality of input and so many questions. Here going back to the training questions, I found most of what was said in the training was born out into practice as to how long you could go on with Daedalus without losing students to boredom and at what time it was no longer productive. All of that was very appropriate and so in planning my lessons, I was able to keep all of that in mind. [Interviewer: Could you describe some of your goals for me? You talked about them focusing around the technology, around the program. What would be the outcome, I guess, the learning outcome that you would look for?] At one point we held a discussion in my physics class about energy and whether or not there were appropriate and inappropriate forms of getting energy from and that involves a lot of things. Students can say we get energy as cheap as we can or they can say that we have to minimize environmental impact, or. While I am looking for logical reason, that is they are not just taking a principled stand and then not backing it up. You must be able to back it up with a principle if you're going to do that. What I was mostly looking for there was that there was collaboration. That is there was feedback. A student would make a comment and at some point someone should respond to that comment. Rather than having it be a poster board of everybody's feelings and I was able to see that there was reading, thinking, commenting going on, as well as output. And that circle of action, reflection, changed action based on that reflection was able to be seen. There was a praxis of using the software on Daedalus and that's important. On other things such as the Web or Tenet or even TeachNet, it's much harder to gauge that because the other interactive component is a machine and so while it can record where they've gone, in terms of what they've visited, particularly your better browsers, it still doesn't tell you how much thinking they've done in there and so it would have to be some sort of external evaluation and that's a hard thing to call. I think it was very valuable for them. They say they enjoyed it a lot, but is that enough? I don't know.

I think it helped them, for instance with the chain stories and the simple past, it helped them understand what simple past is useful for. For instance in German simple past is used specifically for, it's a written tense used specifically for stories and so it helped them 1) solidify their understanding of what simple past is, and 2) the usage of it helped them. Plus it makes language a little more fun and real and to that extent, yes it did. The role playing, uh again, my goals for the role playing were not so specific. Again, my goal was that they get on and use German and that's basically, I mean ultimately, that's what a language teacher wants out of their kids and you want, in order to get the kids to voluntarily use the language, they have to want to use it and this is what the software does for me. The kids like it. I mean they just like it. Even though this is something they've written, I mean obviously we like to do other stuff, lots of verbal sort of stuff, but as far as writing, I haven't come up with anything that motivates the kids like this does. With the mail, it works. The shortcoming there is finding time for the kids to respond so that's why I would make it an assignment for 3 times a 6 weeks that they must post a letter for a grade and it must be something significant. Again, it helped me reach the goal of getting the kids to overcome their fear of using German and actually liking it. I mean I wouldn't continue doing any of the activities if they weren't helping me reach my goals.

### Conditional Yes
I could have accomplished the same thing with out them. Its just a different way to do something.

Some more then others. Teachnet absolutely you know helped us breakdown the barriers, see people outside, and try these electronic things. Daedalus, sometimes was helpful and sometimes seemed very artificial and forced.

I'd say so, but I don't know if we're really doing the best kinds of lessons; really using the computers the way I want to. That's my question.

No, my goals are always higher than reality. I would have like to use the computers more, but you always feel like you don't have enough time to do what you want to do. Academically, with my seniors, I feel that they exceeded my goals. I had more A-range grades on that assignment than I have ever had. I was very happy with the academic success of my 12th graders, not nearly so much with my 9th graders.

*No*
The trouble with that program is that there's no real reason for the students to be on the computers. I mean we could have given them the poem and the questions and they could have written it out at their desks. And that was the one that had to printer problems so it actually would have worked out much better if I hadn't used the computer at all! And again, it's like it's so neat to be using the computer, and it IS neat. I'm not at all doubting...but that wasn't neat. Just because it's something on the computer that it doesn't justifies.... And in that case, with what we ended up doing, it would have been much better without computers.

**Did you do anything different in how you taught the assignments where you used CIRCLE software?**

| | |
|---|---|
| Yes | 5 |
| Conditional Yes | 2 |
| No | 3 |
| Conditional No | 3 |
| Didn't Use or Not Asked | 7 |

**Comments (by response category):**

*Yes*
I think just using the CIRCLE software itself made it different. [Interviewer: So it was just the software itself that was different?] Before they would read an article in the paper and answer some questions about it. They really wouldn't be interchange or discussions among the students about it. It would be the traditional reading comprehension assignments that they would turn into me, and I might discuss it. But when I try to discuss it and get feedback from them they don't supply it. That is on of the real benefits of doing it. I'm not in there voicing my opinion about anything. It is just the students discussing it with each other.

Well I would just try to customize the assignment to meet the resource. In my astronomy class I have them generate a travel brochure to one of the inner planets. While in the past that may have been done using cut and paste drawings, it was now done electronically with debates over what was or was not feasible to using Claris Works for drawings to setting up calumniated brochures and so forth. It was a very enjoyable assignment and there I designed the assignment to meet the resource. I knew what software we had and therefore, I could tell them what to do. They could scan in pictures and paste them in that way. They could download pictures via the web and save it and post it that way. Trying to meet a number of different things.

Yes because I had to break up my assignments. I had some students working on one thing on the computers and I would have some students working on something else, some desk work or something. So, Yeah definitely.

Yes, different in that I try to do a careful explanation or write a careful set of directions beforehand. I try to put an assignment on the computer that they can look up and then it's up to them.

I used students a lot more to help me teach it. yeah. yeah. [Interviewer: In having the students help you, is there anything else that you did differently?] Well, I think it takes a lot of planning. It takes probably more planning than, other things I teach I've been teaching for 20 years and this is something new so it does take more planning time and really trying to work through anticipating what kinds of responses I want, structuring questions so I'm getting students thinking in the direction, kind of sculpting where we're going with the discussion a little bit and that's something I personally still want to perfect because I'm not there yet. I think the way that you ask questions when you're having an interchange is very, very important to what kind of product you're going to get, what kind of thinking process you're going to get. I have a ways to go.

*Conditional Yes*

That's a really hard question because overall, CIRCLE has had a huge effect on the way I teach assignments. Whether I have the software or not, I did it anyway as if I had the software. I just came up with another way to get the same product. CIRCLE entered my life when I was pretty new to teaching so it had a lot to do with the formation of my style and my style has become that which my colleagues laugh at me when I direct teach. So the answer is yes and no.

The big differences that I had to make was an adaptation to the physical room set up that only six people could be on at a time and so the other 22 had to be doing something else and the physical rotation of kids through the computers and back to their tables and getting everybody on in a limited amount of time was the biggest difference that I was very conscious of.

*No*

No and with the 9th grade, I probably should have. I should have prepared them better. With the 12th graders, I didn't need to.

No, because I didn't really do any teaching. I mean it's pretty much them getting on and in some way using German. I mean that's always my main objective is for them to get on and start communicating in German so I wouldn't really say that there's any teaching by me other than showing them how to use the software. In a sense it's unstructured. The kids can do whatever they want. I mean there are certain, for every assignment, there are certain parameters made. For instance, you need to ask German 1 if they've just learned present perfect and you need to use present perfect but otherwise it's all generally fairly unstructured. The kids can go with it wherever they want.

*Conditional No*

I'm usually a real activity oriented type of teacher anyway. I like grouping. I like peer editing. I like the students interacting with each other, so probably not. I'm used to giving lots of directions and having different things going on in different parts of the room, so no, not really.

I think the only difference would be in how you gave directions and set up the movement of the grouping. As far as teaching strategies, it wasn't that different than a lot of the things that we teach, no.

I don't know what it was exactly because we never did anything new. It wasn't really me teaching because I don't teach anymore. I really think kids teach kids easier than teachers teach kids. It was more just a procedure for how we did it. Here's where we are and it was all the things that supposedly we should have been doing. And that's the difference too because it wasn't more open to do you think we should put (?). I mean it was or it wasn't. It wasn't the best use of Daedalus.

**For those answering yes: Have any of the differences you mentioned carried over to your teaching in general, even when you weren't using the CIRCLE programs?**

| | |
|---|---|
| Yes | 5 |
| Conditional No | 2 |
| Didn't Use or Not Asked | 13 |

**Comments (by response category):**

*Yes*

It constantly reminded me that I should not be the locus of interaction as often perhaps as I was and so that's a by-product of still being relatively new to teaching of this age group anyway and trying to figure out how to do that. And this serves another reminder of other ways in which interaction can occur so yes it did affect what was going on.

I think I maybe view my students differently because I do see them as experts in something that I am not an expert in and just the idea that that exists in the area of computers opens the concept that it might exist somewhere else too. So I think I am more open to their ideas and would like for them to be more, to have more input in terms of structuring assignments and helping to focus the class in a direction that would be helpful to them.

CIRCLE has changed my teaching in the sense of doing a lot more collaboration even without the software.

Oddly enough, I think it has. Again, I'm going over a period of 2 years. I think it has in that I am more willing to trust grouping and that the students will themselves carry through the assignment. I think I'm more willing to do that now that I've seen them be relatively independent of me on the computer… I know 2 years ago or more, I would not have tried the kind of small grouping to larger grouping kind of thing that I did with Julius Caesar which happened to have nothing to do with computers, I just know that I had confidence that they could do this and I wouldn't have tried that 2 years ago so I know there is some carry over that is positive in my own attitude toward teaching and in what is possible.

### Conditional No
Not really even though I would like it to. I would like them to do some more thinking out loud on their own in discussion and dialogue with each other. Again a lot of it has to do with their being freshman. A lot of them are not prepared to do that. They can't speak by themselves or with other people. I did work on it a little bit. I had them do another research project not involving CIRCLE but they had to learn the material and then get up and teach it to the rest of the class. I guess it carried over a little bit because I hadn't done that before I had used the software.

**Do you think that your role in the classroom was any different on the assignments where the CIRCLE programs were used?**

| | |
|---|---|
| Yes | 9 |
| Conditional Yes | 3 |
| Conditional No | 1 |
| Didn't Use or Not Asked | 7 |

**Comments (by response category):**

### Yes
Well I see myself more as a facilitator, somebody who makes sure the lights are turned on and that there's paper in the printer, and you know, those kinds of things.

Yes, Yes, Yes, Oh yeah definitely! Definitely much more of a facilitator and less of a teacher

Yes. Because my mentor was doing so much more of it than I was and that was a different role because they see me, you know, as so competent and a source of all the information and I wasn't because there were a couple of kids who knew more and who had done Daedalus in [Teacher X's] class. There were people who had done much more so that was different as far as the mechanics go.

Yes, you're more of a director rather than a direct-type teacher.

I really become only a facilitator. I go from person to person to help, but I feel that I'm suddenly wearing a mentor hat rather than a teacher hat. I'm only reminding them of directions that everybody has. I feel different when I use the computer lab, the Daedalus, or anything connected with computers. I feel somehow as though I'm not responsible for instruction, I'm there to simply facilitate their learning and it's more up to them. I hope that's supposed to be the ideal. I feel it is anyway. I feel the more that you can stop standing in the middle of the room, the better. That seems to be what the consensus is about education these days, doesn't it. The motivated learner, etc.

Yes. I was basically a monitor and sometimes to tell you the truth, in some of the interchanges, I would sort of want to get in on the fun and in that sense I would become more of a peer. Sort of getting on and having fun with the kids. The interchanges are really fun, especially at the German 3 level where their language skills are advanced enough that they can carry on a fairly sophisticated conversation. Basically they would just get on and basically my role was diminished.

(she laughs) I felt scattered that's for sure. I felt really in tune with what every single person was doing which is beneficial than I normally do.

Yes, and it was the interaction that became the focus.

Oh Yea! Totally different. You become a director of learning instead of a depository of all information. You still have the ability to help with information but you don't, give it all at once. This way you lead, you guide. It's the old, "Guide on the side" verses "Sage on the Stage."

*Conditional Yes*
It was different not... it was different, I didn't think in a beneficial way. Because it took, because as I describe a while ago, with the set up that I was using it took me totally out of the discussion and I saw that as not being good because the level of discussion never rose above just "I remember I read this."

It was different because I wasn't really teaching anything. I let them discuss mainly. Since I was new at it myself I really couldn't teach them anything. I was sort of waddling through it with them. That was different. I wasn't the most knowledgeable person.

It's the same thing. Yes and no. My role in the classroom is different because I have those [referring to the computers]. Whether I'm using them or not, yes it affects it.

*Conditional No*
I felt more that way last year because the kids initiated that research assignment, the magazine thing, and we came up with it together, and kind of implemented it and it really was new and this year since it was already in place, I gave that assignment and so I was still the one in charge and then the mentors really took on a technical management role, and so they were the ones we all looked to. I felt just so rushed this year, trying to get something to work you know because once the network was working I was in a big hurry to get something done on it, so I just feel like the kids and I didn't have so much time to collaborate as I was barking "next on the computer, now get off" you know that kind of thing. I felt like I had to become more of a time manager this year. [Interviewer: And less of a collaborator?] Right!

> **For those answering yes: Have any of these differences in your role carried over to your teaching in general, even when you weren't using the CIRCLE programs?**
>
> | | |
> |---|---|
> | Yes | 3 |
> | Conditional Yes | 1 |
> | No | 2 |
> | Conditional No | 2 |
> | Don't Know | 1 |
> | Didn't Use or Not Asked | 11 |

**Comments (by response category):**

*Yes*
I think because I'm looking forward to using different software next year, yes, it's made me think about, for example, approaching a research paper, how could I do that differently.

To some extent I think it must have though I 'd be hard pressed to give you any record. Just by having some times when the teacher is not the focus of the class, that's always going to affect, from there on out, the students' impressions of what can occur in the classroom.

My role in the classroom is different because I have those [referring to the computers]. Whether I'm using them or not, yes it affects it

*Conditional Yes*
Yes and no. So many of the classes that I teach, especially the electives like Creative Writing, I'm constantly doing just about the same thing that you do, the same type of activity when there's a Project CIRCLE activity going on. But no, I think as a teacher you don't always pay attention to every voice in the room as you probably should and I think Project CIRCLE makes you aware of that.

*No*

I don't think so. I don't think that... sometimes I would have students working in groups anyway with or without the computer I am a facilitator more then a teacher so....There is not that much of a difference just because the computers there.  If you have varied activities you have varied activities weather the computers are their or not.

*Conditional No*

No, just in the ways I mentioned, I think.  I'm more open.  I guess I see myself more as the guide on the side.

You know I can't really say that it's that different because I just sort of do it in a constructivist way anyway.  I just sort of hand them the stuff and see where they go with it and how much they can achieve and it just sort of is the same.

*Don't Know*

I've always felt like I do too much direct teaching, but the nature of the beast, I mean teaching in German where you're teaching just beginning German where it's difficult to get around that.  I do try to do more student centered activities but I don't know if that's as a result of the CIRCLE participation.

**Do you think that there were any changes in your collaboration or other relations with students on the assignments where you used CIRCLE software?**

| | |
|---|---|
| Yes | 6 |
| Conditional Yes | 2 |
| No | 4 |
| Didn't Use or Not Asked | 8 |

**Comments (by response category):**

*Yes*

Yeah a lot of them could take of in different directions depending on how much they knew about...[end of side one] Collaboration was more like sharing ideas, not working together as much as everybody doing their own thing on it.

I'm awfully frank to tell them that there is so much that I don't know.  If it means that I'm not the omniscient teacher person, instead I am simply learner as they are.  Yeah, that happens all the time because I can do my best to help if a glitch occurs.  Just this very morning, I had 3 students in the lab finishing up some details for their books.  One came flying over and said "[Students's] disk won't save, [Student] can 't print, what is [Student] going to do?" and we went over to see what we could do.  We flailed around a little bit and in fact [Student's] disk wouldn't save, but she swore to me that it wouldn't print and I found out that it would print so she did get a hard copy so all was not lost.  I was effective there because I knew just a little more than she did.  I think that I was willing to be honest with [Student], there was more of a peer feeling than a teacher-student feeling.  I tried, she had tried and failed, we together tried and succeeded, she was happy.  It was more because we were equal learners, I guess would be a good way to put it.

Yeah.  [pause] Because I'm able to be more one-on-one.  I know that sounds strange, but I'm able to be more one-on-one when they are collaborating because I'm able to more around...there's a lot of activity going on...the noise level is higher and have to understand that's just part of the process.  But it freed me to not be working with the whole, but with individuals.  So that's a lot better.

Yes.  Definitely.  Just because some students become so much more open and you acknowledge that maybe they've never shared a part of themselves like that before in another activity so there's a sort of intimacy that occurs.  Also it's really nice to see students who really are maybe excellent in Math or Science and English just is not their thing maybe, and they sort of go through and do okay, but when you use the technology they really excel and so that's nice.

Yes, I was more helpless.  A feeling I didn't enjoy.  Usually, I feel I'm very in command of what I'm teaching and when the computer screen didn't pop up like it was supposed to, I didn't know what to do and I had to scream for help.  I felt like I was much more dependent on others, including kids.

Yes. I think definitely, absolutely. To be perfectly honest, there are a few students that I am key pals with. Definitely some of the students write me letters so I write back so in that regard, I guess I'm less of a teacher in that way.

*Conditional Yes*
Well certainly with [Student]. I mean that was one on one. She was way out in the lead. I was just going, "well maybe you could do this. What do you think about this?" I did a lot of lead questioning kinds of things because she was brand new to the technology and brand new to the subject area and we just kind of worked as a team problem solving. "Well what do you want to know about?" "Well, I want to know about this." "How about if you try the encyclopedia on the CD ROM and the library?" and we'd go brainstorm and talk to [Teacher X] about the SME and we just went through the process of questioning and we'd talk and I'd bring up some questions and she'd say, "OK I'll try this" and then she'd go off and try it and then report back to me on how it went and then we'd talk some more and do some more questioning and problem solving and yeah, very collaborative.

Well some of the students responded to it extremely well and would stay after class and try to push their interaction even further. They would see me not just as a physics teacher but someone who understood computers and so your technogeek students certainly responded real well…They also see that I'm willing to try something different and I make it real clear when we do this that 'look I don't know how this is going to go, but let's try it out."

*No*
Not really. I wish it had. I think being by yourself at a computer suggests independence.

No, no different really than how I would do any group collaborative work.

**For those answering yes: Have any of these changes in collaboration or other relations with students continued in general, even when you weren't using the CIRCLE programs?**

| | |
|---|---|
| Yes | 5 |
| Conditional Yes | 1 |
| Conditional No | 1 |
| Didn't Use or Not Asked | 13 |

**Comments (by response category):**

*Yes*
Yes, once you learn which students are your computer students, then you know you can always ask them for help even when it's not CIRCLE-related. Sometimes the atmosphere here, you realize you can't do everything yourself and you rely on your students to help you out. I'm sure the CIRCLE program is a contributing factor to that feeling.

Yes. And that's my own reflection as sort of just a personal level of connection that we make as a result of something that we were doing. That they are just more in tune with me maybe and more interested in seeing that English is not just something that's in a literature book.

Yes, though I think it's just a beginning. I think this is a long term process to make major impacts…[Mentor student], who was in here earlier, for example is a wizard on the Web and is now being hired by companies here in Austin to design their Web systems. He's that good. He has been a resource for me, but his ability to come in and talk about what he does with someone who's understanding what he's talking about has been an improvement in that relationship. And there are other students who that fits.

Oh yes certainly. I find it kind of solidifies the relationship that we have.

Yes, definitely. I can see big changes in the past few years. [Interviewer: In just how you approach the students and how they approach you?] Yes. I think not only do I feel more comfortable about letting them learn on their own, but in the classroom, I try certain things. I've tried assignments that I've never tried before on the faith that they can do this. So it's made a change in me.

*Conditional Yes*

It's kinda hard to say to I think it's because of the tables actually, because last year I didn't have the tables until the very last two or three weeks of school, so I really did notice that the collaboration we began on the software transferred into other assignments. but this year from the very beginning I was doing extremely group oriented collaboratively set up assignments that didn't rely on the teacher it was kinda problem solving, like way back in the fall, we did medieval times, and we said you are a guild and you are going to create something and it was really up to them, so it really wasn't a difference it was more like, that group that collaborative setting, caused that. [Interviewer: would you say that use of CIRCLE software a year ago carried over into this fall?] I am sure it did. Yeah, probably in that that kinda got us going working in groups and trying new things.

*Conditional No*
No, I've gotten almost totally away from a read the story and we'll have a test tomorrow. I just almost don't do any of that anymore. So much of what I do now is more project-oriented, more student-driven. I say "which book do you want to read? What do you want to know about the author? Bring me something interesting that you find out. Share this with me. Share this with other students." Those kinds of things as opposed to just the cognitive true/false, multiple choice kinds of things. We're much, I think much more project-oriented, student-driven, technology-aware than we've, I know I am more than I've ever been before since I've been involved with the CIRCLE grant.

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## 4. Teacher Collaboration on Classroom Implementation of CIRCLE Software

As summarized in Table 10, the majority of teachers engaged in some collaboration with other teachers and persons involved with the CIRCLE project on classroom uses of the CIRCLE technology. Planning/discussing potential classroom uses of the technology, collaborating on specific classroom projects, and working on technical aspects of implementation were the most frequently mentioned areas of collaboration. Collaboration on specific classroom projects was mentioned more frequently by Westlake teachers because the two major implementations of the CIRCLE software at Westlake were the poetry project and research project which were department wide collaborations. Outside of these two projects, there was not extensive classroom project collaboration in either school. When asked what aspects of collaboration were most helpful, teachers primarily indicated getting ideas for classroom uses. They also mentioned that collaboration enhanced the quality of ideas and helped build a sense of collegiality. When asked what ways collaboration might not be helpful, a number of teachers indicated that collaboration was never not helpful. The main difficulty they indicated was that it was hard to find time and schedule collaborating. Interpersonal issues such as personality conflicts were also mentioned. Overall, however, teachers saw few problems with collaboration.

When asked what they most needed to continue or increase their collaboration with other teachers on classroom uses of the technology, teachers overwhelmingly indicated time. They also mentioned getting more training and examples of ways to use and a need for support and coordination of the technology aspects. Their responses suggest that finding time is likely the greatest limitation on their ability to do meaningful collaboration.

Teachers unanimously endorsed between teacher collaboration as a good way to develop classroom uses of technology. They were almost as adamant, however, in indicating that they did not feel that collaboration will work for all teachers. They expressed that personal teaching and interaction styles would influence how much individual teachers would want to collaborate and would find collaboration useful. They noted that some teachers like to be more independent and autonomous in their teaching. Although they all felt collaboration was good, they did not think it

was the only way to develop classroom technology and teaching ideas or that an individual teacher working alone could not be effective.  They also saw collaboration as being potentially threatening to some teachers.  There responses suggest that although they strongly endorsed collaboration, they did not see it as something that could be forced on everyone.

## Table 10
### Teacher Responses to Questions Concerning Collaboration on Assignments and Classroom Implementation of the CIRCLE Software

**Have you collaborated with other teachers or persons involved with the CIRCLE project on ideas for assignments or class uses of the CIRCLE programs?**

| | |
|---|---|
| Yes | 14 |
| Yes, but only on technical matters | 2 |
| Yes, but only in training sessions | 1 |
| Yes, but not effective | 1 |
| No | 2 |

**For those answering yes:**

**What sorts of collaboration about classroom uses and assignments did you do?**

| | |
|---|---|
| Informing sharing with non-CIRCLE teachers | 2 |
| Planning/discussing potential classroom uses | 8 |
| Working on technical aspects of implementing the software into a classroom assignment | 5 |
| Collaboration on specific classroom projects | 7 |

**Comments (by coded category):**

*Information sharing with non-CIRCLE teachers*

I talked to the other biology teachers and let them know that I would be happy to wheel them down and I made little handouts for my students.  I've discussed it with them, but one of them was like "what's the point of having them get on and answer some questions?"  I guess I didn't have my wits about me enough to come up with something intelligent to respond to that.  But they were both interested, but I don't know if they would actually take me up on the offer.

I ran a physical science institute for AISD this year where we had about 30 physical science teachers go through about 4 full day in-services on how to teach physical science. (flip tape). We had here at Travis where I showed them Daedalus, that is teachers from all over the district and I showed them the Web and Tenet access as well as this IBM software, Team Focus.  And by showing teachers from schools that were not part of CIRCLE the kinds of things that we are doing in CIRCLE, there was a very positive response.  Teachers were asking how they could use something like Daedalus in their physical science class and being able to answer that.  We did an evaluation of our in-service on Daedalus as well as asking some more generic science questions to get them to answer those to try and model it.  So in that sense being a part of CIRCLE and wearing those 2 hats at once - the Physical Science Institute and Project Circle, I was able to proselytize, if you will, that kind of electronic classroom to a wider audience than what CIRCLE had intended and I think that was a very positive use.  A lot of teachers were very positive about that and those teachers who were here are now the ones who are going up and putting up home pages for their schools.  And so that's a real nice correlation there between exposure and interest and things like that.  It was a part of a formal in-service, but it's also had informal spin-offs.

*Planning/discussing potential classroom uses*
When we had those formal meetings, we talked about how we were going to use it in the classroom.

Yes. [Teacher X] and a couple of other teachers and I have talked about how they should use the software and at the same time we've reflected on what the usage has been afterwards and so that's two important components right there to collaboration.

Well [Teacher Y] and I have discussed doing some things with physical science and physics. Again this is my very first time teaching physical science this semester so we talked doing some things in the future.

Ideas, although they haven't really come to fruition. I'm kind of active through Tenet. I belong to a listserv. Through this listserv, I receive information about other teachers throughout the world who are interested in setting up key pal correspondence. I have forwarded those messages to the teachers in Project CIRCLE for instance.

We have inter-disciplinary, we have inclusion (collaboration with Special Ed).

Well the 2 days that we planned was the most valuable and it was just our English department as a group and then there are some teachers in the project in foreign language and social studies. The collaboration with those people has not been as great as just conversations daily or during lunch or problems with the computer or something like that, although we're aware of what they're doing. (TAPE FLIPS)...and set it up. What's the unit plan going to look like? What's our goal and our purpose? Will we evaluate it? How does it apply to American Lit at this point or Creative Writing? Why will we start it this way to continue it in such a way and what will we do next year? Now most of the discussion is just what are we going to do this summer and how are we going to make the unit plans for next year?

Mostly at the training sessions. We just talked about what would work. What kinds of questions, areas could be investigated through the Daedalus. Researching problems, like social studies problems, to get input from all the people at Westlake and so forth that have ever heard of Ponce de Leon and what he did and when did he die, etc. Things that may not be self-evident and we can get a lot of information off a program like that. It's a matter of tapping somebody's intellect that has the information you need.

When we did training at the university, and even when we had sessions here, we were interdisciplinary. And one of the things that I think has helped all of us to hear, and possibly I'm over-stating the case although I think we were pretty successful, we learned that there are a lot of commonalties in our curriculum that we could we could encompass in our own classroom. We were able to do some things with the English class, the Geography class. We were able to work with the, across with Psychology. We did a few of those things. So I think in that sense, we were more interdisciplinary.

### Working on technical aspects of implementing the software into a classroom assignment
She helped me work out something's about using "Flatland" in the classroom and I can see how that could directly work with Daedalus and she explained some of the Daedalus to me and I did have a couple of questions on it with my pre-calculus kids (this was done in previous years, this teacher also indicated no Circle collaboration this year).

The main thing is that I was a resource that teachers came to me and I showed them ideas and then they went and did it with another class. I was more the resource teacher that knew everything, software wise.

Well they're all more knowledgeable than I am so it's basically, "what do I do?"... I say this is what I want to do. How do I set it up and then they show me the technique involved.

I also sometimes would get pulled into some emergencies. That is something wasn't working in the middle of class and there I would get to interact with their students which was something that I really found interesting, particularly the 9th graders who I don't teach.

We're collaborated, not only on the use of the equipment, One of the things we worked on is how to best frame questions on Daedalus to keep the discussion moving.

### Collaboration on specific classroom projects
That would be the poetry thing I was referring to before.

The poetry lesson was collaborative. We collaborate all the time. Junior level English plans together. I've always been one of those collaborative types.

We did 2 units. We spent a day of inservice. And it was collaborative. But it was collaborative in the sense that I'll do this part and you'll do that part. It wasn't collaborative in the sense of "lets think about this together".

Yeah, the English instruction…The research assignment is big thing that we worked together on. The point of interest stuff that we did as part of that research process but those were collected in my class and then used in their class as sources on the research process that they did.

Well actually the curriculum aspect took off in a direction that is a lot stronger, at this point then the technological aspect….The sophomore level collaboration among the world history and the world literature teachers has become really strong and independent of the software we are going to be able to continue this curricular kind of collaboration in everything. We are matching up our selections and units, and everything, and assignments even, its been really, really neat.

I collaborated with a teacher who is not in the CIRCLE project and she had no real knowledge about using Daedalus. She had a Freshman class doing a book project. I had a Senior class and I felt that they could become effective editors for her freshmen and we tried for ways to use Daedalus. Now another project that I did that had some success…This one was entirely in the hands of the student mentor. It was the Book Exchange, the Book Talk. This was also in conjunction with Westlake. [Teacher X] and I had talked at some earlier in-service things together and had decided that a book talk would be a good idea…

Yea, For instance [Teacher X], the Physics teacher .... I teach a block in Psychology on the scientific method. And [he] reviewed what I do in that and compared to what he does with that in the hard sciences. He came to my class and actually taught my class one day. And dealt with some of those differences. How research in the behavioral sciences and research in the physical sciences is somewhat different but basically the research model is the same.

**Comments from those who did not collaborate or did not have effective collaboration**

*Yes, but not effective*
It sounds so good until you really decide to do it because I've got 12th graders and I've got 9th graders and if I do the Julius Caesar collaboration with the 10 grade English teacher, where does that leave the 9th graders, 11th graders or 12th graders? They're redoing it or else they're not doing it in the right sequence. It's the same with World History. (This teacher teaches a language so she has several different grade levels in her class)

*No*
No, but I have collaborated with [Teacher Y] a couple of years before in the CIRCLE grant before I, like I said this year is unique, so I was involved with it for two years with out being formally in the CIRCLE grant.

No, and I guess that would be one of my biggest goals that somehow my class work with another class. I see lots of opportunities to do it, but haven't.

**For those who collaborated: In what ways was this collaboration helpful?**

| | |
|---|---|
| Gain ideas about how to use it in the classroom | 7 |
| Collaborative discussion enhances quality of ideas and teaching | 3 |
| Builds a sense of collegiality | 2 |
| Collaborative work more productive | 1 |

**Comments (by coded category):**

*Gain ideas about how to use it in the classroom*
It's useful when the person you're talking to is doing something similar. I don't know how useful it would have been if I was talking to a math teacher, but since I was talking to other social studies teacher, it was helpful. You can talk to other teachers and say what worked and what didn't, and then you can adapt it to what you're trying to teach.

[Teacher X is] always very helpful whether it has to do with the CIRCLE grant or not, she is always... She always has really good ideas too, especially for English

Well, for other classes it was useful. I showed them ideas and stuff and what could be done.

It is helpful because [Teacher Y] he always has really good ideas and is supportive and helpful and will come down when I am having a crisis in my class with computers. He will even leave his physics class and come help me. He has really good ideas about how to use it with physical science. It is mainly with biology that I need someone else to think about it with. It was very helpful in every sense of it -- not just in using it and getting my students to use it but in coming up with ideas on what to do

Even though I get the ideas and I go ask her how to put it into action and even before this she has always been extremely helpful helping me put it to gather and fine tune it so I can grade it as an English task as well as a regular math task

We talked about how we could share information, word processing, the best way to use the technology especially with new teachers, It could really help them to rely on other teachers. I'd, many times, help them to format the way to put the questions on TeachNet, on Daedalus, on Interchange so that it would be a broad, thought-provoking, constructivist opportunity for the kids. And we worked will with that. That was a major gain over the last year.

We are trying to mesh the sophomore English and History curriculum together which we would be doing with or without the software and so I am not sure that there was more collaboration between the four of us because the software was there. Because in order to mesh these two classes together and create assignments that were graded in both classes and for which they got content in both classes required for us to talk to each other almost daily whether or not it involved the software.

*Collaborative discussion enhances quality of ideas and teaching*
Because if you have a group of teachers, you're going to have better ideas. You may be having disagreements, but I think coming out of those disagreements is real healthy improvement to your curriculum. I think it's the only way to go.

It leads to improved practice, I'm sorry, any kind of reflection or criticism or anything you're talking about doing is going to lead to improved practice

It's great. I'm able to learn so much more about my content area, we bounce ideas off each other, not only how to deal with the lesson but how to deal with students. You're no longer in this void by yourself. In this room with all these people who hate you. It's like a real world job were you're actually working with other people. You're a team. I think it's really beneficial because you become a better teacher. I've learned a lot. How to present ideas, how to teach content, whatever. I'm now at a point where I can't imagine not collaborating. It's stimulating creatively because there are ideas floating around. It makes you more of a dynamic teacher, I think.

*Builds a sense of collegiality*
Oh, it's very helpful and the way it's helpful is that it lets both or whoever is a participant in the dialogue or conversation know that it is a common experience. ….The other thing is that being a part of CIRCLE gave a group of teachers a sense of identity in a group that is smaller than that of the whole faculty and that is an important component. A faculty of 80 is too large of a group to identify with. A group of 10 is of the right size for people to identify with. And then even when it expanded out to 20. And notice here that I'm still referring to the teachers here at Travis and not the overall Travis, Westlake, UT collaboration because I think that was very important when it was happening in the meetings but that had almost no bearing on my classroom practice.

It builds some collegiality. One of the things about teachers is that they tend to live in isolated cells. And one thing that CIRCLE has done is one, created real friendship among teachers in different disciplines.

*Collaborative work more productive*
It would have been an awful lot of work to set up if we hadn't divided it up and typed in various parts ourselves and just choosing the poems. A real collaborative process, a real fun one too.

**For those who collaborated: In what ways was this collaboration not helpful?**

| | |
|---|---|
| It was never not helpful | 4 |
| Interpersonal issues | 3 |
| Scheduling and time problems | 5 |
| Administrative Issues | 1 |

**Comments (by coded category):**

*Interpersonal issues*
When ever you have a group of teachers, say the four of us who are doing this sophomore thing, collaborating, we have four different points of view, four different personalities and some of the collaboration thing that you have to work out in any group setting we are still having to work out, because there is not really a leader it's just kind of the four of us are equal situation. Those kind of group dynamic things where we have to negotiate, points, ideas and time frames, and lessons and everything, that's difficult.

You have some people who aren't good at it, who are too selfish and don't want to give up some stuff. You have to be willing to give up some. But for the most part, I don't see how we can improve our curriculum if we don't collaborate.

Sometimes it's difficult too because you're dealing with personalities. And especially teachers who are used to being in control. So you have to get through all those things. And everybody has different priorities, etc. But that's just real life to me.

*Scheduling and time problems*
Schedule-wise.

Maybe because we're all spread out. Social studies is way down this hall and business is way down this hall, etc. Just to get together with the other teachers is a trick. When you have a conference period, those are the teachers you see, you never even see the other teachers. So it's difficult to have an ongoing collaborative effort unless we meet or something like that.

But the drawback is time. When I would go and help these other teachers it would often come out of my classroom. That is I had students in here who would have to go into somebody else's class to help them. That is a problem but that's a problem of the school day and not of the CIRCLE Project. We only get so much off time. It's not nearly sufficient to the job they expect us to. Adding another component just exacerbates that problem.

In social studies I get the feeling they're totally overwhelmed by their curriculum, whereas I'm just a German teacher, and I don't really have to answer to anyone so I can really sacrifice a little class time. It's like, I don't know if you understand, but there's a lot of pressure on teachers to cover so much and you have to sacrifice to try something new like Project CIRCLE.

It's more work. It's probably easier in terms of your planning time and that stuff to say "this is the way I'm going to do it and I don't have to talk to anyone else, and I don't have to consult with anybody else. This is the way I did it last year and all my handouts are ready. I just have to Xerox them." It's more work to collaborate.

*Administrative Issues*
The other thing that's difficult is that we've really had to fight for support from administration because its created problems for them.

**What things do you think are needed, such as time, school support, technology availability, etc., to allow you to continue to do collaboration or to do more collaboration?**

| | |
|---|---|
| Time | 10 |
| More training, more examples of ideas and implementation | 4 |

|                                        |   |
|----------------------------------------|---|
| Support from school administration     | 2 |
| Technical support and coordination     | 4 |
| Other                                  | 3 |

**Comments (by coded category):**

*Time*
Time

If you really want us to plan a lesson together, you need time.

In service days.  Days off.  Whatever we were getting that one day a month or two months.  I think we only got two or there but boy were they useful.  That is when we got the majority of our stuff done.  Time is a big issue.  Not only just time itself but time when we can all be together.  And everybody involved teaching Junior English can actually meet so you know when you are given half a day to a full day to do that you can get a lot done.

Time is a big one, we've asked for common planning or lunch periods so we can just meet but that's not going to work well with the kids we are trying to schedule in, so we have to meet pretty often on our own.  We hope to meet this summer and get some compensation for writing lessons that we're going to do together, which we did last summer.

I think it's the chance to work together.  Time.

I guess time more than anything else.  Common time.  The trick is not just time.  It's time when we can get together and actually do something.  Not just plan and not just evaluate, but actually do it or figure out how we're going to teach students to do it.

Nobody wants to have any extra meetings, they have enough as it is.  That's why these workshops are so beneficial because we have a chance to sit down and talk not only to Westlake but to teachers at our own school that we don't get to see and work with.

More time for teachers to train together.  I think I've already mentioned that.  More time between teachers and students within the school.  Just generally, more time.  Maybe at the beginning of the year, the teachers and the students could get together and set some specific goals like "we want to train X number of teachers who are not using our computers, our goal is to get X number of assignments done."  I also want to see more inter-disciplinary work done.  I had hoped to do that with a math teacher.  We had really leaned in that direction.  This spring, nothing inter-disciplinary has been available.  I still keep pushing that way.  I still believe that inter-disciplinary teaching is the way to go.

Time, mainly.  Time to meet.  Common planning time.

I thought the easy, quick, cheap way to do it was not even pay us, but just get some subs up here and say first period we're going to be teaching this and you kind of sign up and get the subs and work it all out and people come and go out of there during the day and maybe do it 3 or 4 times.  You'd have advanced teachers in there and advanced mentors and it would be neat and cheap.

*More training, more examples of  ideas and implementation*
Samples, things to look at, what's going on in other places.

I would really like some more insight from a math science perspective on more things that we could do.

I would say probably a little more training.

What I think we need is, we need someone to come in here, and half of the people would say, "No way, I won't even go to the session," but I'd like to get someone in here that can talk about development of curriculum.  That really is a different kind of curriculum.  Because if all you're doing with the computer is saying, "We're going to post this poem into the computer and then we're going to have some questions."  That's just old fashioned teaching.  Because we've talked about constructivist ideas.  And I'm very interested in that.  But nobody - I mean if I don't understand this I don't

think anyone else did either.  I never had a clear image in my mind what, really, a constructivist lesson would look like.  You know, what would it REALLY be like to have a constructivist classroom?  I think it would really be nice if someone would come in, and not just tell us, but help us along with that.  Someone that, at least, has this vision.  We come with our past.  We come with the way we've done stuff.

*Support from school administration*
We really need the support of the administration in what we are trying to do.  I think that will come gradually, this year we had nine combined sections of world history and world literature, I mean, you know, nine in each discipline, and this next year it's jumping' to 13, and so obviously we are hoping that that is an indication that the kids getting something out of it and they're liking it.  We were afraid that sections would drop, that kids would think that "oh this is too hard" and not want to take it.  It's growing we will be pulling in new teachers we will have six total teachers next year instead of the four of us.  And so we are hoping to see that grow and for the administrators to support us more as we go along.

More computers.  More software.  More phone lines.  More of everything.  But that's what's so important about a project like this is that it is a limited application to find out whether things like this are worth expanding and the answer is "yes, it is."  Because I think I was further along the learning curve of the technology that I've been able to think about how I've wanted to impact the instruction that I may get impatient with the fact that we're missing the technology.  The fact that we had this emphasis of trying to push hard paper books when in fact, rather than getting an eighth set of encyclopedias, we could get three computers hooked up to the Web which I would see just as, if not more important.

*Technical support and coordination*
Even to use the computers in your room, you need somebody to train you to use them and work out the kinks.

It did take a while for the computers to get here.   So more heavy technical support would be nice.

You need somebody in the school who is in charge and can help the others.

Ideally there needs to be one teacher that would have a paid off-period to meet with the other people and supervise and see where the collaboration is going, and if it's not going somewhere, to try to give them a little push and ideas of where it is going and help them expand.

*Other*
I think that people are very resist to that, talking about the philosophical aspects of this thing.  They just want to talk about software, and applications of software.  And it seems to me that it ends up being that you get the    software to do things that you've already been doing in the classroom; in a little flashier way or maybe a better way  but it isn't like really changing the basis, the foundation. To me that's what's interesting. To me, I'd really like to think about how this could really change the whole way we go about  this.

Just the opportunity to put it all together.  It's here.  We've got the computers, we've got the book that tells us how to do stuff, we've got the people who've done stuff and who know how to do stuff.  We have the need to do stuff.

I think the computers are here and I guess the biggest thing I would like to see happen is instead of taking a few paragraphs from a textbook, etc. to rearrange in a word processing assignment, I would like it to be an assignment they had done for another class.  I would like for it to solve several purposes at one time.

**Do you think that between teacher collaboration is a good way to develop assignments and classroom uses of technology?**

| | |
|---|---|
| Yes | 18 |
| Not Asked | 2 |

**Comments:**

Sure, it's be great because then you have two brains and that's better than one.  I'm sure if somebody had seen my 9th grade assignment, they could have given me some helpful criticism.

Yes absolutely, two, or more, heads are better then one for that kind of thing.

Collaboration between teachers can be very effective in developing assignments and classroom uses of technology. Collaboration between teachers encourages innovation.

Oh yeah.  That's one of the reasons I tried to do team teaching this year I do think it's a good idea.  Just because team teaching didn't work as well in High School it works extremely well in middle school so I am still not totally giving up on High School but it is much more difficult to really team or to totally collaborate with teachers in High School then middle school.

Yeah, I don't see how it can be done otherwise.  I think it would have to be.  (Interruption).  Yes, absolutely.  I think what should have happened, with the benefit of 20/20 hindsight vision that what should have (tape flips)
As I was saying, yes, teachers should have been expected  to submit lessons to a library which would then have been compiled and given to all the participants about ways in which the technology had been done.  It would force teachers to think how they had been doing this in terms of how they structured their lessons because there were lots of people, and we'll use me as an example, who used it and made no notes other than mental and that's bad.  That's bad practice!  And as a teacher and researcher I know it's bad practice and I still didn't do it.  So that kind of external incentive should have been there to force people, and they would have whined and they would have moaned and they would have submitted them late, but at least then there would be hard documentation, a catalogue, or library of lessons using this, which would also act as an evaluation document from your perspective.  yes, I do think teacher collaboration is a good way to develop assignments.  In fact, I think it's the best way you could, but again, that should have been done with students around.  You can't develop these lessons in a workshop on Saturday.  You have to develop them in a classroom with students and then refine it in a workshop on Saturday.

Sure.  I think that any interdisciplinary and different teachers collaborating is a good idea.

Yes, absolutely.  Not so much from my own personal experience.  As I said I didn't collaborate with other teachers as much because of the nature of my subject, but I see it much more with the global voices and I think that's one of the best things that's happened with the school

I'm in favor of it but I don't know how we're going to implement it.

Oh yes.  I think that World History and Sophomore English and all those, and that way [Teacher X and Teacher Y] used to do it.  Unfortunately what I do does not lend itself to it.  I'm in my own little world.  We have done some collaboration between languages because then you know you're not overstepping.  If they're in Latin, they're not in German usually.  Occasionally, there is a double language case but not very often.

**Do you think this type of collaboration will work for all teachers?**

| | |
|---|---|
| Yes | 2 |
| No | 12 |
| Conditional no | 4 |
| Not asked | 2 |

**Comments (by category, grouped by reason given):**

**Main reason given:** *Depends on teacher's personal views of collaboration and teaching style*

*Yes*
I think that collaboration works definitely.

Oh yes.  I could not imagine not collaborating.  I just think the more help the better really, the more ideas flying the better

*No*

Teachers have to be able to get along, so no. I'm sure there are some teachers that don't get along. I think if the teachers like each other and want to work together, it will work. Not every teacher is interested in learning technology. Generally, it's the teachers who are always looking to try something new and take a chance.

It would work for teachers who are able to collaborate with each other on anything, they could collaborate on this. I think there are some people who work well together collaboratively and then there are other people who are very independent and like to totally control their own class and to do that with or without the technology...I don't think the technology will change that.

Nothing works for all teachers. There are still teachers who still want to close their doors and be alone. They don't want to deal with anybody else. They don't want to be collaborative. They don't want to be team-oriented. They want to teach their curriculum and not be bothered. I think that group is soon becoming extinct, but the fact is that they still exist.

No, for teachers who view themselves as content experts, who are the source of truth, this is not going to work. We tend to have this ageless tendency to classify young teachers as more innovative than older teachers and I don't think that's always true.

No, but I'm not sure it's because it is not a good thing. It is just because some teachers don't want to collaborate. In my experience the teachers who don't want to collaborate are teachers who want to be the leader of the bandwagon of whatever new thing is out there in education. They aren't as willing to collaborate because they don't want to share any power with anyone. They want to control the situation.

I think it takes a special teacher. It requires a teacher who's willing and able to try new things and who is not so driven by curriculum, or not so driven by having to cover every chapter in the book.

No, it depends on your teaching style and personality. Some teachers are loners which is fine. I'm really against the thing where you have one standard method of teaching or some methodology or tool and tell everyone else to follow it.

Nope, I think some teachers are effective alone. I think for some others collaboration is wonderful. So I think it's a question of style, too. And the fact is that some teachers can be very teacher-centered, very traditional, very alone, and be very, very good at it. Very few, but there needs to be room for that.

I think that if you're the AP calculus teacher then you just need to worry about AP calculus. I mean there's plenty to worry about. I mean there are certain things that are so specific to that curriculum and there's so much to do that it's really hard to stop and pullback and do something that didn't really have that much to do with AP calculus or whatever it is that you're trying to struggle through, Advanced Physics, there are just some things that don't work.

No, I don't think so. We have a lot of teachers who just aren't interested in anything like this. This is change and they don't want to do any change. They want it just like it was 75 years ago. When we got innovative at this school and started doing things different, we lost some teachers because they said "I don't want to do this." Anything to do with computers is a threat to a lot of these teachers

This type of collaboration will not work for all teachers because of the unavailability of computers. If it is not convenient for them to utilize then it will not be effective.

No, I think there are teachers that just don't want to and I think that if there are teachers who are not interested in that, then they are not going to become part of the project.

### Conditional No
Up to a point, I think it should. There are teachers who are really not happy about planning with other teachers, they don't really enjoy doing anything, but I think those teachers are becoming fewer. I think that the trend is more toward cooperative kind of ventures. We're trying to turn the students in that direction and I think more and                 more the teachers are going to have to go there. I think that computer technology is a perfect opportunity.

No, in fact the experience that we had last year was that a couple of teachers involved did not like collaborating . They like the independence or the isolation that you're allowed to have if your a teacher and it was very threatening to have to share or collaborate with other teachers and so it didn't work.  But this year if you have people who are committed to collaborating or sharing then yes.

It probably doesn't work for every teacher, but I could give you specific examples of a few teachers who a couple of years ago wouldn't even turn a computer on.  Now a couple of those teachers are recently literate.  More and more of us are deciding that they're not going to bite us, they're here to help us.  They're not going to rule our lives but make it easier.  So yes, I think things are turning around, but some of us are more literate and more accepting of the computers than others.

I don't know.  That's a good question.  I was kind of leery about getting into this project, but I'm glad I have.  There are some people who are pretty set in their ways who wouldn't enjoy this type of thing, but then again, it seems computer technology is the thing of the future…I see with our younger teachers coming in there's more of this collaborative attitude.  I think it's changing.

## 5.  Teacher Views of the Viability of the CIRCLE Learning Model.

Teachers views concerning the viability of the CIRCLE learning model are summarized in Table 11.  Their general impressions of the collaborative, constructivist approach espoused by the model were positive.   They saw it as being beneficial for students and for teachers.  Teachers, however, strongly qualified their endorsement of the approach.  They noted that collaborative work while helpful was not the only way students could learn and that constructivism was ill defined and not necessarily the only way to view student learning.  They particularly noted that adequate time and support for implementation was needed to fully realize the potentials of the model.  Teachers generally thought that the software and technology used was effective for supporting collaborative and constructivist learning.  They were particularly favorable of Daedalus as a tool for collaborative learning.  Some teachers did express reservations that they did not have enough use to really know how effective the technology could be and some thought that the potentials of both the CIRCLE and other technologies were possibly greater than what had been done in the project.  But overall, the teachers thought the software and technology did support the learning model.  As in year 1, teachers generally believed that the CIRCLE learning model could be implemented and still allow them to meet more traditional school and statewide educational objectives.  They generally saw the model as not necessarily being mutually exclusive with traditional goals, but also indicated that the model needed to be tailored to the objectives and requirements of the specific subject being taught.

Teachers' responses to school support and what support they would need to continue to implement the CIRCLE learning model are summarized in Table 12.  The majority of teachers indicated that they thought their school was supportive of the ideas expressed in the CIRCLE learning model, at least in principle.  They saw administrative support and general interest among their fellow teachers, although some teachers saw limits to what the administration would support and noted that not all teachers were highly supportive.  When asked to indicate what types of support would be needed to implement the CIRCLE learning model, teachers again overwhelmingly indicated time as the most critical necessary support.  They specifically noted the need for time for

teachers to receive training and time for teachers to plan and develop ways to do collaborative, constructivist activities in their classes.  They also indicated a need for more technology and more technical support.  Implicitly and in some cases explicitly, teachers linked these needs to administrative support, particularly monetary commitments to provide time and technology resources.

**Table 11**
**Teacher Responses to Questions Concerning the Viability of the CIRCLE Learning Model**

**In general, what are your impressions and opinions of the sort of collaborative, constructivist approach to learning and teaching that the CIRCLE model espouses?**

**Comments (by coded category):**

*The approach Is useful, but not the only approach*
Well, I'm not totally convinced that constructivism is the model by which all people learn.  That's a research difference more than anything.  In general, I'm very supportive of it because I do think people should be expected to generate their 'truth', if you will, their reality.  Unfortunately, that reality must be tested on other people's realities and very often, in isolation, we don't do that in a constructivist model.  All we're doing is asking, "what is this person constructing?"  and not tempering it with other people's realities.  But collaboration does that and so those 2 in conjunction, I think,  are very productive.  Standing alone either one is very limited.  Together, I think they're very powerful.

The nature of my classes that I've been working with for the past 7 years has been such that cooperative learning is awfully difficult because they're hyper.  It's hard to do anything like that.  If I were to have standard classes, I would have loved and it would have been marvelous, it will be next year.  Working together with other students that don't know about TeachNet.  Really being able to do something like match up two classes, the training kids work with the other kids.

It's a fine model and it works sometimes, but I wouldn't use it 100% of the time.  It's great for technology because you have some kids in the classroom who know more than you.  Would I want to do it all the time?  No.  Collaboration takes a lot longer and sometimes you just need to be more efficient.  I think it has it's place in the classroom and in this model, it works quite well.

I don't have any strong feelings about it one way or another.  I liken it a lot to this big push for collaboration that we are hearing about on our own campus.  I think it is fine for certain things but not fine for other things.  But that is true of so many things in education.

The collaborative approach is a lot of work and even the constructivist approach.  I think the problem I had in the general sense is that what's happened a lot in Travis is don't put them in honors. Put them in the same room and divide them up with the older child who goes to school with the kid who doesn't want to go to college.  I think that's completely wrong. I think people should be with their peers and the collaborative work that I do is not based on taking away the student. They can do so much more.  My kids have achieved incredible results.  We're sort of a phenomenon over here around the state of the results my students achieve.  I never make the slowest work with the fastest.  It just debilitates the slowest and frustrates the fastest.  I just don't believe in, just mix them up and who wants to do this and who wants to do that and because like history, it's what they like, and not just you're dumb so you have to be with her because she's smart and that's what's going on.  And I don't know if that gets at the whole subject or not, but I think if you put kids with their peers, I mean my kids would be here all week, after school, all weekend, this summer, I mean they can't get enough of what we do.   So it is a constructivist approach but it's not me telling them that you have to be in this place with these people doing this.

In general, I think it's great because I think it's been open-ended enough to let creative, motivated teachers take it and make it work for them in their situations, in their classrooms.  What [Teacher X] dealt with at Travis is night and day from what I deal with at Westlake.  But this has been open enough that he has made it work for him and we've made it work here.  And that's very important, because from classroom to classroom, teacher to teacher, schools are very

different and people tend to lump them together but they're communities and they're different. I think one of the biggest problems in education is the way they have mandated from top-down what teachers have to do and what has to happen in classrooms because every class and every teacher is different. I think it's essential that projects like this allow the constructivism of teachers as well as kids. In general, I would say that technology is a catalyst.

### The approach is positive for students
Oh, I think it's great. I think it leads to more, I think students are more motivated when they have a more personal stake in what they're learning. For that matter, I think the teachers get more excited when they see their kids more excited. You know, it is, definitely. Even if I haven't had as much of the collaborative like learning in my classroom separate from the Project CIRCLE type of stuff, when I am doing the Project CIRCLE, I don't know. To me motivation is what it's all about. To me, I don't know, to make learning fun, I think that's what it's all about and I think, for me, that's what's been the biggest asset.

No, I have looked at some studies and the big difference between the Oriental students and the black and Hispanic and white students in college is that the oriental students study in groups. So I have been trying to encourage my students to do the same thing. When they do that their grades come up tremendously. So I think getting them in the habit of doing collaboration with each other will foster study groups and I think that is the only way we are going to get our kids to start really moving up.

Well, I think, to me CoLearning, from what I have seen of CoLearning, and I only saw it demonstrated once and that was in our last in-service, which was last week I guess, the last day we had to do this. That I can see that there is a lot of collaborative learning going on. And also in the interchanges I mean there is definitely a lot because you are sharing your ideas and your information. And your question is what do I think of it? I think it's great I think it's very, very, very good…. The one thing I personally have not figured out fully is how to make it a real successful experience for everybody for a full period when you only have six computers in your room. Because it is such a juggling game. I am sure the more you did it you would become better and better at it each time. But it is a difficult way to begin with it all. It can be done but I always felt there were periods of time that too many of students were off task 'cause I wasn't able to get every where at once in my room and they weren't familiar enough with the computers etc. that I could just let them go with it. Even doubling it, even having 12 in a room would help because what happens only having 6 computers in a room we had to spread every lesson out over four days so that we could have a group on, six on, six off, six on, six off one day... so if you wanted to do anything substantial where they were on for more then thirty minuets you need some more hard ware, I guess.

### The approach is positive for teachers
I Love it. Because a typical problem or a problem teachers have had historicaly is that we are isolated we are just cranking out as much as we can get done and we are in a hurry and everything and we are not encoraged or given the time to work together to truly integrate assignments and conent and everything. And so this has been a positive off-shoot of the project CIRCLE.

Well basically I'm a collaborator at heart and I think it has lots and lots of possibilities that have not yet been realized and it's got a great future if we can keep the funds coming and keep the teachers informed. I think there are teachers out there that if they were exposed to this to the extent of feeling comfortable with the technology, that there would be a lot more of it being used.

I think that people, especially in humanities tend to teach that way anyway. I mean it's pretty much of a universal approach of, that we already believe in so, for me, I don't want to say that, I guess it sounds like I didn't really learn anything new and that's not what I'm trying to say.

### Good but needs more time and support to be really implemented
I think it gets lip service. I'm not sure I can point to readily to anything that I'm doing that upholds this kind of model. I'm unsure. I don't know how to answer this. I feel that probably I could have been 10 times as effective if I had had real encouragement to do well those things that I attempted. I don't see that.

It's been more talk and less action than it should have been or could have been. But it all goes back to having to fit their essential elements and mine too. I guess it could, but where is the time that it's going to take to put these two together?

The collaborative, constructivist approach to learning and teaching can be very effective if an adequate amount of time is given to implement the approach.

My general opinion's I think it's a great idea. I think the amount of implementation is somewhat limited in that, it just takes a long time. This grant should have been a five year grant or something to really implement it in the way it's supposed to go. It's just that teachers get so extremely busy and there's so many other pressures that it's difficult. If there was something built into the grant where it was some kind of social thing where teachers that are members can get together, maybe eat together, and just brainstorm and have fun kind of thing and that might help.

### *Not sure what constructivism is supposed to be*
I think that is one of the places that as we went though the year, in fact the last thing we had just here on this campus we spent quite a time talking about that we didn't really have a grip on what that constructivist word meant or exactly how to do that because we didn't have a clear grip on what it meant we didn't really clearly understand what it meant.

The collaboration is great. The constructivist is questionable because I don't know what it really means. What is the point here?

### How effective do you think the software and technology that we have used in the CIRCLE project are for supporting a collaborative, constructivist approach to learning and teaching?

| | |
|---|---|
| Effective | 8 |
| Somewhat effective | 3 |
| Unsure | 6 |
| Not asked or no answer | 3 |

### Comments (by category):

### *Effective*
I think the software and technology is very, was wisely chosen to fit that learning model. The problem became between the designers of the research project and the practitioners of the instruction in that I think that understanding became very diluted by the time it reached the classroom teacher, and teachers don't have an educational researcher's background. I think they should, but they don't. And so that became a big problem in that the teachers saw the technology as what was being taught, and not the model as what was being practiced. And so that's a big gap there, but I do think it's supportive of, the software supported the goal. The question became "Did the practitioners in the classroom see the goal or did they just see the technology?" And I think very often, they just saw the technology.

All the software I've been using, I like a lot. And sometimes, and this has nothing to do with the software, I think because of the fact we don't have a real server, it's real slow. The technological problems we've talked about. This would be a good question to ask the teachers who've used the Invent and Respond software which I haven't used. It's really something. I love the mail and interchange. I think they are wonderful. There are some little things that I think they can change and improve but for the most part, I think it's good.

As I have said all I have used is Daedalus. Daedalus definitely seems to be wonderful. I don't know CoLearning enough to say anything about it.

I think the Daedalus is great! I can't speak as an expert on any of the others because I haven't used them with students. I've practiced with them. I think the Invent and Respond has some real potential that I would love to see implemented. We're thinking of doing some sort of readers workshop kinds of things and I think we can do that through Invent and Respond. I think that could be done through the network lab through Invent and Respond. I want to try it. I want to see what we can do with it, next year, I hope.

I would say very supportive of collaboration. Just the nature of Daedalus forces people to be involved and exchanging ideas with each other.

I think it's extremely effective. I don't feel that I've really even tapped Daedalus. I've used the conference a lot, I've posted questions and had students respond to them. But I've done those things to see if they work and I liked them and

I've not got back to them. There's our issue of time again. And I just don't feel that I've even really fully explored the potential of Daedalus. Let alone having access to a modem, the Internet, and the rest of it. I just don't feel that I ever have enough time to really do something.

Oh, it's quite usable. It just depends on the subject. If it's applicable for the subject, then absolutely.

### Somewhat Effective
At this point, it's been okay for me because I'm just beginning. It was successful and I thought that the software we used served our purpose at this point. I'm just assuming that later as I learn more, I'll want to explore more.

Computers in general are. I don't know if it's the specific program itself. Daedalus does require that people communicate, but I think it's just the idea that I have to rely on somebody else to help me. That's just the nature of the computer. If I were really a computer whiz, I wouldn't need another student to help me.

Up until Tuesday, I would have said it was good, but I saw this stuff down at San Antonio and it was real good. It's much different. Daedalus is very confining compared to this NovaNet, I think. I'll know more about it next fall. NovaNet, for instance, has got 400 different courses in the network so if a student wants to take a Linear Analysis course on the computer in my classroom, and the person sitting next to him wants to take a 7th grade math course, and another person is taking a World History course by computer with the University of Illinois.

### Unsure
I don't know that it has a whole lot of impact on what I do. I mean if I had time to really try, the things that I really wanted to do, we never had time to do because of problems with the lab. My advanced students were going to do the AP exam. I give them so many outside reading assignments they don't have anything to do with translating the language. Just the Augustan age, all these different things they're reading. Deep scholarly stuff. (tape stops - flip over). Oh and this is another thing that we could use in a lab that we didn't really talk about. But the lab is always booked I mean that's another issue with logistics and pulling a kid out of class and saying "let's go to it". I mean the assignment that the junior research paper teacher thought might take 3 days takes 8 and so 2 classes are piled up in there. It's real hard to say "OK next lesson we're going to do this" and know that you're going to have it functioning and working. It just never happens. There's so much that we have to cover that we just never stop to make sure we could do this kind of stuff.

It was very useful in the research process that we did with the English classes because as said, that was the way that people involved in the research groups communicated in my class, because, as I said they weren't all in class together. And so with out that means for them to collaborate they would have had no time, in my class for them to work on it. Because won't have had everybody. So it totally made that possible. [from answer to previous question] … one place where you asked about the strengths and weaknesses of the training at UT. One of the things that, we used only Daedalus, one of the things I noticed as we went through those training sessions all these samples that we had been given of use of those things hadn't been used other than Travis, but that's it, and UT professors come talk to us about use of the equipment. And an interchange discussion was the constant example we were given and I never really got a grip on how to do, how to go beyond that. That you could do a discussion on interchange but nobody ever really gave me any concert examples of how can you use this technology to teach this specific content. Which I guess is not constructionist, I don't know, but that was a real limitation, from my point of view. Because when you have the state essential eliminates for world history are massive you have tremendous amount of very specific content that you are supposed to cover with your kids and I never got a grip on how it was that the computers were supposed to help me cover this content.

Very effective for collaboration and I guess for constructivism. I don't know because I don't really understand constructivism.

I think Daedalus and ClarisWorks can both do it and I think they are doing it. I guess each semester gets more collaborative than the previous one. How effective it's been, I don't know.

Well that is a dificult quesiton for me to answer, at this point anyway. And that's one of the points we're making in the application for the new grant the CHALENGE grant that some of us are helping to write. Because we feel that we have just gotten our feet wet and to see if it really does suport constructivest learning we need more time to implemtnt it and to see. Because, like I was saying before, we are still in a contrived artifical stage setting up the interchanges just to try the computers and it's not a natrual thing that the kids turn to. So we need more time.

I don't know, I can't answer that because I haven't used the software enough.

**Do you think that a collaborative, constructivist approach to learning and teaching can be done and still allow you to meet school, district, or TEA goals, such as TAAS scores, etc.?**

| | |
|---|---|
| Yes | 10 |
| Conditional yes | 7 |
| Unsure | 1 |
| Not asked or no answer | 2 |

**Comments (by category):**

*Yes*
Yes, yes, yes.  Definitely

Yes, we did it this year. 97% of our kids passed the writing section of the TAAS.  Definitely, yes.  You can meet the essential elements, etc.

Encouraging collaboration is utilized in cooperative learning, which has been a too that is imperative in the workforce.  This type of learning encourages problem solving and the utilization of technology, which will definitely have an impact on TAAS scorea and accomplishing school goals.

Yes.  It's difficult at times and I know that all of us have talked about doing other things that we have not done and in our particular situation where we've been so overcrowded and we've moved so much, it's been a restraint on us.  It just has to be the willingness to give up the time to do it, to plan.

Yes, but it requires creativity on the part of the teachers.  It really takes a special teacher, but I think it takes a special teacher to do anything, I guess.  I think it takes a teacher with energy and enthusiasm.

Sure.  Collaboration with other teachers and student to student teaching means meeting and getting together and brainstorming together.  Coming up with new ideas and different ways of doing things, resolving problems with the course.  I think it's good anytime we can do that.

Sure, I don't see any conflict there at all.  Anything that causes students to write more readily or to learn from one another about writing is obviously going to line up with TAAS writing skills.  Recognition of mechanical errors and such, they're more apt to do this on the computer than in their own handwriting and so I don't see any conflict whatsoever.

Oh yeah.  Thinking for your self is the whole idea behind the Math TAAS test.  If we can get our kids thinking they will do better on the TAAS.  Most of them already know how to add, subtract multiply and divide and pretty soon they are going be able to use calculators on it, so the elementary stuff won't make any difference it is thinking that we are really are concerned with.  I don't know how many people subtract and don't use a calculator in their checkbooks, it's not that they don't know what 3-2 is they just don't want to take the chance of making a mistake and that's how it is going to be in the work place, they will need to know how to use a calculator more then they need to remember 2-1.

It can in English.  The essential elements in English are not as content oriented as in American History.  Yes, definitely.

Sure.  I think though that if you changed over totally to it, you'd find a drop in it because that's what happens anytime you change an educational paradigm radically.  That's what would happen.  I mean it's true.  It should be just temporary.

*Conditional yes*
Yeah.  Because when I taught English I was a lot more involved with that and I taught Sophomore English.  And a lot of what I did falls under current events and the kids were in there choosing what they wanted to read and choosing what they wanted to write about it and argue with each other about whether these issues meant this or that and wanted to, yeah, and it's all set up for them learning to write a persuasive essay and I brought in the newspapers everyday and we

read editorials and then we'd write make believe letters to the editor and that's the same kind of approach. And my kids, and I don't think they're, I think with these kinds of kids there isn't any other way to deal. But you can't waste time with it. You can't just invent thematic units and just decide that everybody's going to do the discovery with Columbus and just bend your curriculum to it. I think that's just a waste of time cause that's talking and stuff too which I think is. You lose the, most of your kids doing that. So, and just allude to what's going on. I think a lot of how you keep these kids moving is with current events and what's going on and I teach Latin and I use current events every day or cartoons and get them going from that . The thematic unit things can make a (word unclear) stay. You know that part of some, you know, and I think that, I think it's gotta be, but I don't think that all kids are collaborators either and if they don't want to collaborate, then that's fine. As long as they're achieving, it just doesn't matter.

As I just said I don't feel I have a grip on just what it was. The collaborative part, yes. Because in planning with the English teachers we are able to sit down and look at, here is the subject matter that we are supposed to cover in this class and mesh that with them as far as books that they are going to chose for reading or the type of writing assignment or what ever... style of writing that they would be studying at a particular time we are able to give an assignment in our class based on the content that we will be covering at that time. So Collaboratively, yes it can be done.

I don't think we can do everything with it, but I think one of the things that it does do that we're not able to achieve through other means is to keep the motivation of our students high. And I see that as one of our main problems, on this campus in particular. And letting students know that their are opportunities out there and they can be part of that competitive group that have the chance to get where they want to get and do what they want to do. I think introducing technology and using it as a learning tool helps them to see themselves in that way. We used the lab, we have actually networked TAAS practices and networked SAT and ACT practices networked in the lab. So we use the networking. We haven't used the Daedalus or the Invent and Respond or the Internet specifically towards TAAS objectives, but so many of the TAAS objectives are simply basic learning, basic educational objectives. Can you communicate clearly? Are you capable of having a vocabulary that will allow you to say what you want to say? Do you know modes of communication? Those kinds of things. Can you read and write? That's what basically TAAS is all about and if you're reading and writing on the computer, than you're working towards those objectives.

That is a really tough question because different disciplines have different requirements. In English we are lucky because we have general EEs, very general, and we can spend time just seeing if students can construct the learning that they need. In Social Studies, however, the world history teachers are stuck with this, have very specific liner Essential Elements and they must cover all this stuff in order to get credit for the course and they don't have time to let the kids try a constructivist approach because if they don't get it "times up" and they have to move on. And so it really depends on the kids, on the time, on the type of course it is, on a lot of things.

It's difficult for me to answer as I don't do TAAS preparation. All the students I get have passed TAAS so what I'm doing is, let's take for example an AP course, and the answer there is no. Within a block schedule where I get my students in January and we prepare them for an Advanced Placement exam in May, there is no place for, or almost no place for this model because in a content-driven test that is criterion-referenced, they don't care about your opinion or how you feel, whereas if you were dealing with a test which is more essay-driven, perhaps you could use it if you had software that allowed for the constructing of student questions, student criterion questions. Students constructing criterion based questions. Perhaps then this model could fit because then they'd have to look at how questions are constructed as well. But I teach such content-driven courses that it's difficult to say that this fits. Physics 2, in Physics 1, it definitely fits. I can meet the TEA requirements of what the course is. I can meet teaching a Physics 1 course and do it well using this stuff. But when I put it at that AP level. It doesn't. And so there is still some question about the appropriate usage of both the philosophy and the technology.

Sure. If anything, this helps. You get a little more writing out of the kids. They seem a little more interested in their work. TAAS is a whole other issue. It has nothing to do with computers. It has to do with the families they come from.

Sure. I don't see why not. Again I don't think it is something that you would want to use entirely in your classroom. I have seen mainly advantages with people working together. The few drawbacks that I have see and this may have to do with the fact that we have heterogeneous classes. I see that the higher level students are getting as much as they could. They are being challenged as much as they could and they are having to do a lot of the teaching to the people in their group –the people they are working with.

It's a little difficult for me to evaluate, but I would hope that everything we are doing is going to improve either reading, writing, or math scores on the TAAS test somehow.

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**Table 12**
**Teacher Responses to Questions Concerning School Support and Support Needed for Continued Use of the CIRCLE Learning Model**

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**In your view, do you perceive your school as being supportive of the constructivist, collaborative approach to learning espoused by the CIRCLE model?**

| | |
|---|---|
| Yes | 10 |
| Conditional yes | 6 |
| No | 3 |
| Not asked or no answer | 1 |

**Comments (by category):**

*Yes*

Yes, as I said earlier, they are willing to give us time to take of for training days, they are willing to let us get subs and do that they are willing to allow us to develop a new curriculum, meshing classes together. There is support for whatever we come up with.

I would say so only they aren't calling it constructivism. Many of the ideas are the same. Definitely.

Our principal, [Names principal], has been instrumental in making sure that the majority of the Travis High School staff receive cooperative learning training; therefore, she is supportive of the constructivist, collaborative approach to learning and teaching.

Absolutely. [Principal] is so into teaming, and collaborative learning, so absolutely.

Yes. Very much. Well all the teachers have been trained in collaborative learning. I mean every single teacher goes to training for it. So I think it's a very useful thing. [Interviewer: This training is provided by the school] Yes, by the school. Something that other schools really don't have, but our vertical team gets training in collaborative learning that's really outstanding.

Sure. Mainly because it doesn't cost anything and they like that. If you can put it in an existing lab, that's great. If you have to go out and buy another lab, sure let's do it. So I think they're very supportive.

Our principal is very supportive.

I really do and as much trouble as we have had with some of the people involved it really very few people, they just happen to have a lot of say-so. But generally speaking the teachers are very, very interested in doing things in the new, different, and better ways. The kids are amenable to it. People in the curriculum office, like [Administrator X, the project co-director] are wonderful advocates of this kind of change. Just allowing us to have the grant and to try these kind of things

Oh yeah. We are given some time off, professionally, to work together, and we are encouraged to do that. And most of the teachers are willing to, they come and ask, we ask each other question. I am teaching algebra 2 for the first time in seven years so I ask the teachers "how's it been going for you" what should I stress. What's going to be the hardest thing...I mean 7 years is a long time. Even though I know the material, "Which thing is the hardest thing to get over, new ideas for projects? What did you learn at the last..." we do this all the time.

*Conditional Yes*

Yeah. And I think that Travis puts too much emphasis on the specific collaborative model. That's what they're supposed to see in every classroom. it's almost too static, what they want. They have how many little groups and who's the reporter. It's too textbookish. It's that model which says let's make the kids responsible for each other's learning. I don't like that. I don't like that. I don't think that's how it works. I don't think that the one who desperately needs to get college scholarships and the ones that will be the valedictorian should be responsible to get the research done for the entire school. That's not right. And my kids complain about it endlessly because they know that I agree with them. So they come in my classes going "you won't believe what we had to do today. And it just hurt my grade and my grade just dropped 2 points." You know it's, there's really no way. It's inauthentic collaboration. It's not the way adults collaborate. It's worse. I'm an authority.

I don't know. I think we're a pretty traditioanl school. Not necessarily. [Interviewer: As far as students collaborating together] Yes, I would say so.

Some of us yes, and some of us no. Some of the teachers are much more receptive and some of them don't want to change anything they've been doing for the last number of years.

I think there are a lot of people who really don't yet fully understand what it's all about. But the ones who have had any contact with it at all and we've had people who are not CIRCLE grant people use the Daedalus for interchange, who have used the networked word processor, who have used the networking toward other goals - Latin, the Latin teacher, Nancy, who's also CIRCLE grant uses it. Nettie does Emissary in our Spanish department. A couple of business teachers have used the lab for interchanges and for word processing so yeah, I think everyone who has used it sees a lot of potential for it.

I perceive them as being more so than they were a year ago, but still what happens is you have to be really careful about what you push for. They have their limits. They're ok. I would rate them fair, not bad, not great as far as support.

I think I answered that question when I talked about that obstacle we came across. [Interviewer: the network] yeah the wiring thing, yeah. Other than that I think so - I think so. You know I have not had a whole lot of contact with the administratives. We have been given the days off that we've needed. We do have, teachers in project CIRCLE were given priority as far as classes were concerned, or it was defiantly taken into consideration as far as were we were going to be placed that defiantly shows some support. I don't know.

*No*
I don't think the school has any philosophy. I think you have to look at each individual teacher. I'm sorry but they [school] talk one game, but there's a whole level of reality. They may have trained every teacher with 40 hours of cooperative learning training, but that doesn't mean that cooperative learning is going on here. It depends on the teacher. It is not a model for everyone.

Not as much as it should be, no.

No. No! NO! NO! I see my school, and maybe I'm cynical, but I see my school interested only in getting through the years without, with minimal ease and few hassles from their teachers.


**In your view, what type of support, such as time, equipment, help, administrative help, training, etc., is needed to implement the CIRCLE type of collaborative, constructivist learning approach in your classroom?**

| | |
|---|---|
| Time | 14 |
| Money | 5 |
| More technology/equipment | 4 |
| More training, more examples of ideas and implementation | 5 |
| Support from school administration | 6 |
| Technical support | 4 |
| Not asked | 3 |

**Comments (by teacher with coded category(s) indicated):**

This approach will require time and training in order to be a success. Our campus must be supportive by being flexible enough to allow time that does not take away from regular planning for the classroom! Our principal is very innovative; she loves change. Therefore, we find it quite challenging each school year to maintain our classes in addition to addressing the areas of implementation that appear on her agenda for the academic year. [Time; Training]

One of the things that bothers me the most about teaching is the lack of time to do it well and it's bothering me to the point where I'm going to get out…. Besides time, money. If the administrators insist that time is money, because I think they will when we start hollering for subs to get truly away from our normal teaching day, I've got lots of ideas to suggest. I wonder how the administration would react if CIRCLE grant could help sponsor one or more persons in each school to be almost full-time support people rather than full-time teachers. We need them. They need to be paid. We need one or two per school and that is certainly money we are talking about. I'll make a nasty suggestion, why don't we take a few thousands away from our superintendent of schools and put it where it should be. Let's get our priorities straight here. I don't think he needs to make that much money. I don't, why should he? [Time; Money; Technical Support]

I think the things I've already mentioned. I think it's important to have the teacher planning time that we can do together, a reassurance that we're going to have the money, and administrative support to give us the feeling that what we're doing is viable and worthwhile and this year we've had that. I think the first year that we got started, it was sort of on shaky ground and no one was sure where we were going but there's a sort of a general feeling in the faculty that we're not some sort of elitist group out there. That we're willing to do it. Also our administrators have been supportive this year, more than last year. [Time; Money; Administrative Support]

I think that the best way to go about the maintenance level of training is to continue the weekend training sessions. That's where it's at. I'm not going to give up any of my time and the other teachers aren't either. We have to organize and make the most out of every minute we're at school. I don't want to carry stuff home at night and I don't want to go to extra meetings. [Time; Training]

Money. Time. Some kind of structure for it to really continue in a viable fashion. Teachers have to commit to that time. [Time; Money; Administrative Support]

Well in doing our restructuring we found that the biggest thing that everyone across the nation needs is time. That is our biggest stumbling block is. The schools try to cram so much stuff in the little space of the day and we have an hour and half, but we have to get everything graded, there is no way you can do that in an hour and a half even if you have to call the parents and all that kind of stuff, there is no way. So if you are doing collaboration in addition to that it means that you have to stay and do that and not the other stuff. So time is a big thing. I think everything else would come along if we just had more time. I don't know how we are going to find it. I think it is going to be one of those problems all of the time. [Time]

All of those things, of course, yeah [In reference to the things stated in the question]. We need time to see if things we think of work and if they don't how if we changed them they might work or if they are just not going to work. You need a lot of trial and error time with something, one of the things a teacher said in a meeting last week, a couple of weeks ago was, "we are not sure what constructivist learning is suposed to look like. Because we just hear all this theory. And all these theoreticians in the colledge of education are thinking this stuff up but we are very practical and what's the bottem line type classroom teachers. We want to know "what does this look like?" "what is the outcome?". If it truly is a paradgim shift where you can't measure it by traditional assessment methods then what is it. If its a portfolio assesment we need to see some examples or something. And so that kind of concrete things is a big leap for, the need for, that causes us to have a big gap between what we are trying to do and what we are getting at our goal. And we need more time to fill that in. [Time; Training]

Time. Time for planning. Time to set up an interchange. That's a precious amount of time for teachers. Support. And that helps with the time because if we had a network support person, then we'd get them to do a lot of that stuff. [Interviewer: So by support, you mean technical support?] Yes, technical support. Planning time to come together and time alone. Some of the best stuff we had this year with CIRCLE was time which was just release time for us to do what we needed to do. That was some of our best money spent, I think. [Time; Technical Support]

I would say Time is the big one. Before we got a whole bunch more hardware and software and whatever else, that we just really got solid with what we got. And that would involve having time to get solid. So I think that would be my big issue. [Time]

Well, of course, time, common time is at the top of the list and I suppose money has to go with that in some form or another because usually that means release time for somebody and that means substitutes or money for in-service or whatever. I think we still do need an administrative source that is dedicated to the promotion of this approach to education and I suppose that could come through the local school district. We do have some sort of administrator for technology, but so far the only way I've seen them function is in terms of keeping up with equipment and copyright laws and things like that. I haven't really seen them taking much of a lead in terms of any kind of creative use of technology, at least not on this campus. So I think we still do need some central source of (TAPE FLIPS). [Time; Money; Administrative Support]

OK. In my class I would need some off-time to plan really good lessons because I want those first few lessons just to be kick-ass. And at the school, well that's about it. I feel like I have sufficient training. I understand the technology well enough that what I need is an environment to produce and that's time. The school-wide questions are, at the school level, I think we need more hardware. I think we need incentives to force people to try this. And I would like to see faculty meetings or department meetings held on Daedalus so that they can see how it's useful- that it's appropriate professionally for them as teachers as well as for students. So I think those are the big changes. [Time; Administrative Support; More Technology/Equipment]

Time and examples. But then I guess examples would not be constructivist. [Interviewer: That's a question. I would think examples of ways of design a classroom or environment that facilitates constructivism does exist. Examples of how you do it 1 2 3 4, no.] That destroys the whole idea. But it keeps you guessing as to am I really doing this right, am I doing what I'm supposed to be, is this really what's happening. That's what I have a real problem with. Knowing what the whole concept means, what is the model supposed to be. I know in teaching everything is not necessarily right or wrong. I'm very open, but I'm confused by this constructivist model or theory. [Time; Training]

If we were to implement it on a school wide basis or throughout to this faculty would require a lot more money. Just to get more computers and training on how to use those computers. Other than that I don't know. I'd say the administration is fairly supportive of the idea and the teachers would be willing to try something out
to see if it works. But the physical resources (Computers) are not there. [Interviewer: What is the minimum that you would need?] In order for us to teach our classes how we want to teach them with the technology being integrated completely I would say a lab in each department if not then probably 5 computers in each classroom. I don't think you could do much with less than five with the class sizes that we have…I would like to get more ideas on way to use it. I did see a lot of value in it the few times I did use it. I definitely want to integrate it more next year. I want to come up with some decent ways to use it rather than having them interchange about certain questions. [Money; Training; More Technology/Equipment].

Well, the classrooms for instance, we need open classrooms so we can plan. We need technology, we need someone to oversee that. We just need more. It would be nice to have the administrators come in and see what we're doing so that they understand scheduling and can help us schedule. For me it's not so much of a concern but if you talk to [Teachers X or Teacher Y], it's been a nightmare for them getting the administration to schedule their global voices. And I know global voices is separate from Project CIRCLE but they're kind of tied together. It's all geared towards collaborative sorts of learning. It can get really depressing thinking how little our administration does to advance any kind of creative and new learning styles. [More Technology/Equipment; Technical Support; Administrative Support].

Time, and I think I wouldn't even want to invest the time after the grant ends cause we'll need technical support, to keep the labs operating. It's a real problem in the schools. There's so many broken VCR's and computer pieces thrown in closets. So I mean it's not just maintenance, it's more than that. [Time; Technical Support]

I need 28 Power Macs - 7100's, I need Internet access, the whole school needs full speed fiber optic Internet access, and probably 1 or 2 more labs, and yes, then we'd really be going. A computer on every teacher's desk too with Internet access. [More Technology/Equipment]

The big thing as far as the use of the software and thinking of things to do with it the big thing that would have helped us is more access to those rooms with the computers.   Because they are used every day there is a teacher in it every period and so there is no time during a conference period that you can just get in and play with the software and figure out, "oh here is something I could do with this". Also use of the buildings on the weekends is very restricted they don't like us to be in here. and so just finding time. [Time; Administrative Support]

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# III. RESULTS OF ANALYSIS OF STUDENT KNOWLEDGE BUILDING, INTENTIONAL LEARNING, AND CLASSROOM PERCEPTIONS

## A.  Introduction

A primary second year goal of the CIRCLE outcome evaluation was to determine the effects of the implementation of the CIRCLE model on student learning, behavior, and attitudes and on students' perceptions of the classroom environment.  We were also interested in whether we could link aspects of students' perceptions of their learning and their perceptions of the classroom to their classroom achievement.  The CIRCLE learning model was based on a knowledge building or constructivist approach to learning among students.  Although the general principles of knowledge building underlie many contemporary theories of student learning and self-regulation, the primary theoretical foundation for Project CIRCLE has been drawn from the work of Bereiter, Scardamalia, and their colleagues at the Ontario Institute for Studies in Education.  In a program of research evolving over the past decade (Bereiter & Scardamalia, 1989; Scardamalia & Bereiter, 1991; Scardamalia & Bereiter, 1992; Scardamalia, Bereiter, & Lamon, 1994; Scardamalia, Bereiter, McLean, Swallow, & Woodruff, 1989), they have developed a theory of learning that focuses on the construction or building of knowledge by the learner.  Knowledge building is thought to involve the creation or synthesis of new knowledge on the part of the student.  This is accomplished by in-depth study of a topic that goes beyond simple factual or recall learning, connection of new knowledge to existing knowledge to expand understanding, integration of knowledge across topics and domains, and development of flexible knowledge that can transfer to new problems and new topics.  Bereiter and Scardamalia have described characteristics that allow students to engage in knowledge building as intentional learning.  Intentional learning is characterized by an active self-regulated approach to learning and studying and by beliefs that knowledge is an evolving entity.  Students who are intentional learners approach their learning with goals of exploring and expanding their knowledge, view learning as problem solving, are planful in  their approach to learning, utilize appropriate learning strategies, and recognize knowledge gaps and ask questions that are directed toward filling in these gaps.  Intentional learning is supported by educational settings and classroom that encourage student direction and student collaboration.

A primary premise of Project CIRCLE, based on the work by Bereiter, Scardamalia, and their colleagues, was that the introduction of appropriate computer technology could support classroom changes that would encourage student knowledge building and intentional learning.  The broad field of this type of technology has been termed computer support for collaborative learning (CSCL) (see Koschmann, 1993/94a).  The premises of CSCL are drawn from the use of computers for the facilitation of collaborative work environments (termed computer support for collaborative work or CSCW).  The computer in these environments is used to facilitate, augment, and/or redefine the interactions among members of a work group (Koschmann, 1993/94b).  When translated into an instructional, learning context, the computer is used in CSCL to facilitate and redefine the interactions among students with each other, and students and teachers. These classroom changes should then allow students to adopt a knowledge building approach to their learning and increase their intentional learning. Project CIRCLE sought to facilitate the development of student knowledge building by using CSCL to facilitate the restructuring of classroom practices toward (a) greater collaboration among students, (b) alteration of the teacher's role from transmitter of information to facilitator of knowledge building, and (c) enhanced student directed intentional

learning and knowledge building. For these purposes, Project CIRCLE utilized a number of technologies and specific collaborative computer tools including interactive brainstorming and writing tools (the Daedalus program), telecommunication links between classrooms within and between schools, and Internet/world wide web access.

Our examination of student knowledge building and intentional learning in the second year focused on three areas: (a) student approaches to knowledge building, examined by assessing students goals for their knowledge acquisition and the extent to which they engaged in behaviors that expand and extend knowledge as opposed to behaviors that foster memorization of given knowledge; (b) student engagement in intentional learning, examined by assessing the extent to which students used cognitive and metacognitive strategies to facilitate their learning and to exercise self-regulation of their learning; and (c) students perceptions of the classroom as a collaborative learning environment, examined by assessing students' perceptions of cooperation and collaboration in the classroom and their perceptions of the extent to which the classroom was teacher directed versus self-directed.

As discussed in the Project CIRCLE First Year Evaluation Report (Shell et al., 1995), there existed no general assessment instruments for measuring the extent of students' knowledge building and intentional learning. Our first step in evaluating the changes in these student characteristics, therefore, was the development of a suitable assessment instrument. The initial development work on this instrument, detailed in First Year Evaluation Report, resulted in the creation of the an instrument for assessing knowledge building, intentional learning, and perceptions of the classroom that exhibited acceptable measurement properties. In the second year, we have continued the development of this instrument and have again used this instrument.

We will first report on the continued development work on the Student Perceptions of Classroom Knowledge Building (SPOCK) instrument. We will then report the results of the analyses of effects of the CIRCLE model on students' knowledge building and intentional learning.

## B.    Instrument Development

Bereiter and Scardamalia have focused on three broad areas in conceptualizing knowledge building and intentional learning. The first is students' approaches to gaining knowledge and learning. This aspect of knowledge building can be examined by assessing students goals for their knowledge acquisition and the extent to which they engage in behaviors that expand and extend knowledge as opposed to behaviors that foster memorization or reception of given knowledge. The second is student' level of intentional learning behaviors. This can be examined by assessing the extent to which students use cognitive and metacognitive strategies to facilitate their learning and exercise self-regulation of their learning. The third is the classroom environment. This can be examined by assessing the extent of student cooperation and collaboration in the classroom and the degree to which students see the classroom as teacher directed versus self-directed.

In the first year of Project CIRCLE, we developed an instrument, the SPOCK, based on these aspects of knowledge building and intentional learning. Factor analyses and item reliability analysis of the SPOCK, based on two first year administrations, resulted in the creation of an instrument measuring four aspects of students' knowledge building and intentional learning (knowledge

building, question asking, self-regulation, and lack of initiative) and two aspects of students' perceptions of the classroom (collaboration and teacher directedness). During the second year, we conducted two further validations of this instrument. First, to test the generality of the instrument in other settings, we administered the SPOCK to students in undergraduate college classes and subjected the instrument to factor and reliability analysis. Second, we administered the SPOCK to the students in the classes taught by the CIRCLE teachers and conducted factor and item analysis on these data. The college sample was administered the same version that was used in the spring, 1994 high school administration. For the high school administration, additional questions were added to the lack of initiative scale.

We will first report the methodology and results of the college sample administration. We will then report the results of the high school administration. We will conclude with a discussion of the nature of the final SPOCK instrument.

## 1. Instrument Verification from the College Sample

### a. Methods and Procedures for Administration to the College Sample

The SPOCK had shown good measurement properties in the two verifications done with high school students in the first year of the project. Theoretically, the aspects of knowledge building, intentional learning, and classroom perceptions measured by the SPOCK should also apply to a college classroom environment. If the SPOCK validly and reliably assesses these constructs, the instrument should have similar measurement properties in a college setting. To examine whether the measurement properties of the SPOCK stayed consistent at the college level, we administered the SPOCK to multiple sections of undergraduate educational psychology courses in Human Sexuality and Statistics during the Spring 1994 and Fall 1994 semesters. In this test, we used the same 38 item instrument that was used in the Spring 1994 high school validation. The only change to the instrument was to alter the wording of some questions by replacing "teacher" with "instructor".

The SPOCK was administered to students as part of a packet containing other instruments. Administration was done to groups of 20 - 50 in sessions proctored by a member of the evaluation team. Students were allowed as much time as they needed to complete the instrument and they recorded their answers on mark-sense (scantron) scoring forms. The scantron forms were machine scored and then hand verified by the evaluation team. Complete and verified instruments were obtained from 386 students. These data were placed on computer disk and analyzed using the SPSS/PC+ statistical analysis package.

### b. Factor Analysis of the Instrument

To test the stability of the factors identified in the initial instrument development, we conducted a factor analysis. Consistent with the factoring done during the initial instrument development, the factor analysis was done extracting six factors using principle components extraction and both Varimax and oblique rotation. In the initial extraction, one item from the question asking scale (item 27, In this class, I ask questions to help me know more about the topics we are covering in class.) did not consistently factor with the other items. This item was removed from the scale and the remaining 37 items were factored. Results from both Varimax and oblique

rotation were similar. The results of the factoring using oblique rotation are shown in Table 13. These results were compared to the results from the first year instrument development.

The basic structure of the six factors replicated those found for the high school samples in the first year. The factors for teacher directedness, collaborative learning, question asking, and self-regulation contained the expected items, with teacher directedness and collaborative learning completely replicating the first year structure. Lack of initiative had one item (Item 8, In this class, I rely on the teacher to tell me what to do.) that had a higher loading on the teacher directedness scale, but it did have a meaningful secondary loading on the expected lack of initiative scale. As in the Spring 1994 high school validation, the most alteration occurred on the knowledge building factor. Four items had higher primary loadings on other factors. These were the four items with the lowest loadings in the initial scale, and the shifts could be predicted based on theoretical grounds. Two items (Item 31, In this class, I ask questions that allow me to explore topics that interest me.; and Item 33, In this class, I ask questions that can only be answered by exploring new information.) shifted their primary loading to the question asking factor. Both did retain meaningful secondary loadings on the knowledge building factor. The shift of these items perhaps occurred because both have wording related to asking questions, although the more critical conceptual part of the questions is the exploration aspect which deals with a knowledge building issue. It is possible that the phrasing of these questions creates a confound between the exploration aspect and the question asking aspect. These items also shifted to the question asking scale in the Spring 1994 high school replication. This suggests a need to reevaluate these questions and perhaps clarify their conceptual meaning. Two items (Item 30, In this class, I use different ways to organize my thoughts such as diagrams, charts, timetables, etc.; and Item 34, In this class, I focus on understanding the important ideas in what I am studying or reading) shifted their primary loading to the self-regulation factor. This is conceptually plausible as both items deal with the metacognitive and strategic aspects of intentional learning perhaps as much as with knowledge building strategies. These were also the two items with the lowest loadings on the knowledge building factor in the initial analysis. In this analysis, neither question retained any meaningful loading on the knowledge building factor, suggesting that reevaluation of these questions may be warranted. Alternately, the loadings obtained here perhaps reflect differences between high school and college students' views of knowledge building versus basic self-regulation and strategy use.

**Table 13**
**College Sample Items and Factor Loadings for Instrument Items and Scales**

| Item | F1 | F2 | F3 | F4 | F5 | F6 |
|---|---|---|---|---|---|---|
| Knowledge Building Factor (F1) | | | | | | |
| 24. As I study the topics In this class, I try to think about how they relate to the topics I am studying in other classes. | **.83** | -.02 | .20 | .16 | .27 | .28 |
| 32. Whenever I learn something new in this class, I try to tie it to other facts and ideas that I already know. | **.78** | .17 | .21 | -.10 | .23 | .20 |
| 28. As I study a topic In this class, I try to consider how the topic relates to other things I know about. | **.81** | .14 | .27 | -.16 | .24 | .12 |
| 16. As I study the topics in other classes, I try to think about how they relate to the topics I am studying in this class. | **.83** | -.03 | .28 | .13 | .27 | .26 |
| 29. In this class, I set goals based on things I really want to learn. | **.59** | .10 | .27 | -.02 | .39 | .44 |
| 23. In this class, I do assignments primarily to learn something new. | **.44** | .11 | .15 | -.04 | .26 | .29 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 31. In this class, I ask questions that allow me to explore topics that interest me. | .41 | -.13 | .37 | .04 | **.74***  | .17 |
| 33. In this class, I ask questions that can only be answered by exploring new information. | .41 | -.10 | .33 | .21 | **.67***  | .22 |
| 30. In this class, I use <u>different</u> ways to organize my thoughts such as diagrams, charts, timetables, etc. | .17 | -.21 | .01 | .20 | .30 | **.61***  |
| 34. In this class, I focus on understanding the important ideas in what I am studying or reading. | .17 | .36 | -.04 | -.28 | .04 | **.48***  |

Teacher Directed Classroom Factor (F2)

| | | | | | | |
|---|---|---|---|---|---|---|
| 25. In this class, I get most of the information from the textbook and the teacher. | -.09 | **.63** | -.21 | -.18 | -.11 | .15 |
| 22. In this class, the teacher focuses on getting us to learn the right answers to questions. | .15 | **.59** | .23 | -.02 | .05 | -.01 |
| 4. In this class, the teacher gives us specific instructions on what we are to do. | .18 | **.55** | .13 | -.19 | .08 | .08 |
| 19. In this class, I know how I am doing mostly by the grades I get on assignments and tests. | .06 | **.41** | -.02 | -.09 | -.14 | .02 |
| 3. In this class, I spend most of my time listening to the teacher. | .02 | **.55** | -.14 | .14 | .02 | .11 |

Collaborative Learning Factor (F3)

| | | | | | | |
|---|---|---|---|---|---|---|
| 26. In this class, my classmates and I actively work together to help each other understand the material. | .24 | .01 | **.89** | .10 | .34 | .07 |
| 37. In this class, my classmates and I actively work together to learn new things. | .28 | .02 | **.89** | .05 | .37 | .11 |
| 15. In this class, my classmates and I actively share ideas. | .32 | .15 | **.78** | -.11 | .31 | -.09 |
| 1. In this class, my classmates and I actively work together to complete assignments. | .23 | -.07 | **.78** | .04 | .26 | .11 |
| 12. When I am doing my work in this class, I get helpful comments about my work from other students. | .20 | -.08 | **.67** | .32 | .28 | .15 |

Lack of Initiative Factor (F4)

| | | | | | | |
|---|---|---|---|---|---|---|
| 11. In this class, I have trouble figuring out how to approach studying the material. | -.09 | -.26 | -.05 | **.72** | .12 | .13 |
| 6. In this class, when I don't know an answer to a question, I try to hide the fact that I don't know. | .11 | .05 | .10 | **.58** | -.04 | -.02 |
| 18. In this class, when I get stuck or confused about my schoolwork, I need someone else to figure out what I need to do. | -.02 | .03 | .30 | **.67** | .30 | .28 |
| 8. In this class, I rely on the teacher to tell me what to do. | .02 | **.54***  | .01 | .38 | -.12 | -.08 |

Question Asking Factor (F5)

| | | | | | | |
|---|---|---|---|---|---|---|
| 2. In this class, I ask questions in order to help me learn new things. | .20 | -.08 | .38 | .01 | **.85** | .27 |
| 5. In this class, I ask questions so that I can be sure I know the right answers for tests. | .20 | -.01 | .27 | .07 | **.84** | .23 |
| 10. In this class, I ask questions to be clear about what the teacher wants me to learn. | .20 | -.02 | .24 | .14 | **.86** | .33 |
| 14. In this class, I ask questions about things I am curious about. | .30 | -.05 | .34 | -.04 | **.83** | .14 |
| 17. In this class, I ask questions so that I can find out what information the teacher thinks is important. | .35 | -.08 | .33 | .03 | **.86** | .30 |
| 20. In this class, I ask questions to help me prepare for tests. | .24 | -.03 | .25 | .08 | **.84** | .35 |
| 36. In this class, I ask questions to help me better understand the things I am trying to learn. | .24 | -.05 | .28 | .03 | **.90** | .33 |

Self-Regulation Factor (F6)

| | | | | | | |
|---|---|---|---|---|---|---|
| 9. In this class, I try to monitor my progress when I study. | .23 | .08 | .09 | .08 | .34 | **.72** |
| 21. In this class, I make plans for how I will study. | .20 | -.01 | .11 | .09 | .18 | **.74** |
| 7. In this class, I check myself to see how well I am understanding what I am studying. | .28 | .10 | .03 | -.07 | .31 | **.72** |
| 35. In this class, I try to determine the best approach for studying each assignment. | .18 | .14 | .02 | .10 | .13 | **.75** |
| 13. In this class, I take notes and jot down questions when I am reading the class materials. | .24 | -.03 | .11 | .10 | .24 | **.44** |
| 38. In this class, I set goals for myself which I try to accomplish. | .29 | .09 | .09 | -.07 | .29 | **.73** |

Notes: Items are shown in the order obtained in the first year factoring.  Highest loadings are shown in boldface type. Items that had highest loadings on a factor different from the expected factor are indicated with an * by the loading.


We again examined the correlations between the factors resulting from the oblique rotation. These are shown in Table 14.  Knowledge building (factor 1) was positively correlated with student collaboration (factor 3), self-regulation (factor 6), and question asking (factor 5).  Also, collaboration (factor 3) and self-regulation (factor 6) were both correlated with question asking. These correlations replicated those obtained in the first year validations.  Also, as in the first year, lack of initiative (factor 4) and teacher directedness (factor 2) again were not highly correlated with any other factors.

**Table 14**
**College Sample Intercorrelations Among the Six Factors**

| Factor | F1 | F2 | F3 | F4 | F5 | F6 |
|---|---|---|---|---|---|---|
| Knowledge Building (F1) | -- | .10 | .28 | -.02 | .29 | .24 |
| Teacher Directedness (F2) | | -- | .00 | -.08 | -.07 | .06 |
| Collaborative Learning (F3) | | | -- | .08 | .33 | .05 |
| Lack of Initiative (F4) | | | | -- | .07 | .05 |
| Question Asking (F5) | | | | | -- | .30 |
| Self-Regulation (F6) | | | | | | -- |

c.    **Reliability and Item Analysis of the Instrument**

We again tested the reliability and item properties of the scales. The results using the original scale items in all scales are shown in Table 15.  The coefficient alpha reliability estimates for all scales were consistent with those found during the first year validations. The item - total correlations were also similar to those obtained in the first year validations.  As in the first year, both the coefficient alpha and item - total correlations suggest that the lack of initiative scale has somewhat

weak measurement properties. Similarly, the coefficient alpha for the teacher directedness scale was only marginal. Items from the knowledge building scale that had primary loadings on other factors (Items 30, 31, 33, and 34) generally had acceptable item-total correlations, except for Item 34.

**Table 15**
**College Sample Reliability and Item Analysis for the Instrument Items and Scales**

| Item | r |
|------|---|
| Knowledge Building Scale (alpha = .81) | |
| 24. As I study the topics In this class, I try to think about how they relate to the topics I am studying in other classes. | .65 |
| 32. Whenever I learn something new in this class, I try to tie it to other facts and ideas that I already know. | .62 |
| 28. As I study a topic In this class, I try to consider how the topic relates to other things I know about. | .57 |
| 16. As I study the topics in other classes, I try to think about how they relate to the topics I am studying in this class. | .65 |
| 29. In this class, I set goals based on things I really want to learn. | .60 |
| 23. In this class, I do assignments primarily to learn something new. | .42 |
| 31. In this class, I ask questions that allow me to explore topics that interest me. | .49 |
| 33. In this class, I ask questions that can only be answered by exploring new information. | .51 |
| 30. In this class, I use different ways to organize my thoughts such as diagrams, charts, timetables, etc. | .30 |
| 34. In this class, I focus on understanding the important ideas in what I am studying or reading. | .18 |
| Teacher Directed Classroom Scale (alpha = .52) | |
| 25. In this class, I get most of the information from the textbook and the teacher. | .37 |
| 22. In this class, the teacher focuses on getting us to learn the right answers to questions. | .30 |
| 4. In this class, the teacher gives us specific instructions on what we are to do. | .29 |
| 19. In this class, I know how I am doing mostly by the grades I get on assignments and tests. | .21 |
| 3. In this class, I spend most of my time listening to the teacher. | .25 |
| Collaborative Learning Scale (alpha = .87) | |
| 26. In this class, my classmates and I actively work together to help each other understand the material. | .81 |
| 37. In this class, my classmates and I actively work together to learn new things. | .82 |
| 15. In this class, my classmates and I actively share ideas. | .66 |
| 1. In this class, my classmates and I actively work together to complete assignments. | .65 |
| 12. When I am doing my work in this class, I get helpful comments about my work from other students. | .55 |
| Lack of Initiative Scale (alpha = .50) | |

| | | |
|---|---|---|
| 11. | In this class, I have trouble figuring out how to approach studying the material. | .30 |
| 6. | In this class, when I don't know an answer to a question, I try to hide the fact that I don't know. | .29 |
| 18. | In this class, when I get stuck or confused about my schoolwork, I need someone else to figure out what I need to do. | .40 |
| 8. | In this class, I rely on the teacher to tell me what to do. | .16 |

Question Asking Scale (alpha = .94)

| | | |
|---|---|---|
| 2. | In this class, I ask questions in order to help me learn new things. | .81 |
| 5. | In this class, I ask questions so that I can be sure I know the right answers for tests. | .81 |
| 10. | In this class, I ask questions to be clear about what the teacher wants me to learn. | .83 |
| 14. | In this class, I ask questions about things I am curious about. | .76 |
| 17. | In this class, I ask questions so that I can find out what information the teacher thinks is important. | .83 |
| 20. | In this class, I ask questions to help me prepare for tests. | .81 |
| 36. | In this class, I ask question to help me better understand the things I am trying to learn. | .86 |

Self-Regulation Scale (alpha = .80)

| | | |
|---|---|---|
| 9. | In this class, I try to monitor my progress when I study. | .61 |
| 21. | In this class, I make plans for how I will study. | .62 |
| 7. | In this class, I check myself to see how well I am understanding what I am studying. | .62 |
| 35. | In this class, I try to determine the best approach for studying each assignment. | .57 |
| 13. | In this class, I take notes and jot down questions when I am reading the class materials. | .32 |
| 38. | In this class, I set goals for myself which I try to accomplish. | .59 |

Notes: Items are shown in the order obtained in the first year factoring.


## 2. Instrument Verification from the Second Year High School Administration

### a. Methods and Procedures for the Second Year Administration

The SPOCK was administered to the students in the classes taught by CIRCLE teachers at the end of the Spring 1995 semester. Because the lack of initiative scale had exhibited somewhat low coefficient alpha and low item-total correlations in the first year samples and the second year college sample, we created five new items for this scale to determine if the addition of additional items would help improve the measurement properties of the scale.

Administration was done in students' classrooms by members of the evaluation team. Students were allowed as much time as they needed to complete the instrument and they recorded their answers on mark-sense (scantron) scoring forms. The scantron forms were machine scored and then hand verified by the evaluation team. Complete and verified instruments were obtained from 1044 students. These data were placed on computer disk and analyzed using the SPSS/PC+ statistical analysis package.

### b.    Factor Analysis of the Instrument

We again conducted a factor analysis extracting six factors using principle components extraction and both Varimax and oblique rotation.  We did a preliminary factoring to test the new lack of initiative items.  Two of these new items did not fit with the six factors.  They were removed and the remaining 40 items were again factored.  Results from both Varimax and oblique rotation were similar.  Consistent with the previous analyses, we report the results from the oblique rotation in Table 16.

The basic structure of the six factors replicated those found for the high school samples in the first year and the college sample in the second year.  The factors for teacher directedness, collaborative learning, question asking, and lack of initiative replicated the expected structures completely.  Self-regulation contained the expected items, however, it also contained items from the knowledge building scale.  As in the Spring 1994 high school validation and the second year college validation, the most alteration occurred on the knowledge building factor.  Four items had higher primary loadings on other factors.  These, however, were not the same four items as were found in the college sample.  The same two items that shifted to the self-regulation factor in the college sample (Item 26, In this class, I use different ways to organize my thoughts such as diagrams, charts, timetables, etc.; and Item 42, In this class, I focus on understanding the important ideas in what I am studying or reading) again shifted their primary loading to the self-regulation factor.  Unlike the college sample, however, both retained meaningful secondary loadings on the knowledge building factor.  Also, unlike the college sample and the Spring 1994 high school sample Item 17 (In this class, I ask questions that allow me to explore topics that interest me.) and Item 11 (In this class, I ask questions that can only be answered by exploring new information.) did not shift their primary loading to the question asking factor.  Both did, however, have relatively large secondary loadings on the question asking factor.  This again suggests that these items may be confounded between the knowledge building, exploration aspect and the question asking aspect.

Two items (Item 37, In this class, I set goals based on things I really want to learn.; and Item 31, In this class, I do assignments primarily to learn something new.) shifted their primary loadings to the self-regulation factor.  Both did retain meaningful secondary loadings on the knowledge building factor.  Item 37 concerning goal setting had shifted to the self-regulation factor in the Spring 1994 replication and had also had a high secondary loading on self-regulation in the college sample.  Because goal setting is a basic aspect of the metacognitive aspects of self-regulation assessed by the self-regulation factor, the reference to goal setting in this question may tap aspects of both general metacognitive strategies and the personal knowledge exploration related to knowledge building.  This suggests some adjustment to this item to clarify which construct is being assessed.

### Table 16
### High School Items and Factor Loadings for the Final Instrument Items and Scales

| Item | F1 | F2 | F3 | F4 | F5 | F6 |
|------|-----|-----|-----|-----|-----|-----|
| Knowledge Building Factor (F1) | | | | | | |
| 2.  As I study the topics In this class, I try to think about how they relate to the topics I am studying in other classes. (24) | **.79** | .04 | .27 | -.04 | .30 | .28 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 8. | Whenever I learn something new in this class, I try to tie it to other facts and ideas that I already know. (32) | **.73** | .12 | .31 | -.10 | .36 | .36 |
| 20. | As I study a topic In this class, I try to consider how the topic relates to other things I know about. (28) | **.80** | .09 | .29 | -.03 | .39 | .41 |
| 23. | As I study the topics in other classes, I try to think about how they relate to the topics I am studying in this class. (16) | **.77** | -.01 | .28 | .02 | .39 | .40 |
| 37. | In this class, I set goals based on things I really want to learn. (29) | .32 | .09 | .28 | -.05 | .31 | **.66*** |
| 31. | In this class, I do assignments primarily to learn something new. (23) | .36 | .14 | .29 | -.04 | .31 | **.60*** |
| 17. | In this class, I ask questions that allow me to explore topics that interest me. (31) | **.59** | -.05 | .36 | -.08 | .50 | .41 |
| 11. | In this class, I ask questions that can only be answered by exploring new information. (33) | **.46** | -.08 | .29 | -.04 | .46 | .43 |
| 26. | In this class, I use <u>different</u> ways to organize my thoughts such as diagrams, charts, timetables, etc. (30) | .32 | -.05 | .23 | .15 | .19 | **.51*** |
| 42. | In this class, I focus on understanding the important ideas in what I am studying or reading. (34) | .43 | .24 | .29 | -.08 | .53 | **.54*** |

Teacher Directed Classroom Factor (F2)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 36. | In this class, I get most of the information from the textbook and the teacher. (25) | .05 | **.67** | -.08 | .17 | .19 | .13 |
| 32. | In this class, the teacher focuses on getting us to learn the right answers to questions. (22) | .06 | **.57** | .16 | .10 | .20 | .29 |
| 10. | In this class, the teacher gives us specific instructions on what we are to do. (4) | .11 | **.63** | .16 | -.05 | .12 | .12 |
| 27. | In this class, I know how I am doing mostly by the grades I get on assignments and tests. (19) | -.08 | **.54** | .05 | .08 | .21 | .05 |
| 3. | In this class, I spend most of my time listening to the teacher. (3) | .26 | **.57** | .04 | .11 | .26 | .20 |

Collaborative Learning Factor (F3)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 14. | In this class, my classmates and I actively work together to help each other understand the material. (26) | .20 | .16 | **.80** | -.05 | .32 | .26 |
| 40. | In this class, my classmates and I actively work together to learn new things. (37) | .22 | .07 | **.82** | -.04 | .33 | .27 |
| 22. | In this class, my classmates and I actively share ideas. (15) | .21 | -.01 | **.79** | -.07 | .36 | .19 |
| 1. | In this class, my classmates and I actively work together to complete assignments. (1) | .22 | .03 | **.73** | .03 | .24 | .12 |
| 18. | When I am doing my work in this class, I get helpful comments about my work from other students. (12) | .29 | -.00 | **.63** | .03 | .17 | .29 |

Lack of Initiative Factor (F4)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 16. | In this class, I have trouble figuring out how to approach studying the material. (11) | -.00 | -.14 | -.03 | **.61** | -.07 | .07 |
| 6. | In this class, when I don't know an answer to a question, I try to hide the fact that I don't know. (6) | .06 | -.15 | -.11 | **.54** | -.30 | .12 |
| 25. | In this class, when I get stuck or confused about my schoolwork, I need someone else to figure out what I need to do. (18) | -.08 | -.01 | .09 | **.61** | -.05 | .13 |
| 12. | In this class, I rely on the teacher to tell me what to do. (8) | .09 | .44 | -.03 | **.55** | .09 | -.09 |
| 21. | I only do things related to this class when the teacher says I have to. | -.17 | .16 | -.08 | **.46** | .01 | -.22 |
| 29. | In this class, if I'm not sure what I'm supposed to be doing, I wait for the teacher to say more about it. | -.03 | .27 | -.05 | **.57** | .07 | .03 |
| 39. | In this class, I expect the teacher to tell me exactly how to do class activities. | .11 | .37 | -.02 | **.52** | .12 | -.08 |

Question Asking Factor (F5)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 9. | In this class, I ask questions in order to help me learn new things. (2) | .43 | .11 | .41 | -.13 | **.74** | .36 |
| 5. | In this class, I ask questions so that I can be sure I know the right answers for tests. (5) | .31 | .20 | .24 | .05 | **.73** | .30 |
| 15. | In this class, I ask questions to be clear about what the teacher wants me to learn. (10) | .28 | .20 | .39 | -.01 | **.74** | .30 |
| 33. | In this class, I ask questions about things I am curious about. (14) | .39 | .06 | .38 | -.14 | **.67** | .27 |
| 24. | In this class, I ask questions so that I can find out what information the teacher thinks is important. (17) | .39 | .17 | .31 | .09 | **.71** | .44 |
| 28. | In this class, I ask questions to help me prepare for tests. (20) | .28 | .27 | .20 | .09 | **.75** | .36 |
| 38. | In this class, I ask questions to help me better understand the things I am trying to learn. (36) | .34 | .18 | .33 | -.14 | **.71** | .46 |
| | Self-Regulation Factor (F6) | | | | | | |
| 13. | In this class, I try to monitor my progress when I study. (9) | .26 | .21 | .24 | -.00 | .38 | **.65** |
| 30. | In this class, I make plans for how I will study. (21) | .32 | .15 | .15 | .12 | .28 | **.72** |
| 7. | In this class, I check myself to see how well I am understanding what I am studying. (7) | .40 | .19 | .26 | -.10 | .44 | **.59** |
| 34. | In this class, I try to determine the best approach for studying each assignment. (35) | .31 | .19 | .21 | .02 | .43 | **.68** |
| 19. | In this class, I take notes and jot down questions when I am reading the class materials. (13) | .42 | .20 | .10 | .15 | .24 | **.53** |
| 41. | In this class, I set goals for myself which I try to accomplish. (38) | .30 | .11 | .32 | -.02 | .35 | **.71** |

Notes: Items are shown in the order obtained in the first year factoring. Item numbers from the college sample version of the instrument are shown in parentheses following the item. New lack of initiative items are listed following the original four items. Highest loadings are shown in boldface type. Items that had highest loadings on a factor different from the anticipated factor are indicated with an * by the loading. Items that had highest loadings on a factor different from the college sample are indicated in italics.

The correlations between the factors resulting from the oblique rotation are shown in Table 17. These correlations again generally replicated those found in the first year validations and those found in the college sample. Knowledge building (factor 1) was positively correlated with student collaboration (factor 3), self-regulation (factor 6), and question asking (factor 5). Also, collaboration (factor 3) and self-regulation (factor 6) were both correlated with question asking. Lack of initiative (factor 4) was again not correlated with any other factor. Teacher directedness (factor 2) also was generally uncorrelated with the other factors, except for a small correlation with question asking. This correlation with question asking was different than in other samples, however, the correlation was low enough that it may have simply reflected some artifact of the sample.

**Table 17**
**High School Intercorrelations Among the Six Factors**

| Factor | F1 | F2 | F3 | F4 | F5 | F6 |
|---|---|---|---|---|---|---|
| Knowledge Building (F1) | -- | .05 | .27 | -.01 | .36 | .40 |
| Teacher Directedness (F2) | | -- | .03 | .13 | .24 | .09 |

| Collaborative Learning (F3) | -- | -.06 | .34 | .27 |
|---|---|---|---|---|
| Lack of Initiative (F4) | | -- | -.04 | .02 |
| Question Asking (F5) | | | -- | .35 |
| Self-Regulation (F6) | | | | -- |

### c. Reliability and Item Analysis of the Instrument

Reliability and item properties of the scales were tested and the using the original scale items in all scales are shown in Table 18. The coefficient alpha reliability estimates and item - total correlations for all scales were consistent with those found during the first year and college sample validations. The addition of the new items to the lack of initiative scale resulted in an improved coefficient alpha, although alpha remained somewhat below the desired level. Item - total correlations for the lack of initiative scale also improved. This suggests that the addition of the new items had helped solidify that scale. Items from the knowledge building scale that had primary loadings on other factors (Items 37, 31, 26, and 42) generally had acceptable item-total correlations on the knowledge building factor.

**Table 18**
**High School Reliability and Item Analysis for the Final Instrument Items and Scales**

| Item | r |
|---|---|
| Knowledge Building Factor (alpha = .85) | |
| 2. As I study the topics In this class, I try to think about how they relate to the topics I am studying in other classes. (24) | .56 |
| 8. Whenever I learn something new in this class, I try to tie it to other facts and ideas that I already know. (32) | .59 |
| 20. As I study a topic In this class, I try to consider how the topic relates to other things I know about. (28) | .66 |
| 23. As I study the topics in other classes, I try to think about how they relate to the topics I am studying in this class. (16) | .64 |
| 37. In this class, I set goals based on things I really want to learn. (29) | .49 |
| 31. In this class, I do assignments primarily to learn something new. (23) | .50 |
| 17. In this class, I ask questions that allow me to explore topics that interest me. (31) | .60 |
| 11. In this class, I ask questions that can only be answered by exploring new information. (33) | .51 |
| 26. In this class, I use different ways to organize my thoughts such as diagrams, charts, timetables, etc. (30) | .38 |
| 42. In this class, I focus on understanding the important ideas in what I am studying or reading. (34) | .54 |
| Teacher Directed Classroom Factor (alpha = .64) | |
| 36. In this class, I get most of the information from the textbook and the teacher. (25) | .45 |
| 32. In this class, the teacher focuses on getting us to learn the right | .43 |

answers to questions. (22)

| | | |
|---|---|---|
| 10. | In this class, the teacher gives us specific instructions on what we are to do. (4) | .37 |
| 27. | In this class, I know how I am doing mostly by the grades I get on assignments and tests. (19) | .34 |
| 3. | In this class, I spend most of my time listening to the teacher. (3) | .37 |

Collaborative Learning Factor (alpha = .82)

| | | |
|---|---|---|
| 14. | In this class, my classmates and I actively work together to help each other understand the material. (26) | .68 |
| 40. | In this class, my classmates and I actively work together to learn new things. (37) | .69 |
| 22. | In this class, my classmates and I actively share ideas. (15) | .66 |
| 1. | In this class, my classmates and I actively work together to complete assignments. (1) | .56 |
| 18. | When I am doing my work in this class, I get helpful comments about my work from other students. (12) | .48 |

Lack of Initiative Factor (alpha = .65)

| | | |
|---|---|---|
| 16. | In this class, I have trouble figuring out how to approach studying the material. (11) | .35 |
| 6. | In this class, when I don't know an answer to a question, I try to hide the fact that I don't know. (6) | .30 |
| 25. | In this class, when I get stuck or confused about my schoolwork, I need someone else to figure out what I need to do. (18) | .37 |
| 12. | In this class, I rely on the teacher to tell me what to do. (8) | .41 |
| 21. | I only do things related to this class when the teacher says I have to. | .28 |
| 29. | In this class, if I'm not sure what I'm supposed to be doing, I wait for the teacher to say more about it. | .39 |
| 39. | In this class, I expect the teacher to tell me exactly how to do class activities. | .39 |

Question Asking Factor  (alpha = .87)

| | | |
|---|---|---|
| 9. | In this class, I ask questions in order to help me learn new things. (2) | .68 |
| 5. | In this class, I ask questions so that I can be sure I know the right answers for tests. (5) | .62 |
| 15. | In this class, I ask questions to be clear about what the teacher wants me to learn. (10) | .65 |
| 33. | In this class, I ask questions about things I am curious about. (14) | .58 |
| 24. | In this class, I ask questions so that I can find out what information the teacher thinks is important. (17) | .66 |
| 28. | In this class, I ask questions to help me prepare for tests. (20) | .64 |
| 38. | In this class, I ask questions to help me better understand the things I am trying to learn. (36) | .64 |

Self-Regulation Factor  (alpha = .80)

| | | |
|---|---|---|
| 13. | In this class, I try to monitor my progress when I study. (9) | .57 |
| 30. | In this class, I make plans for how I will study. (21) | .62 |
| 7. | In this class, I check myself to see how well I am understanding what I am studying. (7) | .56 |
| 34. | In this class, I try to determine the best approach for studying each assignment. (35) | .61 |
| 19. | In this class, I take notes and jot down questions when I am reading the class materials. (13) | .44 |

41.  In this class, I set goals for myself which I try to accomplish. (38)                                    .54
     the material. (14)

<hr>

Notes: Items are shown in the order obtained in the first year factoring. Item numbers from the college sample version of the instrument are shown in parentheses following the item. New lack of initiative items are listed following the original four items.

## 3. Summary of Instrument Development

Taken together with the results from the first year instrument validations, the results from the college and high school validations in the second year, suggest that the SPOCK measures meaningful aspects of students' knowledge building, intentional learning, and classroom perceptions. The SPOCK scales appear to have generally acceptable measurement properties. The factor structures of all scales except for knowledge building have been highly consistent across the validations. Also, the coefficient alphas and item-total correlations on all scales have been very consistent. The measurement properties of the instrument appear acceptable for using the instrument to assess changes in student knowledge building, intentional learning, and classroom perceptions that might result from implementation of the CIRCLE software and CIRCLE learning model.

The most inconsistent results have consistently occurred between the three factors that are most conceptually and theoretically interrelated, knowledge building, question asking, and self-regulation. Although these constructs are theoretically separable, they also are theoretically interconnected in models of knowledge building and self-regulation (e.g., Bereiter & Scardamalia, 1989; Scardamalia et al., 1989; Zimmerman, 1989). In oblique rotation, these three scales have consistently been intercorrelated. Also, in factor analysis, items have generally exhibited meaningful secondary loadings across these three factors. This, however, does produce difficulties from a pure measurement perspective. It would be optimal if all factors were clearly unique. The question asking and self-regulation scales have stayed very consistent in their core items, suggesting that these are good measures of these particular constructs. The knowledge building scale has exhibited considerable instability across the replications and this instability has not been very consistent. Knowledge building is the least theoretically well developed and defined of the constructs in the scale and perhaps this instability reflects the difficulty of cleanly measuring this construct. The most consistent core of the scale has been questions involving cross topic and area integration of information. We think that future development should perhaps try to strengthen this core. Also, the questions in the scale that have shifted, as we have previously discussed, have potential confounds. We think that reworking questions concerned with personal meaningfulness of information and exploration to remove these confounds might improve the stability of their measurement. We will undertake this in future development work.

The replication of the basic factor structures and measurement properties with a college sample suggests that the SPOCK has potential for use in a broad range of settings. There is some indication that the constructs may be more distinct for college students, particularly the knowledge building, question asking, and self-regulation scales. The secondary loadings across these scales were generally lower than what was found on the high school samples in both years. This would suggest that these aspects of knowledge building and intentional learning perhaps become more differentiated as students age. This is an area that warrants further study.

We believe that development of the SPOCK has been successful in creating an effective instrument for measuring students' knowledge building, intentional learning, and classroom perceptions. This is potentially significant, because, as we have noted, there exist no other large group assessment instruments for measuring these constructs. We believe that the SPOCK can help educators and researchers examine and understand these aspects of students' beliefs and perceptions better.

## C.     Effects of the CIRCLE Learning Model on Students' Knowledge Building, Intentional Learning, and Classroom Perceptions

To determine the effects of the implementation of the CIRCLE learning model on students' perceptions of knowledge building, intentional learning, and the classroom environment, we compared the perceptions of students, as assessed with the SPOCK, in classrooms where the learning model was more fully implemented to the perceptions of students in classroom where the learning model was not as fully implemented. We expected that increased integration of the CIRCLE Learning Model and more use of the CIRCLE software by teachers would lead to student reports of higher levels of knowledge building, collaboration, question asking, and self-regulation and lower levels of teacher directedness and lack of self-initiative. In all analyses, we used SPOCK scores based on the factor analysis results from the high school sample. Knowledge building scores were based on the six items loading on the knowledge building factor in this sample. Self-regulation scores were based on 9 items, the original six scale items plus items 26, 31, and 37 from the original knowledge building scale.

Teacher integration of the CIRCLE learning model and extent of technology use was determined from the interviews conducted with the teachers at the end of the school year (see previous summary of interview responses). Technology use (high versus low) was determined based on teachers' reports of how extensively they used the technology in their classrooms during the year. Integration of the CIRCLE learning model (high versus low) was determined based on teachers' reports of whether they had altered their own teaching toward a more knowledge building, collaborative approach as a result of using the CIRCLE technology, and their reports that use of the technology had produced changes in student learning and collaboration that continued on subsequent assignments even when the technology was not being used.

Unlike the first year of the CIRCLE project where technology use and integration of the CIRCLE learning model were identical (see CIRCLE First Year Evaluation Report), in the second year there was a difference between use and integration. In relation to use, 3 teachers (high use) reported high levels of technology use, 12 teachers (medium use) reported moderate use, and 3 teachers (low use) reported either no or very minimal use. These use patterns did not directly reflect integration of the learning model, however. The three teachers reporting high use also reported changes in teaching and changes in student learning and collaboration, and the three teachers reporting low use also reported no changes in teaching or student learning. Among the 12 teachers with moderate, and approximately equal levels of use, however, 5 reported changes in teaching and changes in student learning and collaboration and 7 reported no changes. Therefore, the high integration group was composed of the 3 high use teachers and the 5 medium use teachers reporting high integration (8 total), and the low integration group was composed of the 3 low use teachers and the 7 medium use teachers reporting low integration (10 total). We conducted comparisons between

the high and low integration groups in their students' scores on the six knowledge building and intentional learning scales using *t* tests with an alpha level of *p* < .05.  To examine whether use of technology had an effect separate from integration of the learning model, we conducted comparisons between the teachers within the high integration group and comparisons between the teachers within the low integration group based on differences in use.  Within the high integration group, there were 3 high use teachers and 5 medium use teachers whose students were compared.  Within the low integration group, there were 7 medium use teachers and 3 low or no use teachers whose students were compared.  These comparisons were done using *t* tests with an alpha level of *p* < .05.

Participants.  Students from the classes of 18 Project CIRCLE teachers (10 from Travis; 8 from Westlake) participated in the study.  We deleted from the sample, the students from the classes of two teachers who taught specific computer application courses.  The types of activities done in these courses were specialized enough that we thought that student answers to the SPOCK would not be reflective of normal classroom contexts or compatible with the types of courses being taught by the other CIRCLE teachers.  There were 946 students (310 from Travis; 636 from Westlake) in the final sample.  There were an approximately equal number of boys and girls in all samples.

## 1.  Associations Between Teacher Differences in Classroom Integration of the CIRCLE Learning Model and Students' Reports of Knowledge Building, Intentional Learning, and Classroom Perceptions

Because there were high and low integration teachers in both schools, we initially conducted a 2 (high vs low integration) x 2 (school: Travis vs Westlake) MANOVA to examine whether there was any differential effect of integration in the two schools.  This MANOVA indicated no interaction between school and integration; therefore, we conducted the analysis of integration using the entire sample from both schools combined.  The means, standard deviations, *t* test results, and effect sizes for the comparisons between the high and low integration groups are reported in Table 19.  Students in classes taught by the high integration group reported significantly higher knowledge building, question asking, both low and high level, self-regulation, and perceptions of collaboration with peers.  The effect sizes for knowledge building and self-regulation were somewhat small, less than one-fifth of a standard deviation, but were possibly large enough, over .15, to be meaningful.  The effect sizes for question asking and both question asking subscales approached one-fourth of a standard deviation, suggesting a meaningful difference.  The effect size for collaborative learning was above one-third of a standard deviation, suggesting a fairly strong effect.

**Table 19**

**Mean Scores on Students' Knowledge Building, Intentional Learning, and Perceptions of the Classroom Environment by Teacher Integration of the CIRCLE Learning Model**

|  | High Integration (n = 401) | | Low Integration (n = 545) | | | |
|---|---|---|---|---|---|---|
|  | M | SD | MSD | t | ES | |
| Knowledge building | 2.89 | .82 | 2.74 | .81 | 2.77** | .18 |
| Question asking |  |  |  |  |  |  |
| Overall | 3.38 | .82 | 3.18 | .86 | 3.58*** | .24 |

| | M | SD | M | SD | t | ES |
|---|---|---|---|---|---|---|
| Low level | 3.34 | .88 | 3.15 | .93 | 3.14** | .21 |
| High level | 3.44 | .91 | 3.22 | .93 | 3.51*** | .24 |
| Self-regulation | 2.83 | .75 | 2.71 | .77 | 2.35* | .16 |
| Lack of initiative | 2.80 | .66 | 2.88 | .61 | -1.88 | -.13 |
| Teacher directedness | 3.59 | .74 | 3.63 | .71 | -.79 | -.06 |
| Collaborative learning | 3.55 | .80 | 3.24 | .86 | 5.58*** | .36 |

Note. ES = effect size computed by Cohen's $\underline{d}$. $\underline{df}$ = 944 for all $\underline{t}$ tests.
*$\underline{p}$ < .05. **$\underline{p}$ < .01. ***$\underline{p}$ < .001.

## 2. Associations Between Teacher Differences in Classroom Use of CIRCLE Software and Students' Reports of Knowledge Building, Intentional Learning, and Classroom Perceptions

The means, standard deviations, *t* test results, and effect sizes for the comparisons based on use differences are reported in Table 20 for the high integration group and Table 21 for the low integration group. Within the high integration group, students taught by teachers who used the technology more reported significantly higher high level question asking and perceptions of collaboration with peers and significantly lower perceptions of teacher directedness. The effect sizes for all these differences all appeared meaningful, ranging from about one-fourth of a standard deviation for teacher directedness to approximately two-fifths of a standard deviation for high level question asking. Within the low integration group, students taught by teachers who used the technology more reported significantly higher knowledge building, with an effect size of almost one-third of a standard deviation. The differences identified were not as pervasive as those found for integration of the learning model, but in terms of effect size, the differences were at least as large as those found for integration. The results, therefore, do suggest an additional effect for technology use above and beyond that attributable to integration of knowledge building teaching practices.

**Table 20**

**Mean Scores on Students Knowledge Building, Intentional Learning, and Perceptions of the Classroom Environment by Differential Use of Technology Within the High Integration Group**

| | High Use (n = 88) | | Medium Use (n = 313) | | | |
|---|---|---|---|---|---|---|
| | $\underline{M}$ | $\underline{SD}$ | $\underline{MSD}$ | $\underline{t}$ | ES | |
| Knowledge building | 3.04 | .89 | 2.85 | .80 | 1.82 | .23 |
| Question asking | | | | | | |
| Overall | 3.52 | .78 | 3.34 | .83 | 1.85 | .22 |
| Low level | 3.36 | .84 | 3.34 | .90 | .27 | .02 |
| High level | 3.73 | .90 | 3.36 | .90 | 3.42** | .41 |
| Self-regulation | 2.94 | .73 | 2.80 | .76 | 1.65 | .19 |
| Lack of initiative | 2.75 | .62 | 2.81 | .67 | -.76 | -.09 |
| Teacher directedness | 3.74 | .66 | 3.55 | .76 | 2.36* | -.24 |
| Collaborative learning | 3.73 | .80 | 3.50 | .80 | 2.34* | .31 |

Note. ES = effect size computed by Cohen's $\underline{d}$. $\underline{df}$ = 129.39 for knowledge building; $\underline{df}$ = 147.13 for overall question asking; $\underline{df}$ = 147.14 for low level question asking; $\underline{df}$ = 139.52 for high level question asking; $\underline{df}$ = 144.23 for self-regulation; $\underline{df}$ = 148.45 for lack of initiative; $\underline{df}$ = 157.72 for teacher directedness; $\underline{df}$ = 139.27 for collaborative learning.
*$\underline{p}$ < .05. **$\underline{p}$ < .01.

**Table 21**

**Mean Scores on Students Knowledge Building, Intentional Learning, and Perceptions of the Classroom Environment by Differential Use of Technology Within the Low Integration Group**

| | Medium Use (n = 468) | | Low or No Use (n = 77) | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | M | SD | MSD | t | ES | |
| Knowledge building | 2.78 | .82 | 2.53 | .74 | 2.68** | .31 |
| Question asking | | | | | | |
|    Overall | 3.20 | .87 | 3.09 | .81 | 1.04 | .13 |
|    Low level | 3.18 | .94 | 3.01 | .89 | 1.55 | .18 |
|    High level | 3.23 | .94 | 3.21 | .86 | .13 | .02 |
| Self-regulation | 2.69 | .79 | 2.82 | .64 | -1.61 | -.17 |
| Lack of initiative | 2.88 | .60 | 2.84 | .68 | .54 | .07 |
| Teacher directedness | 3.62 | .69 | 3.63 | .78 | -.04 | -.01 |
| Collaborative learning | 3.27 | .84 | 3.05 | 1.00 | 1.81 | .26 |

Note. ES = effect size computed by Cohen's d. df = 109.61 for knowledge building; df = 107.24 for overall question asking; df = 105.41 for low level question asking; df = 108.14 for high level question asking; df = 118.02 for self-regulation; df = 96.54 for lack of initiative; df = 96.69 for teacher directedness; df = 94.13 for collaborative learning. **p < .01.

### 3.  Summary of the Effects of the CIRCLE Learning Model on Students' Knowledge Building, Intentional Learning, and Classroom Perceptions

Students in classes where teachers integrated the CIRCLE learning model more reported more knowledge building, intentional learning, and collaboration with peers.  These results correspond to those that were expected based on the premises of the CIRCLE learning model.  The findings suggest that implementation of a more collaborative, knowledge building approach in classrooms does enhance students' knowledge building and intentional learning as well as strengthen their peer collaboration.  Results were not as strong or as clear cut for use of the CIRCLE technology.  When separated from implementation of the learning model, there were few effects of greater technology use.  The examination of technology effects was compromised somewhat by the very different sample sizes between different technology use groups which make all findings concerning technology use very tentative.  Even so, effects on student perceptions of question asking and the classroom environment were found within the high integration group, and an effect on knowledge building was found within the low integration group.  These results do tentatively support the contention that use of CSCL technologies can enhance the creation of  more collaborative, knowledge building communities in classrooms.

### D.  Relations of Students' Knowledge Building, Intentional Learning, and Classroom Perceptions to Their Classroom Achievement

The results indicated differences between students on the SPOCK scales as a result of teacher integration of the CIRCLE learning model and use of technology.  These differences are to some extent important only if higher knowledge building and intentional learning, and greater

collaboration in the classroom are, in fact, associated with greater learning and achievement. To examine whether scores on the SPOCK were related to students' achievement, we conducted multiple regression analyses, regressing students' course grades in the classes surveyed on the SPOCK scores. Because many of the SPOCK scales were highly intercorrelated, the weighting of the variables in the regression equation could be somewhat arbitrary, because only one of a set of highly intercorrelated predictors will receive a high weighting (Beta). Therefore, we also computed structure coefficients or loadings by correlating students' predicted scores computed from the regression equation with their scores on each of the original variables. These loadings are similar to factor loadings or canonical correlation structure coefficients and indicate which sets of variables are associated with the dimension defined by the linear combination of the variables created by the regression equation. We conducted regression analyses for the total sample and, because the grade means were considerably different in the two schools (see Table 22), for each school separately.

The regression results and structure coefficients are provided in Table 22. Significant prediction of grades was achieved in the total sample and both schools. However, the magnitudes of the explained variance were small for the total sample and Westlake. Examination of the grade mean and standard deviation for Westlake suggests that predictability was lowered because of a general lack of variability in Westlake grades due to a rather strong ceiling effect. This undoubtedly affected the variability in the total sample as well given that almost two-thirds of the sample were Westlake students. In Travis where there was no ceiling effect and more variability in grades, SPOCK scores predicted 15% of the grade variance. Although in absolute magnitude this is still somewhat low, when considered in relation to the predictability of actual course grades commonly achieved in educational research, the 15% explained variance seems quite respectable.

As we expected due to the high intercorrelations of the SPOCK scales, there were few variables that were statistically significant in the final regression equations, with lack of initiative the only variable that was significant in the total sample and both schools and low level question asking the only other variable achieving significance in any regression (total sample). The loadings provide a more complete picture of the associations between SPOCK scores and grades. In all samples, the loadings indicated that the cluster of question asking, self-regulation, and perceptions of collaborative learning was positively associated with the regression equation, with knowledge building also being a part of this cluster in the total sample and Travis. Lack of initiative was strongly negatively associated with the regression equation in all samples. In the total sample and Westlake, perceptions of teacher directedness clustered with lack of initiative in being negatively associated, however, teacher directedness was positively associated with the regression equation in Travis. Except for the inconsistent results for teacher directedness, these loadings are those that would be expected based on the premises of the CIRCLE learning model.

These results suggest that the types of knowledge building and intentional learning activities assessed by the SPOCK are associated with better academic achievement. The effects on academic performance, however, were small and must be interpreted cautiously. Meaningful relations, however, do appear to exist between higher knowledge building, intentional learning, and classroom collaboration and improved achievement.

# Table 22  Full Model Regression Analysis of Course Grades on SPOCK Scores

| Variable | B | SE B | Beta | Loading |
|---|---|---|---|---|
| | | Total Sample | | |
| | ($N = 677$; $M = 86.03$; $SD = 9.97$; $R = .26$; $R^2 = .07$) | | | |
| Knowledge building | .25 | .66 | .02 | .37 |
| Question asking | | | | |
| Low level | 1.77 | .63 | .17** | .56 |
| High level | .07 | .65 | .01 | .50 |
| Self-regulation | -.89 | .70 | -.07 | .15 |
| Lack of initiative | -2.72 | .60 | -.18** | -.76 |
| Teacher directedness | -.77 | .58 | -.06 | -.19 |
| Collaborative learning | .50 | .51 | .04 | .40 |
| | | Travis | | |
| | ($N = 236$; $M = 81.31$; $SD = 12.11$; $R = .38$; $R^2 = .15$) | | | |
| Knowledge building | .41 | 1.33 | .03 | .33 |
| Question asking | | | | |
| Low level | 1.62 | 1.31 | .13 | .55 |
| High level | 1.54 | 1.26 | .12 | .58 |
| Self-regulation | -.89 | 1.51 | -.06 | .29 |
| Lack of initiative | -5.12 | 1.08 | -.30*** | -.73 |
| Teacher directedness | 1.76 | 1.12 | .11 | .30 |
| Collaborative learning | -.31 | .97 | -.02 | .24 |
| | | Westlake | | |
| | ($N = 441$; $M = 88.56$; $SD = 7.48$; $R = .23$; $R^2 = .05$) | | | |
| Knowledge building | -.97 | .64 | -.11 | .00 |
| Question asking | | | | |
| Low level | 1.09 | .58 | .13 | .35 |
| High level | .02 | .63 | .00 | .27 |
| Self-regulation | .15 | .65 | .02 | .07 |
| Lack of initiative | -1.64 | .62 | -.13** | -.72 |
| Teacher directedness | -1.25 | .57 | -.12* | -.49 |
| Collaborative learning | .62 | .50 | .07 | .34 |

*$p < .05$. **$p < .01$. ***$p < .001$.

# IV. DISCUSSION AND CONCLUSIONS

## A. Introduction

In this section, we will provide a discussion of the evaluation results and draw conclusions about the extent to which Project CIRCLE has achieved its stated goals. We will first discuss the CIRCLE model training program. We next will discuss the CIRCLE learning model. We then draw conclusions about the success of the second year of the CIRCLE project. We will conclude with an overall assessment of the CIRCLE project and make recommendations based on the evaluation results.

## B. The CIRCLE Model Training Program

Our evaluation of the CIRCLE model training program was directed as the following outcome evaluation objective:

-Determination of the effectiveness of the teacher-training model and strategies for facilitating teacher integration and utilization of computers in instruction.

Our primary objective for the evaluation of the CIRCLE model training program was to determine the effectiveness of the training program in relation to the following project objectives:

-Identify state-of-the-art computer technologies, innovative software, and telecommunication capabilities which could significantly impact teacher-training and promote effective technology infusion into classroom practices.

-Develop and implement school-wide teacher training programs at Travis High School in AISD and Westlake High School in EISD to train teachers in the use of state-of-the-art computer technology for teaching in the subject matter areas.

-Train students at both sites to serve as student mentors to provide active and effective support for teachers in the integration of technology into their classroom practices.

-Design and implement a teacher-training model using integrated computer technology that is both generative and self-sustaining within both participating schools that promotes an emerging technology-rich teacher culture consistent with best-use practices, recommendations from the SCANS report, and the development of national curriculum standards in the academic disciplines.

Two specific second year evaluation objectives were related to these project objectives:

1. Determine the effectiveness of the CIRCLE training model in providing technology training and on-going support to teachers.

2. Determine teachers' perceptions of the potential sustainability of the training model in their schools beyond the end of the grant period.

The training model itself consisted of three primary components: 1) formal training sessions conducted at the University of Texas which were designed to provide an initial introduction to the software and how to use it; 2) between teacher collaboration within the schools as a method of technology training and support; and 3) the use of students as mentors to provide training and support to teachers and other students in use of technology. In the first year evaluation, we extensively examined the effectiveness of the first of these components, the formal training sessions at the University of Texas. In the second year, these formal training sessions were decreased, with formal training being provided to second year participants only during one three day summer workshop. The fading out of formal training sessions was planned, as the other components of the model, between teacher collaboration and use of student mentors, were supposed to provide the mechanisms for ongoing training and support once the grant ended. Therefore, in year 2, we focused our evaluation on these components and did not evaluate the formal training session.

We will first discuss the types training activities undertaken by teachers in their collaborative training efforts and in conjunction with the student mentors to examine the effectiveness of the training model in providing technology training and support. We will then discuss teachers' perceptions of the viability and sustainability of the training model. We will then provide a final summary and conclusions about the effectiveness of the training model.

## 1. Effectiveness of the CIRCLE Training Model in Providing Technology Training and On-Going Support to Teachers

We will first discuss the types of collaborative training activities undertaken by teachers. We will then discuss teacher uses of the student mentors. We will then provide conclusions about the effectiveness of the training model.

### a. Between Teacher Collaboration for Training and Support

A unique aspects of the CIRCLE model training program was the focus on between teacher collaboration as a primary method of technology training and support. This approach was envisioned as replacing the more traditional, didactic, inservice training as the major training component. Year 2 was structured to increase this shift to collaboration as the primary training method by decreasing the amount of formal training done. In relation to the first year of the CIRCLE grant, the percentage of teachers reporting some or a lot of collaboration relative to those reporting little or no collaboration stayed approximately the same. In both years, it was approximately 50%. Those who did collaborate reported a variety of collaborative activities related to training and support. As in the first year, the majority of the reported types of collaboration centered on technical support related to trouble shooting and technical aspects of hardware and software setup. Relative to year 1, though, there was greater indication of collaboration for more training type activities such as learning software and discussing classroom applications. This suggests that the collaboration that was done did produce some of the effects on thinking about technology use and teaching practices that were anticipated in the CIRCLE grant. However, these aspects of training collaboration remained at relatively low level and efforts in these more sophisticated training aspects remained scattered. Like year 1, responses to ways that collaboration was not helpful were diverse, suggesting that there was no systematic disadvantage that was perceived by the teachers.

Teachers indicated collaborating primarily on technical, trouble shooting type activities, such as help with how to do a specific function or solve a specific problem. This would suggest that collaboration was seen as primarily a way of getting support for specific problems or questions, rather than as a way of doing broad inservice type training. This may partially account for the somewhat low reported collaboration. Unless one was having problems or had a specific question, there was little reason to collaborate. Therefore, those teachers who did not use the software extensively would have few occasions to collaborate because their low use would lead to few problems being encountered. This seems consistent with an observed trend for more extensive and sophisticated collaborative training activities to be done more by teachers who had more use of the technology. This suggests that perhaps more sophisticated collaborative training emerges as a function of use. In the early stages of use, teachers must deal with and seem to focus on basic trouble shooting and technical setup and operation needs. Perhaps as they become more familiar with the technology and resolve most of their technical problems, they shift to collaboration on more sophisticated uses and learning new techniques. Also, collaboration on more types of training was done more by those who collaborated more. This suggests that collaboration may be somewhat self-feeding. The more one engages in it, the more types of things one finds to collaborate about. If this is true, the generally low levels of on-going collaboration would keep collaboration on more varied and sophisticated training issues from emerging.

Broader, more extensive collaboration appeared to be constrained by time. Teachers reported time for planning collaboration and time to meet with other teachers as necessary for continued collaboration. This would suggest that specific allocated collaboration time may be required for collaboration to be fully used as a way of training. As with the first year, some teachers also reported equipment and software limitations that kept them from implementing any of the CIRCLE software in their classes or having access to all of the CIRCLE software. This would likely limit collaboration, because, as discussed, the amount of collaboration done appears to be a function of use. Therefore, those whose use was limited would likely have experienced few occaisions for collaboration.

The grant anticipated that teachers who had been trained in the model during year 1 would both serve as a resource base for new teachers and take over some of the role of training new teachers in the software. There was some indication that year 1 teachers did take on these roles. Teachers who had been involved in year 1 of the project tended to report more collaboration than the year 2 teachers. In particular, many of the year 1 teachers reported being called on for help with trouble shooting and for guidance in software use. Also, some year 2 teachers specifically mentioned using the year 1 teachers as a resource. This would suggest that the anticipated use of experienced teachers as a resource for training and supporting new teachers was, in fact, occurring. The majority of these efforts, however, appear to have been for technical trouble shooting rather than for extensive training type collaborations.

**b.**     **Utilization of Student Mentors for Training and Support**

A second unique aspect of the CIRCLE model training program was its use of students as a primary training and support mechanism. This student mentor model involved training students in the operation of the technology and specific software utilized. After training students were to work

with teachers and other students to aid in training and provide technical support in operating the technology. As with collaboration, it was envisioned that student mentors could provide training and support in place of more traditional types of inservice instruction, and that use of the student mentors for these activities would increase in the second year.

Approximately half of the teachers made extensive use of the student mentors in year 2. This was consistent with the percentage of use in year 1. Like year 1, use was primarily for technical support. Teachers reported using student mentors mainly for help with technical aspects of setting up and operating the computers and software. However, similar to between teacher collaboration, there were indications that mentors were used for more diverse types of student training activities and more assistance with teaching. In relation to the anticipated larger role for student mentors in year 2, the results appear to be mixed. For those teachers who used mentors, the mentor role appears to have expanded in terms of what mentors did relative to year one. However, significant use of mentors really only occurred for half of the teachers. So for many of the teachers, the mentor role did not expand to take the place of more formal training sessions. Even among those teachers who used mentors, use of the mentors for substantial amounts of teacher training in new software did not occur. Therefore, although mentors did do a number of different technical and training activities, they do not appear to have assumed any significant amount of the role of helping teachers learn new technologies.

c.    **Conclusions Concerning the Effectiveness of the Training Model**

The training model appears to have been effective in providing a mechanism for support and training. Collaboration and use of student mentors were able to be expanded to more teachers during the second year, indicating that the model has potential for providing the type of training and support envisioned. The model seems to have been particularly effective in establishing a base of expertise among teachers and students for technical support and assistance. It's effectiveness in providing a mechanism for training in new software and technology appears to be less certain. Although year 2 did see an increase in use of collaboration and student mentors for training in software, these types of activities were highly limited. Therefore, the model does not appear to have fully evolved as a training mechanism that could replace inservice type training for introducing and learning new software.

As in year 1 the effectiveness of the model appears to be constrained technology availability. The most clear theme that emerges from the interviews is that use of collaboration and student mentors evolves from use of the software. The more the software is used, the more a teacher engages in collaboration and mentor use. And as more collaboration and mentor use is done, the more often this collaboration and mentor use begins to move to higher level training issues relative to technical support issues. This suggests that the entire training process is self-feeding, becoming more extensive and more sophisticated with software use. Thus, constrains on software use will have a large effect on training. As in year 1, teachers indicated significant technology availability issues. Teachers who experienced problems in getting software access were least likely to be involved extensively in training collaboration or student mentor use. Also, as in year 1, time continued to be a constraint. Both collaboration and student mentor use are depended on having time available. Teachers indicated lack of time as limiting how extensively they could engage in

collaborative training or use mentors.  Therefore, the effectiveness of the model appears to also be a function of whether time is available.  Any time limitations will make the model less effective.

Year 2 of the grant appears to have established that the model can be effective.  Although year 2 has also shown that the training model did not realize completely the full range of training activities envisioned or the full spread of training to new teachers.  Perhaps the more full realization of the model is simply a function of time and the model will expand more in subsequent years.  The grant appears to have established a solid base for the continued development of the collaboration and student mentors.  The extent of subsequent development, however, will be constrained by how the individual schools provide for the necessary technology and time in subsequent years.  We will discuss this issue next.

## 2.  Teachers' Perceptions of the Potential Sustainability of the Training Model in Their Schools Beyond the End of the Grant Period

The CIRCLE model training program was designed to ultimately become self-sustaining.  The idea was that once the initial group of teachers and student mentors was trained, they could train new teachers and student mentors, through collaboration and use of the existing student mentors.  This process could presumably continue indefinitely as new teachers and student mentors were trained to take the place of those who might leave, and could presumably expand throughout the school to ultimately reach all teachers and students.  We will first discuss teacher views of how viable they perceived the training model to be as a way to do the ongoing training in their schools.  Then we will discuss the extent to which teachers view their schools as supportive of the training program.  We will then provide conclusions about the self-sustainability of the training model.

### a.  Viability of the CIRCLE Model Training Program

Teachers were very strong in their endorsement of the training model as a viable way to do training and support within their schools.  They were more strongly positive about the viability of the model than in year 1.  However, they indicated that they thought viability was contingent on the same factors as mentioned in year 1: time, school support, and commitment of the school to making necessary resources available.  Teachers indicated collaboration, the student mentor involvement, and increased technology availability as particular strengths of the model and indicated no systemic weaknesses to the model.  As in year 1, teachers saw a need to expand awareness of the model and work to overcome established practices and ways of doing things in their school for the model to continue to expand.  Teachers also generally viewed the model as superior to normal inservice types of training.  They did, however, see a need to perhaps continue some form of inservice type of training in conjunction with the collaboration and student mentors, particularly for the introductory training in new software.

As in year 1, teachers' perceptions of viability contrasted with actual use of the training components.  Although teachers were very positive about the viability of the model, only about half of the teachers extensively engaged in either collaboration or mentor use.  This suggests that although teachers are highly favorable of the model in principle, this favorable view of the model does not necessarily translate into actual practice.  It would appear that the constraints that teachers indicated as keeping them from more collaboration or more use of mentors kept them from being

able to use aspects of the training model, even though they thought that the training model was good. That teachers see value in the model suggests that they will continue to look favorably on attempts to utilize the model components. But any attempts to use the model will likely continue to be constrained by the same factors that constrained use during the grant, primarily lack of time and lack of technology availability.

**b.    Support Within the Schools for the CIRCLE Model Training Program**

Because teachers viewed the viability and potential sustainability of the CIRCLE model training program as contingent on the support within their schools, the extent to which there is support would appear to be a critical factor in whether the model will be self-sustaining. Teachers were generally positive about the support within their schools for ongoing teacher technology training, teacher collaboration for training and support, and the student mentor process. There was a disparity between teachers' discussion of support and the types of support they had indicated were needed. When asked what types of support would be needed to continue the model, teachers mentioned specific, tangible things, like time off, money, more technology. When asked about how their schools were supportive, however, teachers were more likely to indicate verbal support for the process or parts of the process such as collaboration. They were less likely to indicate that specific tangible support, such as time off or more technology, had been made available. This discrepancy between expressed and tangible support was explicitly mentioned by those who saw their school as not being supportive and also by those who expressed that they saw their schools as only conditionally supportive. Similar sentiments were expressed in answer to whether they thought the model could continue after the grant. Virtually all teachers were confident that the model would continue in some form. But they felt that both how extensively the components were implemented and how much the model would spread to new teachers and students were constrained by tangible school support.

These responses and concerns about support mirror those expressed in year 1. Teachers generally feel their schools are supportive in principle, but are less sure how much this expressed support will translate into actual, tangible time and resources, particularly once the grant ends and outside funding is not available. Most teachers though did feel that at least some support for continuing the training model would be available.

**c.    Conclusions Concerning the Self-Sustainability of the CIRCLE Model Training Program**

Teachers perceived the training model as a viable way to implement technology training and support within their schools. They saw the model as having particular strengths in the components of collaboration, student mentors, and the hands-on aspects of the training. They also felt that a core of teachers and student mentors had been created that could potentially keep the model going after the end of the grant. This suggests that the grant was successful in seeding the training model. The most clear conclusion that can be drawn about whether this initial seeding can remain viable and become self-sustaining is that the continuation of the model will be contingent on how well specific support such as time and availability of technology resources, are made available in the schools.

**C.    The CIRCLE Learning Model**

Our evaluation of the CIRCLE learning model was directed at the two broad outcome evaluation objectives as follows:

-Determine changes in teaching practices and computer utilization by teachers who are trained in the CIRCLE model.

-Determine the effects of the implementation of the CIRCLE model in classrooms on student learning, performance, behavior, and attitudes.

We will discuss each of these areas.

## 1.  Classroom Integration of CIRCLE Technology and Effects on Teaching Practices

Our primary objective for evaluation of the effects of the CIRCLE learning model on teaching practices was to determine the effects on teaching and computer utilization in relation to the following project objectives:

-Design and implement a teacher-training model using integrated computer technology that is both generative and self-sustaining within both participating schools that promotes an emerging technology-rich teacher culture consistent with best-use practices, recommendations from the SCANS report, and the development of national curriculum standards in the academic disciplines.

-Create collaborative knowledge-building communities among secondary students, teachers, administrators, university faculty, and university students to explore and model innovative constructivist uses of technology in the classroom.

Three specific second year evaluation objectives were related to these project objectives:

1. Determine the effects of the project on teachers' classroom teaching practices and curriculum, particularly on the implementation of collaborative, knowledge-building communities in their classes.

2. Determine the effects of the project on teachers' perceptions of technology and knowledge building processes.

3. Determine teachers' perceptions of the potential sustainability of the learning model in their schools beyond the end of the grant period.

We will first discuss uses of the CIRCLE software among teachers and the effects of the use of technology and integration of the CIRCLE learning model on teachers' classroom practices, including their collaboration with other teachers on classroom uses of the technology.  We will then discuss the teachers perceptions of technology use and the CIRCLE learning model to address teacher perceptions of the capabilities, limitations, and strategies for use of the CIRCLE learning model and goals within their schools for implementation of the model.  We will then discuss teachers' perceptions of the viability and sustainability of the learning model.  We will then provide

a final summary and conclusions about the classroom integration of CIRCLE technology and any effects this had on teaching practices.

## a. Uses of CIRCLE software and Effects on Teachers' Classroom Practices

Use of the CIRCLE software was considerably higher in the second year relative to the first. All but three of those teaching in subject matter areas made some use of the software. This compares to only half of the teachers in the first year. Although overall use was higher in year 2, the extent of use was quite diverse. Teachers ranged from extensive integration of the technology into day to day classroom activities to use of the technology for only one or two small, short term projects. There were fewer access constraints during the second year as many of the first year start up issues were resolved. However, new constraints on use emerged during the second year. At Westlake, the computers were not fully installed an operational until the spring semester. This limited use considerably. Also, unlike year 1, where Westlake teachers had computers in their regular classrooms, classroom assignments were changed in Westlake to a revolving room arrangement where some of the teachers did not have permanent classrooms and did not have access to computers at all times. This undoubtedly affected use levels in Westlake.

It is difficult to discern any clear patterns of use that would be typical of all or even a majority of teachers. Use in Westlake was much more similar across teachers, primarily because the largest amounts of use were related to two broad, collaborative projects. Outside of these projects, however, use was very idiosyncratic. The individuality of use does suggest, however, that teachers can adapt the CIRCLE software to a wide variety of subject areas and classroom practices. Teachers apparently were able to adapt the software to the particulars of their classroom situation and course subject area. We feel we can conclude that CIRCLE type software can be integrated into classrooms by teachers.

In the first year, use levels were so low that it was difficult to develop any strong conclusions about the effects of the technology integration on teachers' classroom practices. The larger number of teachers participating in year 2, allows a more complete picture of effects to emerge. As in year 1, the overwhelming majority of teachers indicated that use of the CIRCLE software helped them meet their goals for the assignments on which the software was used. As in year 1, some teachers indicated that use of the software allowed them and their students to pursue new, more higher order learning goals than when the software was not used. However, about a third of the teachers indicated that although the use of the software helped them meet goals, the benefit was small and they could have achieved their goals without the software.

Teachers were much more evenly divided on whether the use of the software affected their teaching and role in the classroom. About half of the teachers indicated that they saw differences in their teaching when using the software. But most of this difference was procedural, planning and preparation differences. Few teachers indicated any large shift to more constructivist teaching practices. This should, however, be qualified by the fact that most teachers indicated that they did constructivist oriented teaching normally, so there was little change due specifically to the use of the software. All but one teacher indicated that they saw changes in their role. These changes were in the direction of those envisioned in the CIRCLE model, toward more of a mentor or facilitator role than direct teaching role. Teachers who perceived changes in their teaching or role did, in general,

see these changes as carrying over into their regular teaching practices.  They were, however, unsure how much of this change could be attributed specifically to the CIRCLE software.  Overall, it is difficult to draw any strong conclusions about how integration of CIRCLE type software might affect teaching practices.  Teachers did not uniformly see large changes in their teaching.  But, most teachers felt that they were already doing many of the types of teaching practices espoused in the CIRCLE model.   It cannot be determined whether infusion of CIRCLE type software can produce, in and of itself, shifts in teaching and teacher roles.  It can be said that CIRCLE software does appear to facilitate constructivist practices and support those teachers who may be attempting to use constructivist approaches.  The strongest conclusion that can be drawn is that use of CIRCLE software does affect the role of the teacher, changing this role away from that of direct disseminator of information toward that of facilitator.

Teachers were divided on whether collaboration or relations with students were affected by use of the CIRCLE software.  Those teachers who did report changes also tended to see these changes as carrying over to the classroom in general.   Teachers noted increased personal relationships with students, ability to be more adaptive to individual student needs, and feelings of being more of a collaborator and less in control.  There were, however, no consistent dominant theme to teachers' responses.  Those teachers who reported no change generally felt that they already had strong collaborative relations in their classes before introduction of the CIRCLE software.  It is difficult to draw any strong conclusions, although introduction of CIRCLE software and the CIRCLE learning model does appear to affect teacher - student relations.  These relations, though, are affected in various ways dependent apparently on the individual teacher and class.  The findings would suggest, however, that introduction of the CIRCLE model and technologies will likely affect collaborative and other relations between teachers and students in ways that may not be easily anticipated in advance.

A key aspect of the creation of collaborative knowledge-building communities was between teacher collaboration for the development of classroom projects and assignments and for uses of the technology.  Relative to year 1, there was considerably more collaboration among teachers during the second year.  Most of this was due to the two large interdepartmental projects at Westlake. However, there was some collaboration on projects between individual teachers.  Like year 1, planning and sharing ideas as the most frequent area of collaboration.  But more work was done in year 2 on implementing specific collaborative projects.  Much collaboration also centered on technical aspects of implementing the software.  The increased collaboration apparent in year 2 suggests that teachers in the CIRCLE project were moving toward more collaborative activity consistent with the goals of the grant.  Teachers indicated that the greatest strengths of collaboration was gaining new ideas and enhancing the quality of ideas.  Teacher comments suggest that valued the multiple inputs and ideas that could be developed in a collaborative environment.  They saw scheduling and time limitations as the greatest constraints on their ability to effectively collaborate, and also mentioned difficulties in dealing with diverse personalities in the collaborative setting.  But, unlike year 1, where teachers were guarded in their optimism about the effectiveness of between teacher collaboration, teachers were unanimous in endorsing between teacher collaboration as a good way to develop assignments and classroom uses of technology.  Like year 1, though, they indicated that they did not believe this type of collaboration would work for all teachers, again citing teachers' individual styles and personalities.  It was clear from teachers' comments that although they endorsed collaboration, they did not think it was the only way to be effective.  Year 2 findings

do suggest more strongly than year 1, that between teacher collaboration on assignments and technology use can be done effectively and can be beneficial. More study, though, clearly is needed in this area to fully understand the benefits and limitations of collaboration. The teachers overwhelmingly indicated time as the thing most needed to allow continued collaboration in their schools. The also expressed needs for technical and administrative support to provide continued access to computers and help in using technology. It would appear that collaboration is likely to continue only if teachers are able to have the time and resources they need to do this collaboration.

**b.** **Effects of the Project on Teachers' Perceptions of Technology and Knowledge Building Processes**

An important goal of the CIRCLE project was to shift teachers' thinking and classroom practices toward a more collaborative approach with more constructivist, knowledge-building practices. Key to this change was enhancing both teachers' knowledge of these practices and processes and teachers' positive perceptions of the benefits of a collaborative, constructivist approach. Like year 1, teachers' indicated a generally positive perception of the approach espoused in the CIRCLE learning model. They were particularly positive about the collaborative aspects. They saw the approach as being positive for both students and teachers. However, they strongly qualified these impressions by noting that collaborative and constructivist practices were not universally beneficial and that these approaches had to be adapted to the particulars of courses and students. Teachers were also positive about the use of technology, both the specific technologies used in the project and technologies in general, for facilitating collaborative, constructivist teaching.

Although the CIRCLE learning model espouses a non-traditional view of learning and teaching, a factor in whether the model can be viable is whether the model can also allow teachers to meet more traditional learning goals. Like year 1, teachers did express that they believed the CIRCLE learning model could be implemented and still allow meeting more traditional school goal. Teachers were, in fact, more positive about the ability to implement the learning model and still meet more traditional goals than in year 1. But like year 1, they indicated that it would not necessarily be easy to accomplish some aspects of the traditional goals and curriculum within a constructivist approach. Like year 1, this suggests that effective implementation of the CIRCLE learning model may depend on how well the model can be adapted within the existing school goals.

Overall, teachers had positive perceptions of the learning model and the use of technology. How much impact the project had on these perceptions is hard to determine, however. Teachers came into the project, in many respects, because they were predisposed to the views of the learning model. Therefore, it is likely that the project cannot take credit for establishing positive views of constructivist, collaborative approaches in teachers. The project, however, does appear to have successfully reinforced teachers' positive predispositions and perhaps has helped expand teachers' understanding and appreciation of these views.

**c.** **Teachers' Perceptions of the Potential Sustainability of the Learning Model in Their Schools Beyond the End of the Grant Period**

As in year 1, the majority of teachers saw their schools as supportive of the CIRCLE learning model. They said their schools, and in particular their administrations, supported a constructivist,

collaborative approach to learning and teaching.  A number of teachers, though, qualified their answers.  In particular, they noted that not all teachers were highly supportive of collaborative and constructivist approaches and that they saw limits to what their administrations would support.  A small minority of teachers expressed that they saw little in the way of tangible support from their administration.  Similar to the needs expressed for continuation of the training model, teachers indicated time as the most important support needed to continue implementing the model.  They also noted, like needs for the training model, school support, and technology availability.  A number of teachers also indicated a need for more thorough training.  In sum, teachers appear to see the learning model as being sustainable in their schools.  Although it seems clear that they feel that the school support they perceive in their schools needs to translate into actual tangibles, such as time for planning and collaboration and continued investment in technology.

### d.    Conclusions Concerning the Classroom Integration of CIRCLE Technology and the Learning Model and Their Effects on Teaching Practices

The findings from teacher interviews suggest that the progress made during the first year in the two primary components of the CIRCLE learning model, creation of a collaborative, knowledge-building community and integration of technology into the classroom to support a technology rich teacher culture consistent with best-use practices and evolving national curriculum standards, was continued and expanded during the second year.  Technology implementation in the second year was broad enough to allow the conclusion that the CIRCLE technology and learning model could be successfully integrated into classrooms.  Most teachers were able to do some type of implementation and a few teachers were able to do extensive implementation.  Implementation, however, continued to be constrained by technology access.  In the first year, it was determined that use was higher among teachers who had computers available full time in their classrooms.  Separate laboratory settings appeared to hinder use because teachers encountered difficulties with scheduling the labs and getting access to the computers for planning and set-up of lessons.  This trend continued in the second year as the highest use again occurred for teachers who had full time classroom access.  The access issue was particularly highlighted by a change at Westlake.  In year 1, Westlake teachers had computers available full time in their classrooms and had the highest levels of use.  In year 2, Westlake switched to a rotating classroom format.  The CIRCLE teachers divided use of three classrooms with computers.  This meant that teachers were not present full time in the classrooms with computers.  This appears to have created difficulties similar to those encountered in computer lab settings.  Westlake teachers consistently mentioned access and availability difficulties as constraints on their use of the technology.  Even though they did have access to the computers for students to use during a class, the impediment appears to be on having the computers for preplanning and setting up.  Implementation, therefore, appears to depend not so much on whether a teacher has the ability to get their students on computers during the class as on whether the teacher has computers available to them full time for preparation and planning.  Basically, teachers indicated that they could not develop new lessons or activities when they could not get on the computers.

Unlike year 1, where virtually all teachers who used the software thought it impacted their teaching, the second year teachers were divided on how much effect the software and learning model had on their teaching.  As in year 1, most teachers in the project jointed because they were already predisposed toward the type of teaching envisioned in the model.  Those who said they saw no effects on their teaching almost always indicated that they saw no effects because they were already

teaching in collaborative, constructivist ways. Teacher perceptions of effects on teaching, however, also appear to be partially a function of use. Teachers who had been with the project for both years were more likely to report effects and second year teachers who used the software more extensively were more likely to report effects. Teachers who reported no effects tended to be those who had very limited use or had what they perceived as unsuccessful use. This would suggest that effects on teaching perhaps emerge from use. The more extensively the technology can be used and more extensively aspects of the Learning Model can be integrated, the more likely there are to be effects. This would suggest that even among teachers who are predisposed to the types of teaching and instruction envisioned, the use of the model can enhance these predispositions and produce changes in teaching. However, these changes do not appear to be certain or universal. Much appears to be dependent on levels of use and difficulties encountered in using. It remains an open question whether the CIRCLE learning model and integration of the CIRCLE technology can broadly impact teaching practices, particularly among those who may be less predisposed to the model, or can lead to the creation of a large scale collaborative, constructivist teaching culture in the schools. The effects it does produce may be more evolutionary than revolutionary.

Teachers engaged in considerably more collaboration on the development of classroom applications than in year 1. In year 1, much of the collaboration centered on technical aspects of implementation. Like the evolution of collaboration in the training model, however, teachers in the second year did considerably more collaboration about curricular issues and lesson planning. Also, relative to year 1, teachers more strongly endorsed collaboration as a way to develop classroom lessons and technology applications. The collaborative lesson development aspects of the learning model, therefore, appear to have been implemented successfully and appear to have produced positive views of this approach among teachers. Teachers did see collaborative efforts as strongly dependent on having time to meet collaboratively. Teachers generally saw the CIRCLE learning model as having potential and as a viable way to integrate technology and collaborative, constructivist teaching practices into the classroom. As with the CIRCLE training model, they saw this potential as dependent on support within their schools, particularly time and technology resources. As in year 1, the evaluation findings support the potential of the model as a way to impact teacher classroom practices and curricular planning and development. The evaluation, however, can not provide conclusive answers about how extensively this potential can be realized. Teachers indicated a number of constraints in terms of needed school support on continuation of the model. The extent to which the necessary school support will be realized are unknown at this time.

## 2. Effects of Implementation of the CIRCLE Learning Model on Students' Learning, Performance, Behavior, and Attitudes

Our primary objective for evaluation of the effects of the CIRCLE learning model on students was to determine the effects on students in relation to the following project objective:

-Create collaborative knowledge-building communities among secondary students, teachers, administrators, university faculty, and university students to explore and model innovative constructivist uses of technology in the classroom.

Three specific second year evaluation objectives were related to this project objective:

1.  Determine the effects of the implementation of the CIRCLE model on students' perceptions of school, learning, and classrooms.

2.  Determine the effects of the implementation of the CIRCLE model on students' perceptions of themselves as learners and their approach to learning.

3.  Determine the effects of the implementation of the CIRCLE model on student achievement in subject matter areas.

Two data sources were used to examine the effects of implementation of the CIRCLE learning model on students. First, quantitative analysis was done using the developed student perceptions instrument. Second, qualitative analysis was done using responses of teachers and student mentors to questions about the effects of CIRCLE software use on students' learning, attitudes, and motivation. We will first discuss findings from the quantitative analysis. We will then discuss findings from the qualitative analysis. We will then provide conclusions about the effects of the CIRCLE learning model on students' learning, performance, behavior, and attitudes.

**a.  Quantitative Analysis of the Effects of the CIRCLE Learning Model on Students' Knowledge Building, Intentional Learning, Perceptions of the Classroom, and Achievement**

Consistent with the theoretical model of Bereiter, Scardamalia, and their colleagues (Bereiter & Scardamalia, 1989; Scardamalia & Bereiter, 1991; Scardamalia & Bereiter, 1992; Scardamalia et al., 1994; Scardamalia et al., 1989), the CIRCLE learning model was based on the premise that the introduction of appropriate computer technology could support classroom changes that would encourage student knowledge building and intentional learning. The results of our assessment of students' perceptions of knowledge building, intentional learning, and classroom perceptions using the SPOCK strongly supported the premises of the CIRCLE learning model. In relation to our three central areas of examination, higher integration of the CIRCLE constructivist and knowledge-building oriented learning model by teachers appeared to positively affect students' engagement in knowledge building in the classroom. There were strong effects on question asking and evidence of positive effects on knowledge building activities. These effects suggest that the implementation of knowledge-building oriented instruction does influence students' approaches to learning by increasing their more knowledge building oriented activities and goals. The effect of higher integration of the CIRCLE learning model on students' intentional learning was less. There were no effects on lack of initiative and only a small effect on self-regulation activities. When separated from the more explicit knowledge-building activities and goals assessed in the knowledge building and question asking scales, our intentional learning measures reflect more traditional self-regulation as has been proposed in a number of models (e.g., Zimmerman, 1989). The types of metacognitive and cognitive strategies assessed can be done in both traditional and more constructivist, knowledge-building oriented classrooms. What is suggested by our results is that these types of intentional learning or self-regulation are not necessarily affected much by the type of classroom environment present. In effect, because they are not uniquely associated with a knowledge building approach to learning, they are not influenced much, if at all, by implementation of a knowledge building environment in the classroom.

CSCL approaches (Koschmann, 1993/94a, 1993/94b; Scardamalia & Bereiter, 1991; Scardamalia et al., 1994) propose that computer supports provide special facilitation to the implementation of constructivist, knowledge-building environments. The results of the examination of differential use of the CIRCLE technology within the high and low integration groups suggest that computer supports do perhaps provide this facilitation. Among high integration teachers, those using the computer supports more had students who reported more higher level question asking, with moderate, although nonsignificant, effect sizes also found for knowledge building and overall question asking. Among low integration teachers, those using the computer supports more had students who reported more knowledge building. The effects for computer use examined separately from integration of the learning model are considerably smaller than those for integration of the constructivist, knowledge building learning model, but are large enough to suggest a unique effect for computer supports. In essence, our findings would tentatively support the contention of CSCL that computer technology facilitates more constructivist, knowledge-building oriented learning.

A central aspect of the classroom environment envisioned in the CIRCLE learning model as well as other CSCL approaches is increased student collaboration. The results indicate that implementation of the CIRCLE learning model appeared to produce strong increases in students' perceptions of collaboration with their fellow students in their classes. When considering computer use within the two integration groups, similar results were obtained, with perceptions of collaboration being higher when computers were used more, although being significantly higher only within the high integration group. These findings are particularly interesting because those teachers who did not implement the model as fully reported in their interviews that they were already doing extensive collaboration in their classrooms because in both schools, collaborative teaching approaches had been mandated by the respective school administrations. That integration of the CIRCLE learning model and higher use of CIRCLE technologies produced large increases in perceptions of collaboration in schools where collaborative learning was supposed to be the norm suggests a unique effect on collaboration in CSCL supported constructivist, knowledge building environments. We speculate that this effect occurred because collaboration is more central to the activities done on the CSCL technology used in the CIRCLE learning model. Basically, the types of technology used in the CIRCLE project necessitate real peer collaboration for completion of the classroom projects and activities. This may be perceived by students as more authentically collaborative than more traditional assignments that are done collaboratively in cooperative groups. The results do strongly suggest that CSCL technologies when coupled with a more constructivist, knowledge-building approach do enhance student collaboration.

Within the CSCL field, increased collaboration is often contrasted with a more traditional teacher centered approach. Our findings are less clear on student perceptions of teacher directedness than on increased collaboration, however. Perceptions of teacher directedness were not affected by high versus low integration of the CIRCLE learning model and only were significantly different for computer use within the high integration group. However, unexpectedly, students in the classes of high use, high integration teachers perceived more teacher directedness. This one significant finding may be an anomaly of the rather small number of students in the high use, high integration classrooms, given that there were no differences in other comparisons. The results do, however, suggest that collaboration and teacher directedness are independent of each other rather than being opposites on the same continuum. They also suggest that increasing students knowledge-building and collaboration does not necessarily require diminishing the role of the teacher.

Although not a central question in this study, the results on the relations of knowledge-building and intentional learning measures and student grades are encouraging. Although the effects were small, they were obtained on traditional measures of classroom achievement. All teachers were operating under the normal grading practices in their schools. There were no special grading policies or customized assessments done. Increasing students' constructive, knowledge-building learning orientation and increasing collaborative activities are sometimes questioned because it is thought that they will reduce performance on more traditional assessments. Our findings suggest this is not the case. A knowledge-building approach to learning appears to facilitate higher achievement even on traditional measures. The results for Travis, an innercity, predominantly minority urban school, are particularly impressive. Constructivist, knowledge-building approaches to instruction are often ignored in historically poor achieving schools in favor of a more basics oriented approach. Our results, however, suggest that implementation of CSCL knowledge-building approaches can potentially produce greater facilitation of achievement on traditional assessments in these schools than in traditionally high achieving White suburban schools. We do point out that in all assessments, lack of initiative, which reflects lack of knowledge of intentional learning strategies and inability to self-initiate and self-regulate ones own learning, was the strongest predictor in a negative manner, of grades. Lack of initiative was not influenced by implementation of the CIRCLE learning model or the CIRCLE technology. This would suggest that intervention to improve general self-regulatory and intentional learning skills is perhaps needed before students who lack these skills can fully engage in and benefit from a CIRCLE type knowledge-building environment.

Overall, the results from the SPOCK survey suggest that the infusion of technologies that support knowledge building, intentional learning, and collaboration can enhance the establishment of collaborative knowledge-building communities in high school classrooms and can influence students' engagement in knowledge building and intentional learning and students' perceptions of the classroom environment. We would caution, as also noted by Scardamalia et al. (1994), that CSCL technology is only a support. A collaborative knowledge-building environment can be created without technology. The findings do suggest, however, that CSCL technology appears to facilitate the creation of this type of environment in the classroom.

**b. Qualitative Analysis of the Effects of the CIRCLE Learning Model on Students' Learning, Attitudes, and Motivation**

The majority of teachers who did use the software reported that they saw positive effects on students' learning, attitudes, and motivation. As in year 1, the strongest effect reported by teachers, that cut across all questions, was an increase in motivation and engagement in the learning, particularly increased excitement and enthusiasm. The most mentioned effect on learning was increased depth of learning, with teachers reporting that students went beyond what they normally did. Teachers also mentioned increased quality of discussion and improved writing. When asked if students approached assignments differently, teachers mentioned increased seriousness, more enthusiasm, and more independence and control. Teachers also mentioned increased motivation, including changes in students expectations for learning and school. As in year 1, teachers noted that the effects resulting from CIRCLE software use were not uniform for all students; some reacted positively and some negatively. Teachers indicated that those who were not normally engaged in the classroom were often those who were most engaged and motivated by the CIRCLE assignments, and

conversely, those who did best in the regular classroom sometimes had negative reactions to the CIRCLE assignments.

Unlike the first year, when virtually all teachers who used the software reported some effects on students, teachers' perceptions of effects were more varied in year 2. Although a majority did see effects, a substantial minority did not feel that use of the CIRCLE software produced any substantial effects on learning, attitudes, or motivation. As with previous discussions of the training model and effects on teaching practices, these differences in teacher perceptions were somewhat related to use. Teachers who used the software more tended to see more effects. Also, few teachers saw no effects. Most disagreed about the degree of effects they saw. Also, unlike the first year, teachers who did see changes in students' motivation or attitudes did not see these changes as having much carry over to the regular classroom.

A small majority of the teachers reported increased cooperation on assignments where CIRCLE software was used. Other teachers did not indicate more cooperation, rather they thought cooperation was different among the students. Virtually, all teachers reported some effects, although some reported rather small changes. They were less certain whether this cooperation had continued in the classroom in general, than in year 1. Most reported no carry over or an inability to really determine if it did. The somewhat limited effects pointed out by teachers contrasts somewhat with the quite strong quantitative effects indicated by the analysis of the SPOCK. Virtually all teachers reported using cooperative learning in their classes on a routine basis even when not using the software. That students would report higher levels of collaboration in classes where the learning model was implemented more and the software was used more suggests some change in perception of collaboration on the part of students. Perhaps this difference is due to some more qualitative aspect of collaboration on the computer assignments. Teachers did note that collaboration on CIRCLE assignments seemed more authentic and that students collaborated in different ways. These qualitative differences may have produced the differences that students reported in their questionnaires. This issue certainly deserves further study.

c.    **Conclusions Concerning the Effects of the CIRCLE Learning Model on Students' Learning, Performance, Behavior, and Attitudes**

In this section, we consider the results from the analyses of students' learning, attitudes, and classroom perceptions in relation to our three central second year evaluation questions.

### 1. Effects of the Implementation of the CIRCLE Model on Students' Perceptions of School, Learning, and Classrooms

Results from both the survey of students with the SPOCK questionnaire and teacher interviews suggest that implementation of the CIRCLE learning model and use of the CIRCLE software has effects on students' perceptions of school, learning, and classrooms. The SPOCK data indicate that students' perceive classrooms where the model is implemented and the software used more as being more collaborative. They did not, however, perceive these classrooms as being any less teacher directed. Students' perceptions of collaboration were somewhat supported by teachers' reports of more student collaboration and different types of student collaboration when the software was being

used.  A goal of the CIRCLE project was to enhance collaborative forms of instruction.  The results suggest that the CIRCLE Learning model is effective in enhancing collaborative activities.

Other effects on students' perceptions of school are less clear.  At least some teachers did report that students exhibited different attitudes and perceptions of school and their own learning potentials.  Perhaps the most consistent of these reports was increased student seriousness about learning and doing activities.  Teachers repeatedly said that they thought that when CIRCLE software was used, students took lessons more seriously and viewed lessons as being more authentic.  It can potentially be argued that the activities being done using Daedalus collaboration or Internet communication with experts outside the classroom are more authentic than typical classroom activities because these types of activities require real communication and interaction with real people in a way that typical patterns of student and teacher interaction do not.  This argument is certainly open to question and requires considerably more evidence before it can be fully accepted.  However, the comments of teachers do suggest that students did approach the CIRCLE activities somewhat differently and perhaps more authentically.

The strongest conclusion that can be drawn at this time is that CIRCLE software and the CIRCLE learning model does affect students' perceptions of collaboration.  A much more tentative conclusion is that the CIRCLE learning model also affects students perceptions of school and learning, but the full nature of these effects cannot be determined without more study.

## 2.  Effects of the Implementation of the CIRCLE Model on Students' Perceptions of Themselves As Learners and Their Approach To Learning

As in year 1, the results of the SPOCK survey suggest that implementation of the CIRCLE learning model through use of the CIRCLE software facilitates students' knowledge building and intentional learning in the classroom.  Students in classrooms where CIRCLE learning model was implemented more fully reported more question asking, more knowledge building activities, and more engagement in intentional learning.  These findings suggest that students in classrooms where the CIRCLE model was implemented developed more positive perceptions of themselves as learners and engaged in more self-regulated, intentional learning and knowledge building.  The results of the SPOCK survey are somewhat supported by teachers' comments.  In scattered comments, teachers noted increased self-regulation, increased independence, and student feelings of being more capable learners.  These would reinforce the trends toward more independent, intentional learning evident in the SPOCK analysis.  Teachers also mentioned students learning the material with more depth, which would reinforce the trends toward more in-depth, knowledge building in the SPOCK analysis.

Overall, implementation of the CIRCLE Model and use of the CIRCLE technology does appear to have a positive effect on students' perceptions of themselves as learners and their approaches to learning.  Understanding the full range of these effects, however, will require more study.

## 3.  Effects of the Implementation of the CIRCLE Model on Student Achievement in Subject Matter Areas.

It was hoped in the grant that the implementation of the CIRCLE learning model would ultimately lead to improved student achievement. Within this evaluation, we have no way to directly test whether there was any impact on achievement. There are, however, indirect indicators that can be used to draw tentative conclusions about effects on achievement. We did find positive correlations between intentional learning and knowledge building as measured by the SPOCK and students' grades. Although small in size, these correlations suggest that students who engage in more self-directed, intentional learning and more knowledge building achieve better. Because implementation of the CIRCLE model appears to lead to more student engagement in intentional learning and knowledge building, we can indirectly infer that this increased student engagement would ultimately lead to more learning and achievement. This is a highly tentative conclusion, however, until more direct studies of effects on achievement can be done. Teachers' interviews also suggest achievement improvement. In scattered comments, teachers did say they saw better achievement and more in-depth learning when the CIRCLE model was used. Again, these comments can lead to only very tentative conclusions about effects on achievement, because they were not systematic and were made by only a few teachers. The results do suggest positive effects on achievement, but at this time, the results are only suggestive rather than conclusive.

## D.    Final Conclusions Concerning the Second Year of the CIRCLE Project

In the second year, our evaluation of the CIRCLE model training program was directed as the following outcome evaluation objective:

-Determine the effectiveness of the teacher-training model and strategies for facilitating teacher integration and utilization of computers in instruction.

Our primary objective for the evaluation of the CIRCLE model training program was to determine the effectiveness of the training program in relation to the following project objectives:

-Identify state-of-the-art computer technologies, innovative software, and telecommunication capabilities which could significantly impact teacher-training and promote effective technology infusion into classroom practices.

-Develop and implement school-wide teacher training programs at Travis High School in AISD and Westlake High School in EISD to train teachers in the use of state-of-the-art computer technology for teaching in the subject matter areas.

-Train students at both sites to serve as student mentors to provide active and effective support for teachers in the integration of technology into their classroom practices.

-Design and implement a teacher-training model using integrated computer technology that is both generative and self-sustaining within both participating schools that promotes an emerging technology-rich teacher culture consistent with best-use practices, recommendations from the SCANS report, and the development of national curriculum standards in the academic disciplines.

We can conclude from the results of the second year evaluation that Project CIRCLE made meaningful progress in all of these objectives. The technologies identified and implemented as part

of Project CIRCLE appear to be effective in impacting technology infusion in the classroom. Teachers were able to find various uses of the technology in their classes. Although the extent of infusion varied substantially, the trends in use, and particularly the increase in use during the second year, indicate that the technology can be infused and can make an impact on teaching and the classroom.

During the second year, substantial progress was made in the development of the training model. A key aspect of the second year was to shift the training of teachers and student mentors away from formal inservice sessions at UT toward more collaborative efforts within the schools. This shift was made and the evaluation results indicate that the model of collaborative training and student mentors can be done in the schools. The results, however, suggest limitations on the development of the model. Although collaborative efforts did increase, collaboration was highly varied across teachers. Teachers also continued to collaborate and use student mentors more for technical trouble shooting than for new training efforts. The results in year 2 suggest that the training model can be done, and can, in certain circumstances, be done effectively. But the results suggest that effectiveness is not guaranteed. Development of this type of training model will require continued effort on the part of teachers and support in the form of time and technology from schools.

The second year data suggests that the training model can be generative and self-sustaining. Training was expanded to a large number of new teachers and students in year 2 and their is no reason why this expansion could not continue if the same efforts made during year 2 are continued. It is clear, however, that how extensively the training model can be continued is highly constrained by school support for continuing the collaborative efforts and student mentor training.

In the second year, our evaluation of the CIRCLE learning model was directed at the two broad outcome evaluation objectives as follows:

-Determine changes in teaching practices and computer utilization by teachers who are trained in the CIRCLE model.

-Determine the effects of the implementation of the CIRCLE model in classrooms on student learning, performance, behavior, and attitudes.

Our primary objective for evaluation of the effects of the CIRCLE learning model on teaching practices and student learning, performance, behavior, and attitudes was to determine the effects on teaching and computer utilization in relation to the following project objectives

-Design and implement a teacher-training model using integrated computer technology that is both generative and self-sustaining within both participating schools that promotes an emerging technology-rich teacher culture consistent with best-use practices, recommendations from the SCANS report, and the development of national curriculum standards in the academic disciplines.

-Create collaborative knowledge-building communities among secondary students, teachers, administrators, university faculty, and university students to explore and model innovative constructivist uses of technology in the classroom.

We can conclude from the second year evaluation data that Project CIRCLE made progress in realizing all of these objectives. Teachers did indicate that integration of the technology and the learning model influenced their teaching in ways consistent with the collaborative, constructivist practices promoted by the CIRCLE learning model. For about half of the teachers, primarily those who integrated the technology and learning model the most, the integration of the technology and learning model appeared to have substantial effects on their teaching practices. For the other half of the teachers, whose integration of the technology and learning model was less, there were fewer effects, if any. For teachers who reported no specific effects, however, the technology and learning model appeared to reinforce practices that these teachers were already engaged in. It is not clear from the second year data how extensive the effects of the technology and learning model can be. The data do, however, indicate that integration of technology, in conjunction with collaborative, constructivist teaching principles, has the potential to influence teaching in positive ways.

The second year data indicate that collaborative, knowledge building communities that use innovative technology applications can be created in classrooms. Teachers reported many creative uses of the technology that supported increased between student collaboration and increased teacher - student collaboration. In some classrooms, this collaboration was extended between the two schools and to university faculty. The technology and learning model appeared to be effective for facilitating the development of this type of collaborative community. The data, however, indicate that the creation of these types of communities is not an automatic result of the simple implementation of the technology. Teachers who were effective in creating these communities did more than simply use the technology. They integrated technology with creative teaching. The successful development of these types of communities did appear to enhance students' intentional learning and knowledge building suggesting positive effects on students' learning, attitudes, and self-direction occur when successful collaborative, knowledge building communities are created.

The second year data supports the potential of the learning model to be self-sustaining. Teachers were positive about the teaching principles and practices espoused in the model and felt that efforts would be continued to infuse technology and the principles of the model into teaching practices. As with the training model, how extensively the learning model can be continued is highly constrained by school support for continuing the efforts toward collaborative curriculum development among teachers and technology availability in classroom.

Overall, Project CIRCLE would appear to have been successful in meeting its objectives during the second year. Progress was made in all project areas that demonstrated that the goals envisioned by the project are potentially achievable. We would, therefore, conclude that Project CIRCLE has been successful in meeting its stated goals for the second year of the project.

# V.  FINAL CONCLUSIONS AND RECOMMENDATIONS

Project CIRCLE was established as a cooperative between the University of Texas at Austin College of Education, the Austin Independent School District (AISD), and the Eanes Independent School District (EISD) to develop a model collaborative, teacher training program to enhance technology infusion into the secondary schools.  Specifically the project had three broad objectives:

1.  To develop the CIRCLE model training program by

   -Identifying state-of-the-art computer technologies, innovative software, and telecommunication capabilities which could significantly impact teacher-training and promote effective technology infusion into classroom practices.

   -Developing and implementing school-wide teacher training programs at Travis High School in AISD and Westlake High School in EISD to train teachers in the use of state-of-the-art computer technology for teaching in the subject matter areas.

   -Training students at both sites to serve as student mentors to provide active and effective support for teachers in the integration of technology into their classroom practices.

2.  To establish a collaborative community of teachers and students in the schools by

   -Creating collaborative knowledge-building communities among secondary students, teachers, administrators, university faculty, and university students to explore and model innovative constructivist uses of technology in the classroom.

   -Using interactive database networks and new telecommunication approaches to connect participants to each other and to mentor/experts locally, nationally, and internationally.

3.  To develop a self-sustaining program of training and technology infusion in the schools by

   -Designing and implementing a teacher-training model using integrated computer technology that is both generative and self-sustaining within both participating schools that promotes an emerging technology-rich teacher culture consistent with best-use practices, recommendations from the SCANS report, and the development of national curriculum standards in the academic disciplines.

In this section, we will draw final conclusions concerning the extent to which the CIRCLE Project has achieved each of these objectives over the two years of the grant.

## A.    Development of the CIRCLE Model Training Program

During the course of the grant, Project CIRCLE was successful in identifying effective technologies for promoting technology infusion as evidenced by teachers' abilities to implement these technologies in their classrooms with effective results.  Project CIRCLE was also effective in developing a training program based on within school collaboration between teachers and use of students as mentors.  Over the course of the grant, the project showed that innovative collaborative

training and student mentors were feasible as a way of doing ongoing training and support within schools. The project succeeded in creating a cadre of trained teachers and students who could provide a base for further spread of the training.

Although there was considerable success in the development of the training model, the two years of the project also identified areas of concern. In year 2, the project shifted most of the training onto the in-school components of teacher collaboration and student mentors by discontinuing periodic inservice type training sessions at UT. The results of interviews suggests that the in-school components were effective for providing technical support and a resource base for teachers, but was less effective for explicit identification and training in new technologies and new applications. Also, a number of second year teachers expressed that they did not feel entirely comfortable with their technical knowledge of the technology. Second year teachers were also less likely to have been successful in implementing applications within there classrooms. These trends suggest that the training model needs to develop some mechanism for providing the types of training done in the inservice sessions at UT. Collaboration and the student mentors alone do not appear to be enough to do all training, and particularly, training in new technology and new applications. This was confirmed by the general response of teachers that they saw a need for something like the UT training sessions.

In sum, the training process developed by the project appears to be very effective. It is clear, though, that some sort of seeding process, like that supplied by the formal training sessions at UT, is necessary to identify and introduce new technologies. The data support that once initial training is completed, teacher collaboration and the student mentors can support the integration of technology in the classroom, deal with trouble shooting, and help identify ways to use the technology to develop lessons and activities. However, there is little evidence that these can effectively introduce new technologies or train teachers in how to operate new technologies.

## B.    Establishment of Collaborative Communities of Teachers and Students in the Schools

Over the two years of the grant, Project CIRCLE demonstrated that, with appropriate training, teachers could infuse technologies into the classroom that fostered the creation of collaborative learning communities. The project also demonstrated that when these types of communities are effectively established there are positive effects on students' perceptions of school and learning, their self-directed, intentional learning, and their collaboration with fellow students. The results of the project, however, also clearly showed that the creation of these collaborative communities is not simply a result of the infusion of technology. Even though all teachers were trained in the technologies and most attempted some type of application in their classes, only about half of the teachers were really successful in creating an effective collaborative community in their classrooms. From teacher interviews, it appears that perhaps the key variable in effectiveness is whether the technology is used to do something new and different. Teachers who were successful in creating effective communities reported that the technology affected how they taught. They reported designing new lessons around the software and changing teaching practices. Teachers who attempted to use the software but were not as effective, generally reported that they did not really do anything different. They used the software to do what they had always been doing. This suggests that it is not enough to just use the technology to do what has been routinely done. Establishment of effective collaborative learning communities appears to require using the technology to do new things.

It is not clear from the data why there were these differences among teachers in how the technology was used. All were trained similarly and the vast majority engaged in some collaborative efforts to develop innovative applications. One factor appears to be experience. Teachers who were with the project for both years were more likely to develop effective communities than those who joined for the second year only. Coupled with data that suggest that more sophisticated training and collaboration emerge from more use, this suggests that ability to develop new and different applications may be a function of experience with the technology. As teachers become more experienced, they are able to find more creative uses. Teachers who were less effective in establishing collaborative communities also appeared to experience more problems and constraints, including technology access and time. The data is not sufficient to pin point exactly what is needed to foster effective community establishment.

Overall, Project CIRCLE was successful in demonstrating that collaborative, knowledge building communities using innovative technologies and teaching practices can be created in schools, and in demonstrating that technology can support the creation of these communities. The project also identified constraints that can limit how effectively these communities can be established. Their establishment appears to be particularly dependent on easy technology availability and sufficient time for training, collaboration, and development of innovative curriculum.

## C.    Develop a Self-Sustaining Program of Training and Technology Infusion in the Schools

The CIRCLE Project was successful in demonstrating the feasibility of developing the training model and creating collaborative learning communities in the schools. The determination of whether these will be self-sustaining beyond the end of the grant cannot, of course, be done within the confines of the grant itself. Ultimately, this question will only be answered by whether the training and learning models do, in fact, continue in the respective schools. However, the potential for the components of the project to be self-sustaining are present. Teachers perceived both the training and learning models as viable and saw both as being potentially self-sustaining. Clearly, the fact that they were effective provides a strong argument for continuation.

What is most certain about the long term self-sustainability of the project is that it will be dependent on school support. Repeatedly throughout the two years teachers expressed a need for time, to do planning and collaboration, for technology access and availability, and for general school support. It was clear that problems with technology access and time limitations during the grant restricted the effectiveness of both training and implementation of the technology in classes. It seems certain that similar problems will restrict the continuation of the project components. The grant has shown that teachers can provide collaborative training and support to each other, students can become a viable resource for training and support, and teachers can do creative and effective implementations of technology and constructivist teaching in their classes. But, it is unreasonable to expect that teachers will be able to do extensive collaborative training, do collaborative curriculum development, identify new technologies, and implement technology in their classes in their spare time. Teachers are continually overloaded with their regular duties. It will simply not be feasible for them to add the components of the training and learning models to these duties. As a result, the training and learning models will likely not be self-sustaining unless specific resources, particularly time and technology, are allocated to continuing them.

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