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ABSTRACT

This report provides baseline information from the six schools in Arkansas, Louisiana, New Mexico, Oklahoma, rural Texas, and urban Texas participating in the Applying Technology to Restructuring and Learning (ATRL) project, which seeks to create replicable models of constructivist learning environments supported by technology. The information in this report was collected in the spring and fall of 1998 from teacher surveys; state, district, and school reports; classroom observations; and field notes from initial on-site visits. The purposes of these data are to enable the project team to compare initial classroom conditions with the development of constructivist learning environments supported by technology and to examine how these environments change instructional practices and student learning. Findings for each site are organized under the following headings: The Community and Environs; State Support for Technology; District Overview; Description of School Site; Project Participants; Teacher Self-assessment in Technology; and Observations of Classroom Practices. Appendices include letters of understanding/intent, the technology skills self-assessment checklist, and the classroom observation form. (AEF)

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Initial State of the Sites Report

Applying Technology to Restructuring and Learning

Technology Assistance Program

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State of the Sites Report
Applying Technology to Restructuring and Learning

Description

This report provides baseline information about the Applying Technology to Restructuring and Learning site schools. Demographic and descriptive information about the schools and communities collected during the process of selecting the sites, as well as analysis of patterns across initial classroom observations and teacher self-assessments of computer skills are included.

Intended Audience

This baseline information is intended for internal audiences and OERI.

Purpose

The baseline information included in this report is intended to provide a picture of the schools prior to intervention at the sites and will be used for comparison against subsequent observations and data collected from the sites over the course of the project.

Intended Audience Outcome

Awareness level information regarding the site schools, classroom practices, and characteristics of participating teachers at the time of entry.

Contract Reference

An ongoing activity of Goal 5 is documentation of the experiences of classroom teachers and students as they create Constructivist Learning Environments supported by technology. (Goal 5, Year Four Plan of Work, Activity 2). This report contains baseline information collected upon identification of the site schools and initial observations and visits to classrooms.

Dissemination Strategy

Dissemination of this report is limited to OERI and SEDL staff.

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Introduction

This report presents the baseline data from the six schools participating in the *Applying Technology to Restructuring and Learning* (ATRL) project. The ATRL project seeks to create replicable models of constructivist learning environments (CLE) supported by technology. The information in this report was collected in the spring and fall of 1998 from teacher surveys; state, district, and school reports; classroom observations; and field notes from initial on-site visits.

The purpose of these data is to enable the project team to compare initial classroom conditions with the development of constructivist learning environments supported by technology and how these environments change instructional practices and student learning.

Site selection

The project team used the following criteria in the initial site selection process:

- High concentrations of economically disadvantaged populations (based on the percentage of students qualifying for free and reduced lunch);
- High concentrations of culturally and linguistically diverse students;
- Rural and urban settings in the U.S./Mexico border, Mississippi Delta region, and the Indian nations; and
- Commitment to support the creation of technology-rich classrooms and teachers as they employ instructional approaches consistent with constructivist learning theory.

Using data from 1997-1998 Quality Education Data (QED) reports for each state in SEDL's region, recommendations from colleagues in the field, Internet searches, and presentations by schools at conferences, staff compiled a short list of potential sites. SEDL staff visited the district offices and individual school campuses of these potential sites. Staff interviewed district technology coordinators and campus administrators to ascertain levels of support for the creation of technology-rich constructivist learning environments. SEDL staff also made presentations to potential ATRL teachers in order to explain the goals of the project as well as teachers' and SEDL's roles within the project. In making the final site selection, the project team focused on the following criteria:

- The district's technology plan and its financial commitment for ongoing purchase, support and maintenance of technology.
- Prior evidence of reform-based or innovative projects designed to improve teaching and learning or promote the use of instructional technology;
- The presence of an on-site technology coordinator or contract with a local service provider; [1]

[1] Previous SEDL experience had demonstrated that teachers quickly lose interest in using technology if there is no on-site support for correcting technical problems in a timely manner, even when extensive staff development is provided.

- At least twenty-five teachers on staff at the school who are committed to creating a constructivist learning environment supported by technology in their classrooms and who agree to work with SEDL staff for the duration of the project.
- Administrator support for the project itself through the provision of time on the school calendar for professional development sessions and support for teachers as they transition to CLEs supported by technology;
- A staff member identified at the school or in the district who will work with SEDL staff as a co-developer for professional development sessions.

After an examination of potential sites, the team selected five school sites to represent the five states of SEDL's region—Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. The team also selected an additional urban Texas site (the sixth site) located near the SEDL office.

Once a site was selected, SEDL and the district superintendent, campus administrator and participating teachers signed letters of intent (See Appendices 1-3) which outlined the goals of the project as well as SEDL's and the participants' roles within the project.

The teachers in the six site schools who agreed to participate in the *Applying Technology to Restructuring and Learning* project during the 1998-1999 and 1999-2000 school years receive the following:

- A total of 72 hours of on-site professional development;
- Continuous on-line follow-up assistance by SEDL staff;
- Monthly on-site follow-up assistance by SEDL staff;
- Opportunities to participate in constructivist environments to learn new tools for teaching;
- Print and on-line resources that will assist in the development of technology-rich constructivist learning environments.

The six site schools and the 25 teachers in each site that are profiled in this state of the site report represent a variety of demographic and cultural differences.[2] This was intentional, as it provides a maximally variable sample.

- The Arkansas selection is a rural site with all of the district's schools on a single campus. Participating teachers represent the intermediate, junior high, and high school. Ninety-seven percent of the district's student population is white and 50 percent of students qualify for free or reduced lunch.

- The Louisiana site is a semi-rural middle school serving approximately 1,061 students, of whom 48 percent are black. Seventy percent of the students qualify for free or reduced lunches and the school is identified as "at-risk" according to state test scores.

[2] The following data were reported by participating site school officials.

- The New Mexico site is a rural middle school serving approximately 970 students, of whom 91 percent are Hispanic. Seventy-eight percent of students qualify for free or reduced lunch.

- The Oklahoma site represents five rural elementary schools serving a total of approximately 1,860 students, of whom 62 percent are American Indian. Seventy-eight percent of students qualify for free or reduced lunch.

- The Texas rural site is an elementary school serving approximately 686 students, of whom 94 percent are Hispanic. One hundred percent qualify for free or reduced lunch.

- The Texas urban site is an elementary school serving approximately 510 students, of whom 42 percent are black and 40 percent Hispanic. Eighty-five percent of students qualify for free or reduced lunch.

Using data provided by the school sites themselves, Table 1 provides a demographic overview of the six ATRL participating schools.

Table 1: Demographic Overview of ATRL School Sites

School Site	Students	Student Ethnicity[a] (Percent)	Students Qualifying for Free/Reduced Lunch (Percent)	Participating Teachers
Arkansas rural K-12 site	1920	97 white 3 other races	50	25
Louisiana semi-rural middle school	1061	50 white 48 black 2 other races	70	25
New Mexico rural middle school	970	91 Hispanic 9 white	78	25
Oklahoma K-8 rural cluster	1860	62 American Indian 36 white 1 black 1 Hispanic	78	25
Texas rural elementary school	686	94 Hispanic 5 white 1 black and American Indian	100	28
Texas urban elementary school	510	42 black 40 Hispanic 18 white	85	31

[a] Racial and ethnic data are disaggregated differently by each school, hence the variation in classifications.

Organization of reports

Data gathered by SEDL staff include information organized under the following headings:

The community and environs provides geographic, economic, socio-economic and demographic information. For this section, the 1990 Census, where available, was used as the source of these data.

State support for technology reports local, state and federal technology initiatives as they impact that state's site school.

District overview describes the district's demographics as well as technology resources and initiatives. This information is gathered from the 1997-1998 QED (as available), individual district technology plans, and interviews with district and school personnel.

Description of school site profiles the school's physical facilities and provides an administration, teacher, student, and technology resources profile. In addition, this section, drawing upon the district and/or school's technology plan, outlines the district's technology goals and concerns. Technology information is taken from the QED which assigns a measure of *high, medium*, or *low* based on the school's technology inventory.[3]

Project participants serves as a general introduction to participating ATRL teachers: their demographic characteristics, and the number of years, grades and subject area they teach. It also includes teachers' original reactions to the ATRL project—their expectations and concerns.

Teacher self-assessment in technology Teachers completed a computer skills checklist (See Appendix 4) in spring 1998. The checklist of skills included general computer operational skills, familiarity with a number of commonly found school software applications, and familiarity with commonly found computer peripherals (classified as "other technology" in the checklist) such as scanners. Since many computer skills require more skills than others do (e.g., creating folders is a more complex task than saving files), each computer skill was weighted differently and a score assigned accordingly. Depending upon the participant's score, experience or familiarity levels were categorized as *None, Low, Moderate* and *High*.

The results of this self-assessment are presented in tabular form throughout this report. This information helped SEDL staff formulate a preliminary impression of teachers' technology skills and plan professional development sessions accordingly.

Observations of classroom practices are descriptions of instructional practice; levels of student engagement, and the role of technology in teaching and learning in the six school sites. Descriptions are based upon SEDL staff classroom observations over four

[3] This measure uses a combination of numerous technology elements, such as computers per school, modems, online services, web browsers, etc. Also considered are such factors as the presence of newer computers, student enrollment and teachers per state. (QED, 1998)

Table 2: Observation of Classroom Practices

Constructivist Learning Environment	none to low	moderate	high
high			
moderate			
none to low			

Technology Use

to five days in spring and early fall 1998. SEDL staff spent approximately 40 to 60 minutes in each participant's classroom and recorded observations on a SEDL-developed observation protocol (See Appendix 5.)

The observation protocol was used to record the degree of learner-centered approaches based on the constructivist principles guiding the project's work, and the extent to which technology was employed in the classroom. SEDL then cross-tabulated these results to determine the extent to which participants' classrooms were constructivist learning environments (CLE) and to what extent technology was used in these classrooms. Because of classroom variations in the degree and intensity of both learner-centered approaches and technology integration, a classification matrix (See Table 2) was developed that categorizes classrooms according to differences in learner-centered approaches and technology use.

Supporting materials

Supporting materials are attached at the end of these reports as appendices.

Preliminary findings

The six schools of the *Applying Technology to Restructuring and Learning* project serve an approximate total of 6,997 students. Thirty-eight percent of the student body is Hispanic, 36 percent are white, 15 percent black, 10 percent American Indian and 1 percent unidentified (other) races. The average free and reduced lunch rate is 77 percent. One hundred fifty-nine teachers are participating in this project.

On average, 36 percent of all ATRL project teachers have taught for five years or less. As Table 3 illustrates, almost all teachers know how to use computers. Familiarity with software applications is limited to word processing, email, and the World Wide Web, with over two-thirds expressing some level of familiarity with these applications. Table 3 illustrates teachers' familiarity with commonly found school software applications in greater detail:

Table 3: Teacher Self Assessment of Technology Skills (All Schools)

Skill	None	Low	Moderate	High	Total
General Skills	6%	4%	45%	45%	100%
Word Processing	10%	11%	31%	49%	100%
Spreadsheet	48%	14%	27%	11%	100%
Database	76%	11%	0%	13%	100%
Drawing	42%	8%	33%	17%	100%
Presentation	68%	13%	14%	6%	100%
World Wide Web	31%	11%	32%	26%	100%
Email	28%	33%	26%	13%	100%
Other Technology	52%	36%	10%	2%	100%

Table 4 provides a summary of the classroom practices across all six schools in the ATRL project. As indicated by the table, the range of classroom practices among participant teachers is indeed diverse.

Of the 155 classrooms observed by SEDL staff, the largest percentage (41 percent) were categorized as moderate CLE and low technology. In such learning environments, the teacher employed some learner-centered approaches such as collaborative grouping and problem solving and functioned less as an information purveyor and more as a facilitator and guide. In such classrooms, students were observed to be more active and engaged in the classroom activity than were students in low CLE classrooms. Though technology was often present in these classrooms, students did not use it.

The next largest percentage of classrooms (28 percent) were defined as low CLE and low technology. In such learning environments, the method of instruction was teacher-directed, typically with the teacher at the front of the class lecturing or giving directions, and the students passively receiving information. Materials tended to be traditional: notebooks, chalk and chalkboard, and textbooks. In these classrooms, technology, though evident in many instances, was not employed.

Table 4: Overview of Classroom Practices

Constructivist Learning Environment	none to low	moderate	high
high	7 (5%)	2 (1%)	4 (3%)
moderate	64 (41%)	18 (12%)	3 (2%)
none to low	44 (28%)	7 (5%)	6 (4%)

Technology Use

Note. For easier analysis, the above table lists classrooms by number and percentage.

On the other end of the scale, only 13 classrooms (a total of nine percent of classrooms observed) were identified as high CLE. In these classrooms, teachers utilized small group activities and encouraged collaboration and discussion as students created some sort of intellectual product. However, in seven of these classrooms technology was not employed. In the two classrooms identified as high CLE and moderate technology, students were also involved in collaborative activities. In these classrooms,

however, students used computers to develop their academic products.

Finally, four classrooms were identified as high CLE and high technology. In these classrooms, the students assumed center stage as they rotated through learning stations or conducted research and presented the fruits of this research via electronic presentation software such as PowerPoint and HyperStudio. Within such collaborative, decentralized learning environments, students appeared to be challenged by and engaged in the activity and as such exhibited a high degree of autonomy. The teacher, though in control of the class, oftentimes relegated herself to the physical periphery of the classroom as she allowed students the freedom to learn on their own.

State of the Site: Arkansas Site

The Arkansas site is one of two ATRL project sites involving multiple schools. An intermediate, junior high, and high school are participating in the project. This is the only site in the ATRL project that includes high school teachers. Although the site has access to computers, there has been little modification of traditional teaching practices. Both the superintendent and participating teachers are interested in ways of using technology to improve student learning.

The community and environs

This school district serves a town of approximately 6,000 residents and its surrounding rural community.[4] The town is located in the foothills of the Ozark mountain region at the edge of a major river. An analysis of the area's workforce by the state's Economic Development Commission reflects the blue collar nature of the community's available labor force; the local economy is primarily supported by agriculture, logging, small industry, and tourism.

State support for technology

A state education telecommunications agency network, designed to streamline data gathering, links every public school in the state to the central education office and provides Internet access throughout the state. Support from this network has accelerated the district's implementation of network technology. In addition, aggressive pursuit of state grants, including a $75,000 Technology Literacy Challenge Grant awarded in 1998, has provided the means for the district's substantial technological infrastructure.

District overview

The district includes one high school (grades 10-12 with approximately 400 students), one junior high school (grades 7-9 with approximately 500 students), an intermediate school (grades 3-6 with approximately 570 students), and an elementary school (grades K-2 with 450 students). The district supports 137 teachers and an administrative staff

[4] There is no US Census data at a municipal level available for this community.

that includes the superintendent, a part-time curriculum specialist, and a technology coordinator. The district receives Title I funding.

One of the district's priorities is improving reading instruction, the result of a low ranking on the national Stanford 9 Achievement Test. In their 1997 scores, more than half the students scored below the test's 50th percentile rank. As a part of the Technology Literacy Challenge Grant fund, the school chose the Accelerated Reading program, which uses a computerized system to track student completion of reading goals. The program emphasizes a schoolwide reward system for reading from a large group of selected titles.

Description of school site

Facilities. Except for the elementary school, all schools in the district are located in adjacent buildings on a campus next to the county fairground. The facilities range from the 70-year high school cafeteria to a 10-year old intermediate school. There are several separate, small structures that house such classrooms as home economics, the vocational agriculture facility, and a drama building. Another separate building provides offices and classrooms for the three business faculty members. Classrooms are clean and well-kept, although some classrooms in the older high school building are crowded and dark.

Administration. The tone of the district is set by the superintendent, a former teacher and principal in the district, who maintains close connections with teachers throughout the system. On the first visit to the district, he explained that there is an open policy concerning classroom visits and that teachers are accustomed to having unscheduled visitors in their rooms. The superintendent arranged for the introductory session with the ATRL project, set the introductory visit schedules, and publicly encouraged teachers to participate.

Teachers. The teachers in the district are primarily white (99 percent). The remaining percent are either Hispanic or American Indian; there are no black teachers. Many have taught together in this district for more than 20 years.

Student body. The school district serves a student populace of approximately 1,900. Students are primarily white (97 percent) with a small representation of black students (2 percent). Hispanic, Asian, and American Indian students collectively comprise less than 1 percent of the student population. Over 50 percent of the district's students qualify for free or reduced lunches. From the 1997-98 graduating class, 40 percent enrolled in a two- or four-year college.

Technology resources. The 1997-1998 Quality Education Data (QED) ranks two of the three participating site schools as "medium" and one as "high" in their technology inventory. The district prides itself on the technology innovations it has undertaken through the years. In the late seventies and early eighties the school's computers were located in the business department and in IMPAC (Instructional Microcomputer Project for Arkansas Classrooms) labs that provide computer-assisted instruction for mathematics and language arts. These laboratories, which are found in many schools throughout the state, were funded through a state initiative begun in the early 1980s.

In the late 1980s and early 1990s, community businesses supported computer upgrades for selected classrooms and an internal district network was established. In 1993, the high school acquired Internet access as a pilot school in the state's Public School Computer Network. Teachers, students, and volunteers installed the equipment needed to accommodate that access. With the full implementation of the state's electronic network, the entire district was linked to the Internet.

The district has three servers (two campus-wide and one dial-in server that hosts web sites and list servers), 144 networked Personal Computers (PCs), 30 PCs in the IMPAC lab, and another Apple lab with 27 computers.

As a recipient of a Technology Literacy Challenge Grant, the district is acquiring a variety of software and hardware, including digital cameras, flatbed scanners, external/removable zip drives, and printers. It has purchased AverKey PC-to-TV converters for each campus building. This equipment was chosen to support an effort to move to a project-based curriculum that provides students with experience in writing, publishing, and multimedia presentations. The grant's primary recipients are classrooms for grades 2, 4, 6, 8, and 10.

There are computers in each building in the teacher lounges and libraries. However, computer access is richer for some buildings than for others. While Internet connections were installed throughout the district in 1995, not all classrooms have computers. The business department houses the richest technology environment, providing three fully equipped computer laboratories, each with approximately 25 multimedia computers. The computers are networked with printer access and the classrooms use projection equipment for demonstrations. Part of the participation in the ATRL project includes the installation of computers and printers into classrooms that have never had electronic access.

The district supports a full-time technology coordinator who is responsible for network maintenance, individual computer installation, software troubleshooting, and initial training for computer use. The coordinator does not have curriculum or instructional support responsibilities, nor does he have any salaried assistants to help him with the district work. When the tech coordinator was offered a more lucrative position in the community, the superintendent approached the school board and secured approval for a substantial increase in salary, in order to keep him on the district staff.

The district does not have any designated professional development staff. The superintendent recommended that a team of five teachers, one from the elementary school, one from the high school, and three from the business department, serve as the ATRL project's co-developers. In addition to these on-site contacts, the high school librarian is also designated as a co-developer.[5] In the summer the librarian provides staff development to teachers outside the district. She also teaches a technology

[5] Co-developers are district personnel who work with SEDL staff in providing on-site assistance to teachers and, in some cases, carrying out SEDL's professional development model in other schools within the district. They may be instructional technology coordinators, professional development specialists, or classroom teachers.

integration course at a state university in a neighboring town. With these interests and qualifications, she seemed an appropriate choice for the project.

Technology goals and concerns. The district's technology plan, which was revised in January 1998, lists four major goals for the use of technology:

- To embrace change.
- To assure equitable access.
- To provide adequate training.
- To establish a "foundation of support" to assure the plan's success.

As part of the goal for embracing change, the plan describes an intent to "empower teachers to utilize technology to move from a teacher-centered approach to a learner-centered environment."

While the district perceives itself as a technology leader in the state, comments by the superintendent and several staff members indicate their concern that the benefits of computers have not been fully realized. Student performance on the mathematics and reading portions of the statewide assessment test are particularly troublesome to the superintendent. He is frank in his assessment that changes in instructional strategies are needed to improve student learning. Teachers expressed the concern that current and future demands for technology literacy and collaborative work habits are not being addressed in classrooms.

Project participants

Twenty-five teachers in grades 3 to 12 are participating in the ATRL project. There are six elementary teachers, 11 intermediate school teachers, and eight high school teachers in the group. The six elementary teachers are responsible for all subjects. The intermediate teachers include science, English, mathematics, social studies, business, agricultural science, art, Spanish, and gifted and talented teachers. Finally, high school participants include an English, social studies, home economics, special education, business, and agricultural science, and gifted and talented teacher.

Participants can generally be classified as veteran teachers with 84 percent having at least 11 years of teaching experience. A more detailed break down of levels of teaching experience is provided in Table 5.

Table 5: Years of Teaching Experience

Years of Teaching Experience	Participants
0-5	2
6-10	1
11-15	3
16-20	8
21+	10
Total	**24**

Note. One participant did not complete this data-gathering form.

Participants' initial reactions. The introductory visit to the site revealed a faculty that seems generally ready to attempt new approaches to instruction. A receptive audience of approximately 40 teachers attended a first information session concerning the ATRL project; 31 signed letters of intent to participate in the project and ultimately 25 teachers were selected. The superintendent decided to include only classroom teachers (with the exception of the high school media specialist) and to exclude teachers from classrooms lower than grade 3 as the primary campus is located some distance from the other three schools.

As the project began, the teachers were cordial, curious, and eager to begin. Many mentioned privately that they were not sure exactly what the project would offer, and a few noted that they had been influenced by the superintendent's obvious interest in the project.

Teacher self-assessment in technology

Upon selection of this site, participating ATRL teachers competed a technology skills self-assessment (See Appendix 4). The results of this self-assessment are shown in the following table.

Table 6: Teacher Self-Assessment of Technology Skills

Skill	None	Low	Moderate	High	Total
General Skills	3	2	11	9	25
Word Processing	6	3	5	11	25
Spreadsheet	15	3	4	3	25
Database	20	2	0	3	25
Drawing	16	0	8	1	25
Presentation	18	3	4	0	25
World Wide Web	8	2	8	7	25
Email	6	7	7	5	25
Other Technology	12	10	3	0	25

This self-assessment expresses a broad range of confidence and skill levels concerning computer use. These data reflect the school district's efforts to build its infrastructure (note the comparatively higher level of confidence about using word processing and telecommunications applications such as the World Wide Web and email). In addition, slightly more than half of the teachers expressed some familiarity with such ancillary technology as scanners and display devices.

Other tools that can support instructional applications have not been fully explored. Nearly three-quarters of teachers reported no familiarity with presentation software while approximately 60 and 80 percent reported no familiarity with data applications such as spreadsheets and databases, respectively. Informal conversations have confirmed that while most of the teachers have attended some kind of skill session for particular software, there has been no focused staff development on effective classroom use.

Table 7: Observation of Classroom Practices

Constructivist Learning Environment	none to low	moderate	high
high	3	0	0
moderate	14	0	0
none to low	5	1	0

Technology Use

Observation of classroom practices

Twenty-three participants were observed teaching for approximately 45 minutes. Observations were recorded, entered into an electronic database and results cross-tabulated (A copy of the observation protocol is attached to this report as Appendix 5).

Visits to each participating teacher's classroom confirmed the superintendent's comment that traditional instruction is the standard for most teachers. While a few teachers arrange student seating in ways that encourage conversation and small group work, in most classrooms desks are arranged in rows facing the teacher. Many teachers lectured for most of the observation period. Students in most of the classrooms were polite, quiet, and responsive to direct questions. One or two teachers had difficulty maintaining decorum in the class; in those settings, an underlying hum of conversation was mixed with outbursts and interruptions.

In general, several different instructional styles were evident in the classrooms observed by SEDL staff. Some teachers exhibited one style throughout the observation, while a few used a mix of approaches.

Low CLE and Low Technology. In the five classrooms identified as such, the teachers presented the lesson content as a lecture with no apparent expectations for extended student contribution. In four of these classrooms a few short-answer questions were posed to the students but there was no discussion of their responses. In one of the classrooms the lecture content was directly lifted from the textbook and was projected at the front of the class with an overhead projector.

Moderate CLE and Low Technology. Fourteen of the classrooms were identified in this group. These classrooms generally focused either on discussion or products. In the discussion-centered classroom, the teachers structured the activities around a whole-group discussion or question-and-answer exchange. While the students were actively involved in the classroom activity and there was some opportunity for reflection, there were no instances of cross-student discussion or arrangement of the students into groups smaller than the full class. In the classrooms that exhibited a product-based approach, the teachers structured the activity so the students worked independently to create a tangible product such as completion of worksheets, responses to teacher-posed questions, or development of a research paper. There was no small group work and no discussion, questioning, or reflection. Technology was not used in any of these classrooms.

High CLE and Low Technology. Three classrooms were identified in this group. In these classrooms the teachers structured the activities so that students worked in small groups, talked to each other, and created an intellectual product by the end of the class. Technology was not used in any of these classes during the observation.

Low CLE and Moderate Technology. One classroom was identified in this category. The teacher led a discussion presenting the content with an electronic presentation format. The students interacted by responding to short answer questions and offering a few instances of their personal experience.

State of the Site: Louisiana Site

The Louisiana site is located in a semi-rural community near a mid-sized city in the Acadiana region of southwestern Louisiana. The school currently serves Grades 5 to 8, but upon completion of a new elementary school (projected in two years), the school will serve grades 6 through 8.

The school was chosen as a project site for a number of reasons. Its student population included a substantial minority population, students from low socioeconomic background and students who are academically at risk. The school is part of a district that is pushing both technology integration and learner-centered approaches. Turnover among the faculty at the site school, unlike that of other schools in the district, is low to negligible. Administrators describe the faculty as ready to take the "next step" in integrating technology into the curriculum. Finally, a strong support system seems to be evolving for teachers. The district's technology coordinator has promised a new PC to all teachers who wish to join the project but who do not have computers in their classroom and has offered to provide weekly technical assistance to ATRL teachers. Finally, two eager potential co-developers have been identified.

The community and environs

This school serves a semi-rural community of about 5,000 residents located in Acadiana in southwestern Louisiana. Although a low-density area, the community is growing rapidly. The community is mostly white; the only significant minority population is black — 36 percent of the total community according to the 1990 Census. The majority of community members are Cajuns, traditionally a poor, rural, isolated, and conservative people. According to the 1990 Census, one-third of households in the community still speak French as their first language.

The community's economic status is low-to-middle income. According to the 1990 Census, 17 percent of households receive public assistance and the median household income is $16,000. Educational attainment is also low. The 1990 Census reports that 36 percent of residents over the age of 25 have less than a 9th grade education. Geographically, the area is flat with numerous bayous and mangroves. The community is fairly close to the Atchafalaya Basin, the largest wetland in the United States. Because of the abundance of wetlands and the prevalence of Cajun culture, the communities in the area gather much of their revenue from recreational activities such as musical festivals, birding, boating, hunting and fishing, and tourism.

State support for technology

In terms of educational resources, Louisiana has typically been a poor state. With the oil bust of the 1980s, Louisiana began to diversify its economic base and to rehabilitate its educational system. The state legislature has given education a higher priority and the state board of education has emphasized school reform, including the introduction and integration of technology to enhance student achievement. The new Louisiana content standards speak to this change.

Most schools in Louisiana, including two-year colleges, do not have access to the kind of technology that will help students become competitive in an information-driven marketplace. The state has developed a plan to address this problem and ensure that all students become "technologically literate." The state appropriated $38 million in 1997-1998 for classroom-based technology—hardware, software, and equipment including modems and scanners. In addition to these funds, the state has a Technology Innovation Challenge Grant from the U. S. Department of Education for $10 million. The Louisiana Networking Infrastructure for Education (LaNIE) is a joint plan of the Goals 2000 initiative, Board of Elementary and Secondary Education (BESE), Louisiana Public Broadcasting, and the Louisiana Systemic Initiatives Program (LaSIP). Five pilot sites were funded to develop models for integrating Internet resources with K-14 instruction. Each site involves collaboration between university faculty, district and school administrators, and classroom teachers and the project incorporates access to technology with professional development for teachers, assistance with curricular integration, and on-going technical support.

In July 1997, the Louisiana Department of Education created the Louisiana Center for Educational Technology (LCET), whose goal is to provide all K-12 educators with access to technologies that improve student achievement. To achieve this goal, the state has focused on providing leadership and professional development. Each summer the State Board of Education sponsors Teaching, Learning and Technology Leadership workshops that help teachers use technology in a more learner-centered fashion.[6]

The district is one of the five state Challenge Grant sites. In addition, several teachers from the district, including the ATRL site, have participated in the LaSIP and LCET summer professional development seminars.

District overview

The district enrolls more than 30,000 students at 41 schools, with a faculty of approximately 1,600 teachers. The student population is predominantly white (63 percent); 34 percent are black, and 1 percent each are Asian and Hispanic.

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[6] Southwest Educational Development Laboratory. (1998). *The Progress of Education in Louisiana.* The first three paragraphs in this section were adapted from this paper.

Description of school site

Facilities. The site school is a two-story building situated on approximately two acres of land. As testimony to its growing student population, the school has about 12 portable (or Butler) buildings. It has also converted an engineering and maintenance building into a home economics and industrial arts area.

Administration. The project's initial contact with the school was through the assistant principal. Though not proficient with computers, he recognizes the utility of computer integration in the classroom. He is also familiar with, and highly supportive of, learner-centered approaches. Discipline is a major emphasis of the school's principal; the school evidently has had behavior problems in the past. The principal does not appear to be as current on pedagogical and technology trends as the assistant principal. Nonetheless, he has expressed support for the ATRL project.

Teachers. The site school has a total of 57 teachers and aides. The faculty's tenure is long and stable. The faculty appears to be close-knit and hard working; teachers seem to have a good working relationship with the principal. Although the student body is diverse, the faculty is extremely homogeneous. The majority of teachers are white, female, middle aged, and Cajun, with a small number of black teachers and one black administrator. The faculty's racial composition is unusual for schools within the parish; other schools with a similar student racial composition appear to have a more diverse faculty.

Student body. The student body of the site school is more diverse than the community, with many students commuting by bus from the neighboring urban area. Of a total of 1,061 students, 50 percent are white, 48 percent are black, and 2 percent are "other" (Hispanic, Vietnamese and mixed race). Based on the demographics at the school's elementary feeder school, the black population of the middle school should increase significantly within the next few years.

The site is a Title I school and has been identified as "at risk" because its test scores fall in the bottom 20th percentile of parish scores. Seventy percent of the student body receive free or reduced lunch.

Technology resources. The parish is one of five state Technology Innovation Challenge Grant recipients. Within the district, Challenge Grant staff have worked with parish schools to run computer wires and provide Internet drops in 40 schools parish wide. Several parish schools also use Title I funds to support technology integration. In the fall of 1998, several schools (including the site school) will serve as Educational Management Group (EMG) pilot sites. EMG is an Arizona-based educational broadcast company that provides custom curriculum and educational videos via satellite link to participant schools. The parish offers basic and some advanced technology training to all of its teachers and administrators in email, Microsoft Office, HyperStudio, and Netscape web browser.

The parish technology plan includes the creation of "model classrooms" — classrooms with "cells" of computers and attendant hardware. According to this vision, model classrooms will have four networked computers, a printer, scanner, TV/VCR and

display device. Currently certain classrooms in each school are being targeted as models. The idea is that eventually all classrooms will adopt this structure.

The parish has a full time district technology coordinator who provides software training for K-12 teachers, and two technicians who serve the entire parish. Currently the parish has no technicians to help individual campuses with technical problems. In the fall of 1998, however, the parish will create zones of schools, with the intention of employing one technician per zone. The parish also has applied for the Universal Fund (e-rate). Presently, the parish has a partial T-1 line. Administrative and instructional uses of the local area network are separated by the systems router.

The parish has a new superintendent who is actively promoting the use of technology — specifically personal computers (PCs) — in parish schools. The parish no longer provides technical support or upgrading for Apple Macintosh computers, and where possible they are being replaced with PCs running Microsoft Windows operating systems and Microsoft Office software. The superintendent also has advocated the use of technology in grades 3 through 12, believing that K-3 is where basic skills are inculcated. Hence, the parish will not support computers in these earliest grades.

The 1997-1998 Quality Education Data (QED) ranks the site school as "medium" in its technology inventory. Every teacher has at least one Apple Macintosh, PC, or Apple IIE in her or his classroom. The school was first connected to the Internet in late fall 1997; presently fewer than 50 percent of the school's computers are connected. Of those connected to the Internet, 37 computers are housed in two labs—one lab has 25 PCs and the other contains 16 Apples: either Power Macintoshes, other types of Macintoshes or Apple IIGs. Twelve teachers have Internet connections, six with four Internet-connected computers each. The school is connected to a Local Area Network (LAN) and the library has two computers with Internet connections. Four additional computers are scheduled to be connected in the near future.

The primary software for the PCs is Microsoft Word, Excel, PowerPoint and Encarta; Grade Book and Accelerated Reader. For Macintoshes, primary software is Claris, Grade Book, and for ten teachers who use Macintoshes, HyperStudio. Teachers use Grade Book to record grades. Students frequently use Accelerated Reader for test taking purposes. The other software packages are used much less frequently by teachers and students.

Teachers who have either PCs or Macintoshes have a number of subject-specific CD-ROMs. Many of the Apple IIEs have no software or are not used by teachers. The primary operating system for PCs is Windows95 while the Macintoshes employ OS Version 7.

Technology goals and concerns. The district's technology plan includes four major goals:

1. To provide access, for both educators and students, "to technologies that are effective in improving student achievement."

2. To provide adequate staff development and support "to help all students learn through technology resources."

3. To provide schools with "modern equipment in classrooms connected to technology resources to bridge cultural, political, economic, and geographic diversity."

4. To make "effective and engaging software and online resources" an "integral part of classroom instruction."

The school also has a technology plan, prepared in November 1997. The plan lists four goals that are compatible with the district's goals: providing technology access to all students, connecting classrooms and the library to the Internet, training teachers "to integrate technology into the curriculum," and improving student achievement in mathematics and language arts.

The issue of managing a one- or two-computer classroom is a major one for project teachers. The school's technology plan includes in-service training for one-computer classrooms.

Project participants

Twenty-five teachers are participating in the project; all are white. As a group, approximately two-thirds of participants have taught for less than ten years. Table 8 illustrates participants' teaching experience in greater detail.

Table 8: Years of Teaching Experience

Years of Teaching Experience	Participants
0-5	9
6-10	7
11-15	3
16-20	3
21+	3
Total	**25**

All but one of the 25 participants are classroom teachers, many of whom teach more than one subject area and grade level. One participant, the librarian, also works with all grade levels.

Three of the participant teachers have self-contained classrooms (two 5th grade and one 6th grade). The remaining teachers teach one or more core subject area, in some cases across multiple grades and in others in only one grade level. There are nine language arts, six science, six social studies, two math, two special education, one computer science, and one home economics teacher.[7]

[7] This number does not equal 25 because some participants teach more than one subject area.

Participants' initial reactions. SEDL first presented the aims of the ATRL project to 45 teachers in March 1998. Though eager for the professional assistance, teachers appeared somewhat nervous about the aims of this project and their roles within it. Despite these concerns, 33 teachers signed letters of commitment to participate in the ATRL project. Because of funding constraints at the district level however, the principal restricted participation in the project to teachers of "major" subject area teachers, dropping the number of participants to 25.

During initial planning meetings with SEDL staff, teachers were enthusiastic about the project but expressed reservations about their own and their students' ability to use technology. Two paramount concerns emerged: managing the non-computer lab classroom and discipline, particularly when such expensive equipment was involved.

Teacher self-assessment in technology

Upon selection of this site, participating ATRL teachers competed a technology skills self-assessment (See Appendix 4). The results of this self-assessment are shown in Table 9.

Table 9: Teacher Self-Assessment of Technology Skills

Skill	None	Low	Moderate	High	Total
General Skills	0	0	18	7	25
Word Processing	1	2	9	13	25
Spreadsheet	12	6	7	0	25
Database	22	3	0	0	25
Drawing	8	5	12	0	25
Presentation	19	4	2	0	25
World Wide Web	1	2	18	4	25
Email	3	13	7	2	25
Other Technology	10	14	1	0	25

The assistant principal reports that teachers are "comfortable" with or at least "willing" to use technology. Almost all have some familiarity with general computer skills, word processing, email and the Internet. The assistant principal reports that 30 percent of all teachers use computers "frequently" and that 90 percent have attended basic training.

From the self-assessment checklists, all project teachers reported a moderate-to-high level of general computer skills. Nearly all teachers reported some degree of familiarity with word processing (96 percent); an ability to use email (88 percent) and to navigate on the World Wide Web (96 percent). Most (60 percent) had some familiarity with other technologies, such as digital display devices and computer-connected TVs. Approximately half expressed familiarity with spreadsheet software, most likely the result of using Grade Book.

While familiarity with word processing and communications applications is high, familiarity with presentation and database is low (24 and 12 percent, respectively).

Table 10: Observation of Classroom Practices

Constructivist Learning Environment	none to low	moderate	high
high	1	0	1
moderate	5	2	0
none to low	14	0	2

Technology Use

Observation of classroom practices

Twenty-five participants were observed teaching for approximately forty minutes at the start of the project. Observations were recorded, entered into an electronic database and results cross-tabulated (A copy of the observation protocol is attached to this report as Appendix 5).

Based on these observations, a majority of classrooms are very teacher-centered, allowing for little autonomy and initiative on the part of students and only minimum degree of collaboration. Overall, in 21 of the 25 classes, students were seated in rows and their participation was limited to short answers and talking out of turn.

Little evidence of computer use was observed during initial classroom visits. Indeed, several computers looked like corpses in a coroner's office — silent and still under a sheet. It appears that technology is used sparingly or not at all in the majority of classrooms. Of the 25 classrooms observed, computers were used in five. In three of the five, they were used as peripheral activities—to take a test or begin either word processing or researching a homework topic. Only in two classrooms—computer science and Louisiana history—were they truly integrated into classroom practice.

Low CLE and Low Technology. In the 14 classrooms identified as such, instruction was worksheet, short answer and lecture-based. Typically, the teacher began the class by having students answer homework questions aloud while correcting their own work. This was followed by either a teacher lecture or students reading aloud from a textbook. Students were then asked to answer either textbook chapter questions or fill out a worksheet. In observations of 13 of these 14 classrooms, there was no student interaction. In the one exception, two students stood in front of the class and recited an Abbott and Costello comedy routine in preparation for 8th Grade Awards Night. In all of these classrooms, students were seated in rows. Resources in such classrooms tended to be traditional: textbooks, notebooks and the chalkboard.

Moderate CLE and Low Technology. Five classrooms were identified as moderate CLE and low technology. Materials tended to be traditional for the most part: textbooks, notebooks, and chalk board, supplemented in some cases by non-traditional materials such as math manipulatives. In three of these classrooms (all science classrooms), students were seated in rows but engaged in some level of collaboration, either on an activity or on a test review. Within these classrooms, the teacher attempted to serve as a facilitator, but this role, and the student autonomy it should generate, was evident in only one of the three classrooms. This collaborative activity extended for the entire period in two of the three science classrooms. In the third classroom, students took a

written test individually once the collaborative activity was completed. Though all of these classrooms had computers, technology was not employed in any of the activities.

Of the remaining two classrooms identified as moderate CLE and low technology, one was a mathematics class and the other home economics. In the former, students, seated in rows, created geometric shapes using manipulatives. The teacher first created each shape and then students, collaborating and consulting with one another, designed their shapes. The teacher stood at the front of the room, never circulating among students. In the home economics class, students sat in groups and alternated between working collaboratively and individually on their sewing. Students frequently clustered around the teacher soliciting her advice and input on both the process and product. Though computers were present in both classrooms, they were not employed in any part of the activity.

High CLE and Low Technology. Only one classroom was identified as such. This 6th grade mathematics class used "connected math" — a hands-on, inquiry-based form of math where students created geometric shapes by cutting out pieces of colored paper and gluing them onto grid paper. Unlike its 5th grade counterpart mentioned above, the teacher in this class served as a facilitator, circulating among groups of students and eliciting their knowledge through questions that drew upon prior knowledge and meaningful experiences. For example, she referred to a dog owned by one of the students and whether in building a pen for the dog more fencing would be necessary for a trapezoid or rectangle. The teacher encouraged student questioning and autonomy and even asked a group of students to teach geometric concepts to the SEDL observer. There were no computers in this classroom, though the teacher reported that she takes students to the computer lab once a week to reinforce math skills in preparation for the Louisiana Educational Assessment Program (LEAP) test. While the materials used by students were traditional—construction paper, glue and scissors, they were used in a non-traditional manner in order to facilitate understanding of certain geometrical concepts.

Moderate CLE and Moderate Technology. Two classrooms were identified as moderate CLE and moderate technology. In one classroom, the first half of the class period was teacher-directed with the teacher lecturing while students took notes. For the second half of the class, students formed groups in order to continue working on a literature notebook. The teacher circulated among groups listening to and observing each group, and providing information only when asked. When students finished a certain part of their assignment, they were allowed to individually use one of the four classroom computers to conduct additional research using the Internet or Encarta.

In the second classroom, students read aloud from *The Diary of Anne Frank* with the teacher assuming the narrator role (although not every student had a reading part). After a certain amount of time, students formed groups and worked collaboratively on their poetry notebooks. As with the classroom above, individual students were allowed to use one of four computers for Internet research or word processing, once they had completed a certain portion of their assignment.

Low CLE and High Technology. Both the librarian and computer science teacher were identified as low CLE and high technology. While all four library workstations were

being used by students for research purposes, the librarian had almost no interaction with students except to admonish them on proper behavior. In the computer science class, held in the Macintosh lab, students worked individually on a variety of projects. Though they spent the entire period on a variety of computer-based activities (e.g., spelling words, writing a story, creating art for the yearbook), students worked silently with no input from other students or from the teacher. All assignments were teacher-generated and there was no attempt to identify and build upon prior knowledge, encourage student initiative or make the activity meaningful for students.

High CLE and High Technology. Only one classroom was identified as high CLE and high technology. In this 8th grade Louisiana history class, students worked together in groups to create a HyperStudio project on some aspect of Louisiana history. All projects were to be collated into a student-created Louisiana textbook. In this class, students collaborated as they worked on their project and negotiated the "staffing" of the project: some group members worked at their desks while others worked at one of the four Macintoshes. it was evident from this dynamic of highly active and focused students and teacher-as-guide that the activity was meaningful for students.

Based on teacher-student conversations and on student projects they showed to SEDL staff, it appears that more learner-centered approaches may be in use than were evident during the observations. One 6th grade science teacher provided examples of group projects while another made references to group activities that had occurred earlier.

From the initial observations, the younger teachers as a whole seemed to use more traditional approaches than the more experienced teachers. Teaching practices also appeared to vary according to department. The special education teachers were lecture-oriented in spite of the lack of responsiveness on the part of their students. The science teachers — as evidenced by references to projects and by the student work on walls outside their classes — seemed to use more active approaches.

State of the Site: New Mexico Site

The New Mexico site is a middle school in a large, rural school district in the south central part of the state. The site was chosen because of its desire to begin integrating technology into the classrooms and its early efforts to put together an infrastructure to support their effort. In addition, the principal strongly supports the project and wants to bring technology to the school along with learner-centered instructional practices. Over the next two years, the district school board wants to observe how the project is implemented and possibly use it as a "seed" for its long-range plan for technology integration across the district.

The community and environs

The school is located in the Mesilla Valley, an area that stretches northward from El Paso to Las Cruces. The Rio Grande River traverses the valley and is the primary source of water. The Franklin Mountains and the interstate highway form the eastern boundary of the valley. Except for the lush green vegetation from the crops along the Rio Grande, the landscape is mostly rocky terrain with minimal vegetation.

Several small towns make up this rural community whose economy and lifestyle are shaped primarily by its agricultural heritage. Most of the population of approximately 17,000 live along the Rio Grande Valley, with agribusiness dominating the economic base. According to the 1990 Census, 80 percent of the population is Hispanic and 17 percent is white. Over two-thirds of households speak Spanish as their first language. Median household income, according to census data, is approximately $13,000, with 79 percent of households receiving public assistance.

In addition to agricultural and related industries, the railroad industry, a large food processor, a federal correction unit, and the local school district provide jobs for the majority of residents. New economic development is minimal and the taxing capacity is constrained by the high level of public land and greenbelt exemptions.

State support for technology

In 1994 the New Mexico legislature required all school districts to submit a strategic plan for integrating technology into the learning process. Upon approval of each district's technology plan, the New Mexico Council on Technology in Education and the State Department of Education allocated monies from the fund. The legislature has granted $3.1 million to the technology fund each year since 1994. On average, this amounts to about $9-10 per pupil.

With support from the New Mexico Council on Technology in Education, the state department of education facilitates the statewide planning process for integrating technology into the learning process, assists school districts to develop long-term strategic educational technology plans, and makes monetary distributions to school districts. The department also coordinates the state's Technology Literacy Challenge Fund Grant and other technology-related education activities.

School districts are required to submit annual updates and progress reports about their educational technology planning and implementation. Criteria used to evaluate a technology plan include curriculum enhancement, installation and connections, and ongoing maintenance. State officials are also working to develop "teacher competencies" in technology. The standards would establish what teachers should know about equipment and using technology in the classroom. Each district will determine how they will implement these standards.

Another statewide initiative is Regional Educational Technology Assistance, (RETA) a partnership created to develop the capacity of New Mexico's school districts to integrate technology into classrooms. The program's mission is to establish, at both local and regional levels, an infrastructure of teachers who are familiar with educational technologies and their uses. The site school has asked some of its teachers to participate in the RETA initiative during the 1998-1999 school year. A proposal for a federal Technology Innovation Challenge Grant was submitted to extend this project beyond the current school year.

District overview

The school district serves the 11 small communities in this area. Approximately 98 percent of students ride to school on buses. The school district itself is the single largest employer within these communities, employing about 1,500 people. The district has the lowest bonding capacity per student and the highest tax rate among the largest districts in the state, with the present bonding at 100 percent capacity.

With an enrollment of approximately 12,500 students in 17 schools (two high schools, three middle schools, and 12 elementary schools), the district is the state's fifth largest. The student population is over 90 percent Hispanic. At least one-third of those students are Spanish language dominant when they enroll. Seventy-eight percent of families fall into low income or poverty levels, and every school in the district has a Title I designation.

Description of school site

Facilities. The school is one of three middle schools in the district. The building is low, flat and spread out. The building inside is much like the outside, simple with few adorning elements. It is clean and well kept. The school library is centrally located in the building and is used frequently for meetings and special events. The gym, two smaller permanent buildings with classrooms, and tennis courts extend to the side and back of the main building. Beyond an exterior fence at the back are the district warehouse and other utility buildings. The district food services office adjoins the cafeteria and has a separate outside entrance. The district's administrative offices are located adjacent to the middle school's main building.

Administration. The principal, a white female, has been at the school for three years. She appears to have a good rapport with the teachers, students, and staff. Two assistant principals, both Hispanic males, are responsible for discipline, the facilities and supervision of the technology installations.

The principal expressed support for the goals of the ATRL project. She noted during initial contact with SEDL staff that participation in the project would provide the opportunity to distribute technology resources throughout the campus rather than concentrating technology in the computer lab.

Teachers. The school employs 67 teachers. A majority are white; a smaller but significant percentage are Hispanic. In general there is a high rate of turnover among teachers at the site that the principal attributes to opportunities available in nearby, more prosperous school districts.

Student body. The school has a student population of approximately 970 students in grades 7 and 8. The student population is over 90 percent Hispanic and 78 percent receive free or reduced lunch.[8] The principal reports that, overall, students' academic performance is very low and that the dropout rate is extremely high after the 8th grade.

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[8] 1997-1998 Quality Education Data provides Title I information at the district level only.

Technology resources. A new Assistant Superintendent for Special Projects is taking the lead in the district to establish a comprehensive technology program and obtain funds and support from various sources. She works with the local state university to coordinate Technology Literacy Challenge Fund Grant activities and will serve as the key contact for the ATRL project.

A district technology coordinator will participate in making technology decisions regarding software and hardware and will participate in training delivery at the district level. The district computer laboratory, located adjacent to the technology coordinator's office, is equipped with 18 high level multi-media computers and is available for training of school personnel.

At the beginning of the 1998-1999 school year, the district began implementation of a technology infrastructure, establishing in each school (a) technology planning teams, (b) mentor teachers, selected for their technology skills, (c) a curriculum coordinator who assists teachers with aligning curriculum to the district's standards, (d) a technology support person who assists with trouble shooting of both hardware and software, and (e) a "tech-squad" of students to be chosen by the mentor teachers.

During the 1997-1998 school year, 21 district teachers from the five secondary campuses were trained as the core technology experts for their schools. This training was supported with a Technology Literacy Challenge Fund Grant and assistance from the local state university. During the 1998-1999 school year, the district will partner with the same state university in a Goals 2000 Technology Literacy Challenge Fund Companion Grant. This grant provides $50,000 for staff development, $50,000 for equipment, and $40,000 for substitutes. The district's technology teams and principals will receive 36 hours of computer training. The middle school principal is attending these training sessions.

The 1997-1998 Quality Education Data (QED) ranks the site school as "medium" in technology. In the middle school, there are three computer labs for teaching keyboarding and basic computer applications. The principal plans to dismantle one computer lab with personal computers (PCs) with 486x processors and distribute the machines to individual classroom teachers. There is also a Title I reading lab with networked PCs with 386x processors that will remain intact. Three computers in the library are wired for the Internet and are waiting for an external connection to a telecommunications provider. One multimedia computer is available for using resources available on CD-ROM. The card catalog can be accessed via three computers. Three VCRs and ten overhead projectors can be checked out to individual teachers. A laser disc player and several miscellaneous CD-ROM titles are also available. Each classroom has a TV monitor connected to Channel 1, which broadcasts worldwide news to classrooms every morning.

There is no general access to the Internet or to email at this time. However, one science teacher has a telephone line with a private Internet provider service. Plans are to connect the school library during the fall semester. As a whole, the school is wired with Ethernet connections but lacks the connection to an external communication line. There is hope that discounts from the Universal Service Fund (e-rate) will help fund these connections.

All of the participating ATRL teachers were equipped with a computer in their classrooms at the beginning of the school year; seven teachers had computers in their classrooms prior to this time. These teachers obtained their computers by participating in another sponsored educational technology program, by receiving grant money, or through donations. New computers were ordered during the summer of 1998 for the ATRL project participant teachers and for technology team members in other district schools. Computers for all teachers in the school district will be ordered at a later time. Since the middle school principal believes in the "each one teach one" concept, those teachers who are participating in the ATRL project are expected to help non-participating teachers learn how to use the computer once they have them in their classrooms. A recent donation from a local hospital of about 90 computers will be upgraded (if possible) to provide extra computers in classrooms. The district has selected Microsoft applications to be used across the district. This includes Microsoft Works, Microsoft Publisher and Microsoft Office.

A full-time technology coordinator at the school has been assigned to help teachers with their technology needs. A curriculum coordinator, who is part time and has no teaching duties, is assisting classroom teachers in aligning their instruction to the district's standards. Six teachers have been designated as technology mentors; each will choose two students to become part of the school's "tech-squad" to take care of minor troubleshooting. Two teachers will be selected to participate in the RETA project. The principal has pledged funds generated by the vending machines for purchase of technology software and supplies.

Technology goals and concerns. The district's Educational Plan for Student Success lists three major "teaching and learning" goals. The third of these goals specifically addresses technology use: "Students will improve performance in literacy and oral communication skills through instructional technology integration." Another goal focuses on communication, both internal and external to the district; within this broad area are objectives and strategies addressing Internet access.

Project participants

The 25 teachers participating at this school are quite diverse. Ten teachers are Hispanic, 14 are white, and one is black. Though slightly more than half have been teaching for under five years, a significant portion (39 percent) have been teaching for at least 11 years. Table 11 provides a more detailed description of the varying years of teaching experience.

Table 11: Years of Teaching Experience

Years of Teaching Experience	Participants
0-5	14
6-10	2
11-15	4
16-20	3
21+	4
Total	**25**

In addition to the 25 classroom teachers, the technology coordinator, curriculum coordinator, and school librarian will attend professional development sessions. Since they do not have classroom-teaching responsibilities, no classroom observations will be conducted for them. All of the teachers either volunteered or were asked by the principal to participate in this project. In both cases, teachers signed a commitment form to actively participate in the project for two years.

Twenty of the 25 participants teach core curriculum courses in either grade 7, grade 8, or both grades. Six teach language arts, six mathematics, five science, and three social studies. The remainder teach special education, reading, physical education, and English as a second Language.

Teachers of core subjects are organized into five-member, cross-functional instructional teams with the same planning period. For example, a 7th grade or 8th grade instructional team will be comprised of an English, reading, math, science, and social studies teacher. In some teams, all members are participating in the ATRL project. In others, as few as three members are participating. Special education teachers also form an instructional team. Initial observations indicate that some teams appear to work well together in planning instructional activities and sharing resources while others come together only to plan certain student or school activities.

Participants' initial reactions. Teachers feelings about participating in the ATRL project were as varied as teachers themselves. Generally, teachers were skeptical that they would receive a classroom computer; some were concerned with their lack of skills. However, most were excited about being the first recipients of computer technology in their school and about learning more about constructivist teaching and learning.

Teacher self-assessment in technology

Upon selection of this site, participating ATRL teachers competed a technology skills self-assessment (See Appendix 4). The results of this self-assessment are shown in Table 12.

Table 12: Teacher Self-Assessment of Technology Skills

Skill	None	Low	Moderate	High	Total
General Skills	0	0	8	17	25
Word Processing	1	3	5	16	25
Spreadsheet	9	2	10	4	25
Database	14	2	0	9	25
Drawing	9	2	5	9	25
Presentation	12	4	5	4	25
World Wide Web	8	2	5	10	25
Email	8	5	6	6	25
Other Technology	9	11	4	1	25

Based on this self-assessment, all teachers reported either a moderate or high degree of familiarity with general computer skills and almost all some degree of familiarity word processing software. Approximately two-thirds of the teachers expressed some level of familiarity with spreadsheet software, drawing programs, the World Wide Web, email,

and with "other" technologies, such as display devices and digital cameras. As opposed to teachers in other ATRL sites, slightly more than half of New Mexico site teachers reported familiarity with electronic presentation software.

Table 13: Observation of Classroom Practices

Constructivist Learning Environment	none to low	moderate	high
high	1	2	1
moderate	4	5	0
none to low	10	2	0

Technology Use

Observation of classroom practices

Twenty-five participants were observed teaching for approximately 40 minutes at the start of this project. Observations were recorded, entered into an electronic database and results cross-tabulated (A copy of the observation protocol is attached to this report as Appendix 5).

Low CLE and Low Technology. Ten classrooms were identified as low CLE and low technology. In these classrooms, teachers primarily utilized teacher-directed activities (from the front of the room) with very little student collaboration, problem-solving activity, or use of multiple materials and resources. Working individually on assignments and problems from the classroom textbook or worksheets was a common strategy observed. Technology use in this category was typically the computer placed in a non-accessible location in the classroom, often covered with plastic or cloth.

Moderate CLE and Low Technology. Four classrooms were classified as such. In these classrooms teachers used small group activities. While students might exchange some ideas on an assignment, student work was individually assessed. Students were frequently observed engaging in social conversation rather than discussing class assignments. Technology use in this category was typically the computer placed in an accessible location in the classroom, turned on and with a screen saver visible, but not being used by the students or teacher.

High CLE and Low Technology. One classroom was observed to be high in constructivist practice and low in technology use. This teacher used collaborative groups of students for project work. The teacher constructed the lesson by eliciting students' prior knowledge and experiences, allowing students to discuss relevant ideas, and presenting a problem and soliciting possible solutions. The teacher had just received a classroom computer a few days earlier and was eager to use it for class projects.

Low CLE and Moderate Technology. Two classrooms were observed to be low in constructivist practice and moderate in technology use. These teachers approached classroom instruction in a traditional way with instructor-led activities and individual deskwork. Students used computers for copying written assignments into word processing software.

Moderate CLE and Moderate Technology. Five classrooms were observed to be moderate in both constructivist practice and in technology use. In some cases these teachers used small group activities in the classroom. While students might exchange some ideas on an assignment, student work was individually assessed. At times students were engaged in social conversation rather than discussing class assignments. Students used computers primarily for copying written assignments with word processing software. In one classroom math students were observed using a spreadsheet while in another they used a constellation tracking software application. In general, when the computer was used for an activity, on-task collaboration between students increased. In two classrooms, the teacher helped a trio of students with a class project while in the other three, pairs of students worked together on a class assignment.

High CLE and Moderate Technology. Two classrooms were observed to be high in constructivist practice and moderate in technology use. In these classrooms, teachers frequently utilized small group activities. These activities included groups working on the same activity and groups working on multiple activities. In all cases, desks were arranged to accommodate discussion and group work. Furthermore, a variety of materials and resources were made available. Teachers in this category either had multiple computers in their classroom or had prior experience using computers in a classroom environment. Students used computers to write reports, compose letters, and make journal entries.

High CLE and High Technology. One classroom was observed to be high both in constructivist practice and technology use. This classroom was designed with several work areas, one being the computer area. One area was for materials and resources and another larger area included table groupings to accommodate small group or individual work. Three computers and a printer were available for student use. Students were observed working on different projects, some in small groups and some individually. While the computers were used primarily for a variety of word processing projects, students composed and edited directly on the computers. They also used graphics to enhance their project.

State of the Site: Oklahoma Site

This site in northeastern Oklahoma is the second of two that involve multiple schools. In this case, 25 teachers from a cluster of five PK-8 schools are participating. These schools are unique in that each is its own school district. All of these schools feed into one of two high schools in the same county.

Several factors contributed to the selection of this site, including the schools' relative lack of wealth compared to that of other schools in the state and the presence of technology resources on which project activities can build. In addition, the administrators of these schools are eager to improve the quality of instruction, and participating teachers have expressed a desire to learn to use computers in ways that will improve student learning.

The community and environs

This cluster of schools is located in an economically depressed rural county in the western foothills of the Ozark Mountains. The main industries of the area are a regional state college and numerous plant nurseries, as well as tourism related to two large nearby lakes. The median household income of the county is approximately $17,000. Slightly more than 12 percent receive public assistance.

According to the 1990 Census, 65 percent of the county's approximately 34,000 residents are white and 33 percent American Indian, primarily Cherokee. The American Indians of this region seek to preserve their heritage, in spite of the low proportion (3 percent) that speak Cherokee as their first language. Many serve on school boards and in city and county governments.

State support for technology

The Oklahoma State Department of Education produced an instructional technology plan in late 1996 that districts have used to guide the development of their own technology plans. The only state-sponsored technology initiative that impacts this site is a statewide telementoring program in which teachers were selected to provide telementoring support to teachers from other areas. One of the two local site facilitators was selected as a telementor and has received training, hardware, and materials to support telementoring activities.

District overview

As noted earlier, these five schools are unique within the ATRL project in that each constitutes a separate and autonomous school district. There are ten elementary schools within the county, each one organized as a separate school district. All ten feed into one of two high schools. The county's depressed economic status has translated into a relatively poor tax base. However, the school districts have become skilled in planning for and obtaining federal funds to support educational improvement.

Almost all the schools in the county serve a predominantly American Indian population; the proportion of students who are American Indian ranges from a low of 45 percent to a high of 80 percent. The county's poverty rate averages approximately 25 percent. Seventy-eight percent of students qualify for free or reduced lunches.

Description of school sites

Facilities. In the absence of a strong supporting tax base, almost all facilities in these schools have been built from funds derived through federal programs. One of the two smallest schools has two main classroom buildings, the older of which consists of several patchwork additions to the original structure. One classroom is located in a basement room accessed by going through a maintenance closet and down a narrow, winding wooden staircase. The largest school has five buildings, all but one of which have had rooms added as necessitated by increased enrollment. All of the facilities are kept clean and attractive by maintenance and teaching staffs.

Administration. In four of the five participating schools, the superintendents also function as the school principal. All five are former teachers from the area. To help overcome the lack of resources, the superintendents have developed strong working relationships among the self-governing districts.

Teachers. The five schools employ a total of 124 teachers, with the faculty size ranging from a low of 15 teachers to a high of 48. Most teachers are white; a small number are of Cherokee ancestry.

Student body. The five schools serve approximately 1,860 students from pre-PK-8. Overall, 62 percent of students are American Indian; two percent are Hispanic and black. All five schools receive Title I funding. The American Indian population ranges from a low of 45 percent to a high of 79 percent across the five sites.

Technology resources. The 1997-1998 Quality Education Data (QED) ranks four of the five participating site schools as "medium" and one as "high" in numbers of computers available to teachers and students, as elaborated in Table 14. In spite of the relative poverty of these school districts, all have substantial computer technology, a result of foresight and careful planning by administrators and involved teachers. Each school has at least one networked computer lab, consisting of current models with more than adequate speed and memory for any software application common to educational use. All schools are in the process of improving their technology capabilities as their limited funds permit, leading to some awkward interim situations such as having mixed platforms, partially finished networks, and unequal distribution of available classroom computers.

Table 14: Technology Overview of Oklahoma Site Schools

	Number of Networked Labs	Computers in Most Classrooms	Classrooms Networked
School 1	1	yes	yes
School 2	1	no	no
School 3	1	yes	no
School 4	2	yes	yes
School 5	3	no	yes

All of the project schools use their labs for computer-assisted instruction, primarily in the form of game-environment drill and practice software focused on mastery of basic content skills and knowledge. All five schools have T-1 access to the Internet in at least one lab; however, few teachers feel comfortable allowing their students to use the Internet due to lack of training and concerns about inappropriate material.

Joint planning among ten school districts in the area has resulted in Goals 2000 grants. These funds were used for instructional planning and technology training for teachers in three of the participating schools.

Technology goals and concerns. The school districts, including the five site schools, cooperatively developed a comprehensive technology plan for all of the elementary schools in the county. This plan, completed in 1997, lists seven major goals:

1. To establish "an effective, efficient computer network" that meets both instructional and administrative needs and that is adequately supported by personnel and services.

2. To assure computer access for teachers and students in every classroom.

3. To assure access to "effective software and on-line learning resources."

4. To provide "a fully integrated technology curriculum."

5. To assure that all teachers receive "adequate and appropriate professional development on a continuing basis."

6. To apply technology in ways that facilitate effective administration and communication.

7. To use technology for community outreach, promoting parent involvement and lifelong learning.

Technology concerns vary according to site. One school, in particular is concerned about reconciling the need to maintain tight network security with unrestricted teacher access to the network. Across all sites, superintendents and teachers are concerned with learning strategies for using technology to improve student learning.

Project participants

The number of participants from each school ranges from a low of three teachers in two of the schools, to a high of eight teachers from the largest participating school. The majority of teachers have been teaching for five years or less. A more detailed break down of teaching experience among the participants is shown in Table 15.

Table 15: Years of Teaching Experience

Years of Teaching Experience	Participants
0-5	14
6-10	6
11-15	3
16-20	1
21+	1
Total	25

Sixteen teachers in the Oklahoma site teach in self-contained elementary classrooms. Two teach pull-out classes, one for gifted and talented students in grades 6-8, another for state-mandated special courses such as drug awareness and problem resolution. One teacher has several social studies classes in grades 7 and 8 in addition to a math

class and a physical education class. Six have predominantly computer lab instruction responsibilities, one of whom is on leave from her classroom for one year to work on special projects.

Participants' initial reactions. The desire to learn more about integrating technology into their classrooms was the primary teacher motivator for participating in the ATRL project. Twenty-five teachers signed letters of intent to join the ATRL project. Teachers' comments during the interviews and observations suggest tension between the desire to learn new ways of using technology and current priorities, particularly concerns about addressing standardized test requirements.

Computer lab managers in two schools expressed the desire to work with teachers to use the technology for more than CAI, but appeared to be unaware of how to do so. The lab manager in yet another school described herself as satisfied with CAI but expressed an openness to learning more about other ways of using the lab equipment.

Teacher self-assessment in technology

Upon selection of this site, participating ATRL teachers competed a technology skills self-assessment (See Appendix 4). The results of this self-assessment are shown in Table 16.

Table 16: Teacher Self-Assessment of Technology Skills

Skill	None	Low	Moderate	High	Total
General Skills	6	1	11	7	25
Word Processing	8	3	6	8	25
Spreadsheet	13	6	6	0	25
Database	19	5	0	1	25
Drawing	11	1	11	2	25
Presentation	20	2	3	0	25
World Wide Web	8	2	10	5	25
Email	7	10	7	1	25
Other Technology	18	6	1	0	25

All of the schools have provided training in the technical use of the computer, but virtually none have provided staff development in its use for teaching and learning beyond CAI programs or keyboarding. Teachers in at least two schools complained of having been taught how to use Internet browsers before they had access to the World Wide Web, and with no connection to instructional context.

Most teachers expressed some level of familiarity in terms of their general computer skills and in word processing. Many teachers also appear to be familiar with such communications programs as email and the World Wide Web—72 and 68 percent of responses, respectively. In keeping with assessment results at other ATRL sites, the Oklahoma participants appeared to be least familiar with presentation software (only 20 percent reported familiarity), other technologies (28 percent expressed some level of familiarity) and database software (24 percent).

Observation of classroom practices

Twenty-five participants were observed teaching for approximately 45-60 minutes at start of the project. Observations were recorded, entered into an electronic database and results cross-tabulated (A copy of the observation protocol is attached to this report as Appendix 5).

Table 17: Observation of Classroom Practice

Constructivist Learning Environment	none to low	moderate	high
high	2	0	1
moderate	5	2	3
none to low	6	2	4

Technology Use

Low CLE and Low Technology. Six classrooms were classified as low CLE and low technology. The three teachers who expressed considerable concern about preparing students for the state-mandated PASS test appeared to have the most rigid routines in their classes; their students seemed to lack enthusiasm. These teachers lectured and students answered rhetorical questions. In interviews immediately following the observation, one of the three teachers said she felt she had no time to teach or do anything with her students that was not focused directly on bringing up test scores. The other two seemed less concerned with the urgency of raising scores, but accepted the PASS test as the norm for what was to be taught, leaving little room for anything else. (Although all administrators were concerned with state-mandated test scores, conversations with the principals and other teachers suggest that the preoccupation with the test is largely a matter of personal perception in teachers. Some teachers spoke with indifference about the test, yet still appeared to have the support and approval of their principals.)

Moderate CLE and Low Technology. Five classrooms were observed to use predominantly direct instruction strategies, interspersed with some techniques that encouraged individual reflection and problem solving. Initial observations revealed that most classrooms in the lower grades have many manipulative resources, but few were used in exploratory or inquiry activities. Students in three classes used manipulatives in the observed class period; the instruction, however, was primarily teacher-directed.

High CLE and Low Technology. Two classrooms were observed to use methods that depended on students' application of prior knowledge to build understanding of new information. One of these teachers utilized multiple strategies for organizing students, which grouped learners differently and challenged them to think about new content in several different ways. Neither of these teachers was observed to use a computer for any aspect of the instruction.

Low CLE and Moderate Technology. The two classrooms in this classification used few, if any, constructivist strategies in their instruction. While the teacher noted student

comments, instruction was not adjusted to capitalize on students' expressed prior knowledge. The classrooms were arranged in rows of desks. Classes were focused on teacher-talk, with students responding mostly to rhetorical questions. The classes were well behaved and students seemed attentive to the teacher's instruction. Both classes were using the one computer in the room for Accelerated Reader program testing. This activity was isolated from instruction directed toward the rest of the class.

Moderate CLE and Moderate Technology. Two classrooms were observed using constructivist practices to encourage learners to reflect on prior knowledge and construct knowledge accordingly. Their overall methodologies, however, still had all students working on the same tasks at the same time, with the exception of one or two students who were using the one computer in the classroom to take Accelerated Reader tests.

Low CLE and High Technology. The four classrooms in this group were all computer lab settings in which teachers employed direct instruction techniques to teach basic skills to the whole class at the same time. While some students were allowed to select which CAI program to work with, and were able to work at their own pace, few opportunities existed for students to ask or pursue their own questions, or to apply that which they already knew toward creative procedures or products.

The computer lab manager in one of these schools stated that she would like to move toward an open-lab environment in which students come to the lab to use the computers as tools for problem solving and construction. However, the technology coordinator responsible for construction and maintenance of the school network has configured the computers only for CAI purposes and reportedly resists modifying the function or structure of the lab. Teachers are not allowed to access the hard drives of the computers in their rooms or to modify the configurations in any way.

Moderate CLE and High Technology. Three teachers in one school who work closely with each other were classified in this same grouping due to their innovative practices regarding the use of computers. Two teachers team-taught in a lab setting as students worked on keyboarding and software skills. The teachers acted as facilitators to assist students in thinking through problems as they encountered them. The other class was engaged in similar skill building activities with the teacher playing a similar facilitator role.

During interviews immediately following observations, each described the desire to plan activities collaboratively and to attempt more innovative practices. The moderate CLE ranking reflects mostly direct, whole-group instructional strategies applied in a very open environment in which learners are encouraged to think for themselves to solve problems.

High CLE and High Technology. Only one of the 25 classrooms could be characterized high in both domains. The class consisted of eight 7th grade gifted and talented students. Instruction involved individually produced student PowerPoint presentations relating to some topic of research. The high ranking in technology use reflected the utilization of eight computers to conduct research on the World Wide Web and to prepare interesting and informative electronic presentations. The high ranking in

constructivist practice resulted from the teacher's use of ill-structured problem strategies and the expectation and reinforcement of group involvement, even though the products were individualized.

State of the Site: Texas Rural Site

This site is an elementary school in a largely Hispanic, low-income agricultural area of Texas. The district was selected for the ATRL project because of its past experiences with technology and commitment to improving teaching and learning with the support of technology. Within the district, this school was selected because of its supportive and proactive principal, past experiences implementing technology, a parent involvement project focused on technology, and a partnership with a local university. Another contributing factor to selection was the recognition by district and school staff that more teacher training and support was still needed.

The community and environs

The school serves a small community west of El Paso, along the banks of the Rio Grande River. The Mexican American Legal Defense Fund has identified the town as containing one of the poorest census tracts in Texas. The primarily agricultural community is located near a major interstate highway. Small, locally owned and franchise businesses are clustered on either side of the town's main road. Widening of the interstate is expected to make the region more desirable to developers. The tax base and tax revenues for the district are increasing with new industrial growth in the area.

According to the 1990 Census, the community of 4,500 is comprised mainly of residents of Hispanic origin (83 percent). The remaining 17 percent are white, non-Hispanic. Seventy percent of households speak Spanish as their first language. The median household income of the community is approximately $18,000. Fifteen percent of households receive public assistance.

State support for technology

Three state agencies in Texas are involved in the area of technology and education. The first is the Texas Education Agency, which has developed a long-range plan for technology and a new set of state curriculum standards. Since September 1992, all school districts in the state have received a technology allotment (currently $30 per student) for the purchase of technology equipment, materials or training in support of the goals of the state's long-range plan. The new state education curriculum standards were adopted in September 1998. They establish expectations for technology proficiencies by students in K-12, including computer-related skills for each high school graduate by the year 2000.

Another source of state funding for technology is the Telecommunications Infrastructure Fund (TIF), created in 1995 through legislation requiring telecommunications companies to contribute to school technology. The funds were targeted to pay for wiring, networked connections to the Internet, and computers for classrooms, especially for rural and low-income schools. Public schools applied for this

non-competitive funding. The district was one of 629 schools or districts approved for funding in fall 1997.

The State Board of Educator Certification (SBEC) has encouraged teacher pre-service programs to create curriculum promoting the adoption of learner-centered practices and proficiency requirements for in-service teachers.

District overview

For many years, schools in this community were part of the El Paso Independent School District. In 1959 the people of the town voted to establish their own school district. Due to its low tax base, the district has the lowest per pupil allocation in its region.

In 1997-1998, approximately 4,600 students were enrolled in the district's seven schools, an increase of approximately 700 students within the past three years. The regular high school (grades 9-12) has 1,055 students; the alternative high school has 25 students, and the middle school (grades 7-8) has 600 students. Enrollment in the four elementary schools (grades PK-6) ranges from 550 to 820 students. Hispanic students comprise 91 percent of the district's student population; 8 percent are classified as white.

According to the 1997-1998 Quality Educational Data (QED), 58 percent of the district's students are college-bound. Fifty-three percent of students are classified as at risk and 42 percent are identified as having limited English proficiency. At all campuses, the entire student population qualifies for free and reduced lunch. Each campus at the district has been declared a Title I campus by the state education agency.

Description of the school site

Facilities. In 1994, district residents approved a $10 million bond issue. A portion of these funds was allocated for construction of a new building for the school. Construction of the new school building was completed in 1998. The new building houses the first through third grades, special education, school administrative offices, cafeteria and library. In the old building, there are 52 classrooms, with 33 in use at the start of the 1998-1999 school year. The old building also contains office space, a book room, a tutoring room, and a playroom.

Administration. The principal, a Hispanic male, has been at the school since December 1996. The assistant principal, a black male, began working at the school full time in August 1997. Both administrators are supportive of both students and teachers.

Teachers. The staff at the school is comprised of 43 teachers, three professional support personnel, two campus administrators and 12 educational aides. Sixty percent of the staff is classified as minority. The average number of years of experience teaching is 8.9.

Student body. The site school serves grades PK-6. In 1997-1998, 94 percent of the school's 686 students were Hispanic; all students were classified as economically disadvantaged and 53 percent as limited English proficient. Bilingual education is a major academic focus at the school.

Technology resources. The 1997-1998 Quality Education Data (QED) ranks the site school as "medium" in technology. The district created a technology department in 1992. Last year the technology department was comprised of a director of technology, a lead teacher for technology, a technology specialist, three technicians and a secretary. In addition, each campus has a full time technology specialist.

In 1996, the district created the position of lead teacher for technology to provide assistance to classroom teachers in the use of technology. The lead teacher works with other teachers throughout the district on using technology in their classrooms with their students. She works with teachers one-on-one, models teaching with technology, reinforces professional development, and sets expectations for the use of technology.

The new school building is completely networked for technology, with four multimedia computers and a printer in each of the 18 new classrooms, and 12 multimedia computers in the library. The computers in the new school are networked in an Intranet. Internet access is also available. In the old school building, which still has 33 classrooms in use, there are three computer labs and one modem Internet connection. Each classroom has at least one stand alone computer.

The school's computers are of various ages and capabilities. For example, the gifted and talented teacher has four multimedia computers, a scanner and a digital camera while five other teachers have two computers in their classrooms. The primary software applications are Windows '95, Microsoft Internet Explorer 4.0, Lotus SmartSuite97, and the School Vista management system. The School Vista Management System has many capabilities, which the school is just learning, including creating student rosters, folders for lesson plans and student work, and an Intranet communication system.

The principal has required teachers to work with the computer lab manager to integrate the computer into their lessons, and to stay with their students during computer class. In addition, to create learning opportunities between high school students and elementary school students, student mentors from the high school work with younger students in the elementary school lab.

Another technology innovation at the school is involvement with the Reading Renaissance Accelerated Reader program. Teachers learn reading strategies and integrate them into the bilingual learning environment. The program emphasizes a schoolwide reward system for reading books from a large group of selected titles. Students take computerized tests on the books they read. The school began working with Accelerated Reader in 1996 and became the nation's first bilingual Reading Renaissance Model School in 1997.

In an effort to encourage parents to be comfortable with technology, the school has begun lending Apple IIE computers to parents. Parents are trained to use the computer, then are loaned a computer for a minimum of two weeks to use in their homes.

Finally, during the 1997-1998 school year, teachers and students from the school participated in computer training sessions at the district's partner university's Multimedia Teaching and Learning Center. NASA selected this university as one of

seven Network Resource and Training Sites, whose purpose is to increase the use of Internet resources.

Technology goals and concerns. The district's technology plan lists six broad goals, which are stated for students, staff, and community members:

1. To experience "educational and cultural opportunities."

2. To "challenge their abilities," thereby helping to develop higher order thinking skills.

3. To "develop marketable skills" that lead to career opportunities.

4. To "develop self-directed learning skills" that support lifelong learning.

5. To increase teachers' knowledge about the use of technology "as an instrumental tool."

6. To increase parents' and community members' knowledge "about technology and its role in education and society."

The school's campus improvement plan does not list technology use as a separate goal. Rather, for each of its instruction-related goals — which focus on TAAS scores, curriculum and instruction, and dual language use — technology use is included as a strategy for supporting student learning and performance. Outcomes listed under technology use include expansion of computer availability and use, Internet access, availability of monolingual and bilingual software, availability of software and multimedia materials to support specific subject areas, and training in the evaluation of educational software.

Table 18: Grade Levels Taught

Grade Level	Teachers
Kindergarten	2
Grade 1	6
Grade 2	7
Grade 3	5
Grade 4	1
Grade 5	2
Grade 6	1
Special Education*	2
Total	26

** Teach all grades*

Project participants

A total of 28 participants are included in the project, 26 are classroom teachers. (The remaining two participants are the computer lab manager and the district's lead teacher for technology.) Thirteen teachers are Hispanic and 15 are white. Twenty-four are female and four are male. Their teaching assignments are summarized in Table 18.

Over two-thirds of the faculty have been teaching for less than ten years; many are on second careers. Participants' teaching experience is presented in the following table.

Table 19: Years of Teaching Experience

Years of Teaching Experience	Participants
0-5	8
6-10	11
11-15	4
16-20	1
21+	4
Total	28

Participants' initial reactions. After the introductory session, some teachers expressed concern about the amount of time the project would require. They expressed these reservations to the lead teacher for technology for the district. The lead teacher for technology was also concerned that too much would be demanded of teachers in too short a time. She was familiar with technology professional development and was enthusiastic about the goals, requirements, duration, and research-based nature of the ATRL project.

Teacher self-assessment in technology

Upon selection of this site, participating ATRL teachers competed a technology skills self-assessment (See Appendix 4). The results of this self-assessment are shown in Table 20.

Table 20: Teacher Self-Assessment of Technology Skills

Skill	None	Low	Moderate	High	Total
General Skills	0	2	14	12	28
Word Processing	0	2	16	10	28
Spreadsheet	19	1	3	5	28
Database	22	4	0	2	28
Drawing	15	2	8	3	28
Presentation	20	3	4	1	28
World Wide Web	14	6	1	7	28
Email	16	5	5	2	28
Other Technology	18	4	6	0	28

All teachers appear familiar with general computer operations and with word processing. The former is most likely a result of their work with the Accelerated Reader program.

Aside from word processing, teachers are most familiar with the World Wide Web and drawing programs, with approximately half of participants reporting some level of familiarity. Unlike other project sites, however, the majority (64 percent) reported no familiarity with email.

Teachers expressed the least familiarity with presentation software (with only 29 percent reporting some level of familiarity) and with database software (only 21 percent expressed some degree of familiarity).

Table 21: Observation of Classroom Practices

Constructivist Learning Environment	none to low	moderate	high
high	0	0	1
moderate	16	3	0
none to low	6	1	0

Technology Use

Observation of classroom practices

Twenty-seven participants were observed teaching for approximately forty minutes at the start of the project. (The computer lab manager was not observed with students.) Observations were recorded, entered into an electronic database and results cross-tabulated (A copy of the observation protocol is attached to this report as Appendix 5). Most of the teachers at this school used more than one instructional method; some methods were teacher centered, and some learner-centered.

In general, no classroom was organized with a learning stations approach to instruction. In the majority of classrooms, students were seated in small groups of four to six, either at tables or at grouped desks. A few teachers had students seated in two or three horizontal rows with desks touching. In two classrooms, the desks were organized in separate rows with spaces between student desks on all sides.

Although all of the teachers observed have computers in their classrooms, students were observed using computers in five of the twenty-seven classrooms.

Low CLE and Low Technology. Six classrooms were identified as low CLE and low technology. The teachers in this category led the class through a lesson, step by step. There was little evidence of constructivist strategies in their instruction. Teachers offered assistance to students with questions, and there was little or no teacher-supported interaction among students. Traditional resources such as textbooks, worksheets, teacher or professionally made charts, and the chalkboard were used in these classrooms. Although each classroom had at least one computer, none of the computers were being used during the observations. Four of the six teachers taught first grade, and two of those teachers were first year teachers.

Moderate CLE and Low Technology. Sixteen classrooms were identified as moderate CLE and low technology. In eight of these classrooms, students participated in a teacher-led discussion or individual desk work. In one of the classrooms, students worked individually, while the teacher walked around the room and responded to questions. In six of the classrooms, students worked collaboratively in groups or

assisted each other for less than half of the observation time, while the rest of the time was either teacher-led, or individual work. In only one of the classrooms were students working collaboratively in groups for the entire observation time. Overall, students were on-task and involved in their work. Generally, teachers offered more in- depth questioning of student prior knowledge, understanding and opinion, than in a low CLE classroom. Teachers provided a greater variety of resources such as manipulatives, magazines, a tape player, student journals and writing, and literature books. Although each classroom had at least one computer, none of the computers were being used at the time of the observation.

Low CLE and Moderate Technology. One classroom was identified as low CLE, moderate technology. In this first grade classroom, the teacher introduced a math worksheet which the students completed individually. Four students at a time rotated through the four computers to practice typing their name and password from a teacher-created index card.

Moderate CLE and Moderate Technology. Three classrooms were identified as moderate CLE and moderate technology. These classrooms were more learner-centered, with the teacher in the role of facilitator or working with small groups of students. Students worked individually with student-selected books, student journals or manipulatives. In two of the classrooms, the computer was used for taking Accelerated Reader tests, and in one of the classrooms, pairs of students worked at the four computers, exploring the features and clip art of a new software program, FreeLance Graphics.

High CLE and High Technology. One classroom was identified as high CLE and high technology. This instructional method was employed by the district's lead teacher for technology who was working with a group of seven high school students, on an introduction to the Internet as an information source. The lesson began with an introductory discussion in which students' prior experiences and knowledge were shared as they discussed their experience or —lack thereof— with the Internet. Students then worked alone or in pairs to find and analyze resources on the Internet. While reviewing web pages, students discussed what they found and the ways in which the electronic medium of the Internet differed from the print media with which they were familiar. Opportunities for active exploration and reflection were the focus of this lesson.

State of the Site: Texas Urban Site

This site, the second in Texas, is a newly opened elementary school in a relatively affluent, urban school district. The school's principal was a major factor in this site's selection as an ATRL project site. In her previous position, she established an elementary school technology program that was designated as exemplary by the state's Academic Excellence Indicator System, and sought to replicate this learner-centered, technology-rich learning environment in the new school by creating an instructional planning team.

This planning team, which included SEDL staff, prepared a learner-centered, technology-rich, interdisciplinary instructional plan, which called for horizontal and vertical teacher teaming, and other strategies. These strategies create teacher-teams that have responsibility for coordinating a student's educational program throughout his/her years at the school.

The community and environs

This school is located in a growing section of a central Texas city. The metropolitan area's population is over one million. According to the *American City Business Journal* [*], the city is one of the fastest growing in the United States. *Fortune* recently called it the best city for business in 1998. More than 825 high-tech firms are in operation in the city.

The 1990 Census reports a population of nearly 500,000, 71 percent of which is white, 23 percent Hispanic, and 12 percent black. Sixteen percent of the households speak Spanish as their first language. Median household income for the city is approximately $25,000 and 5 percent of the households receive public assistance.

The school is located near a major interstate highway, with open fields on three sides and housing on one. The area around the school is growing, as evidenced by the construction of new apartments and single-family homes. Although the school is in a newly developed area, an established mobile home park lies within the boundaries of the school attendance area. Children who attend the school are from primarily low-income families.

State support for technology

Three state agencies in Texas are involved in the area of technology and education. The first is the Texas Education Agency, which has developed a long-range plan for technology and a new set of state curriculum standards. Beginning in September 1992, all school districts in the state began receiving a technology allotment (currently $30 per student) for the purchase of technology equipment, materials, or training in support of the goals of the state's long-range plan. The new state education curriculum standards were adopted in September 1998. They establish expectations for technology proficiencies by students in kindergarten through grade 12, including computer-related skills for each high school graduate by the year 2000.

Another source of state funding for technology is the Telecommunications Infrastructure Fund (TIF), created in 1995 through legislation requiring telecommunications companies to contribute to school technology. The funds were targeted to pay for wiring, networked connections to the Internet, and for classroom computers. Public schools applied for the non-competitive funding. Four elementary schools in the district received awards in the fall of 1998.

[*] April, 1995 issue

District overview

For the 1997-1998 school year, this urban school district had a total of 76,606 students: 18,675 students in 11 high schools, 15,715 students in 15 middle and junior high schools, 41,740 students in 68 elementary schools, and 476 students on four special campuses. The district's student population is diverse: 43 percent of students are Hispanic, 37 percent white, and 18 percent black. Just over 2 percent of students are Asian, and .3 percent are American Indian. Half of the district's students are classified as economically disadvantaged; 12.6 percent have limited English proficiency. Thirty-six percent of students are college bound.

Description of school site

Facilities. The new school opened its doors in August 1998. The facility has 69,950 square feet of space and was built at a cost of almost $6 million. There are 32 rooms for classroom teachers, an art room, a music room, a gymnasium, two special education classrooms, a library, a teacher workroom, a cafeteria and kitchen, and additional office and meeting space. The school is designed so that the gym, cafeteria, library and reception area are in the center of the building, with the classrooms organized into four separate halls which span out from two sides of the center. This design allows for further expansion if necessary. Each hall currently accommodates approximately 125 Pre-K through fifth grade students and their vertical team of teachers, thus creating smaller "schools-within-a school."

Administration. There are five administrators on the campus with extensive experience in education. Four of them are white females. The campus technology coordinator is a white male, who was an elementary school classroom teacher for 13 years. The principal worked with the assistant principal at her previous campus. The school's project coordinator is employed through grant funding; her responsibilities are coordinating the planning, development, and implementation of the curricular thematic units, writing additional grants, and working with teachers in developing constructivist, technology-rich learning environments. She serves as co-developer for the ATRL project and worked with the principal at her previous campus. The fourth female administrator is the school counselor.

Teachers. The district required that 50 percent of the teachers for the new school come from the two relief schools[10] of the district. Ninety teachers from 39 schools throughout the district requested a transfer to the new school. After an extensive interview process, created with the assistance of the planning team and SEDL staff, 24 classroom teachers, three special area teachers, three resource specialists, one librarian, and four administrators were hired to begin the new school year.

Student body.[11] The site school serves 510 students. Forty-two percent are black, 40 percent are Hispanic and the remainder is 18 percent white or comprised of other races.

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[10] Relief schools are schools who lose students to the new school.

[11] Because the school first opened in August, 1998, no 1997-1998 Quality Education Data (QED) exists for the school.

Eighty-five percent of students are economically disadvantaged, 20 percent have limited English proficiency and the mobility rate is 40 percent.

Technology resources. Technology was introduced into district schools in the 1980s. The district's focus for technology is currently changing, with a move away from computer labs toward the placement of multiple computers in each classroom. Nine percent of a successful 1996 school bond program is dedicated to implementation of the district's technology plan. A fiber optic backbone is to be installed in all schools, and all classrooms will be networked so students can use the Internet.

The district's instructional technology division includes three technology facilitators who work with schools to develop competencies, train teachers, and visit classrooms. In addition, teachers receive training at the district's professional development academy on specific software applications. Other divisions under the supervision of the director of technology are networking, computer repair and the help desk.

To create technology-capable staff in each school, the district has established two technology leadership teams composed of classroom teachers: the District Technology Leadership Team and the Campus Technology Leadership Team. Teachers on these teams receive specialized technology training, serve as support personnel on their campus, write instructional units that incorporate technology and receive four multimedia computers for their classrooms. There are eight classroom teachers at the site school who have that training and computer equipment.

The school has an up-to-date technology infrastructure with at least one new, networked, multimedia computer with direct Internet access in every classroom and office. Seven classrooms have four new multimedia computers each, all with Internet access. There are five computers in the library. The school was designed without a computer lab to facilitate integration of technology into daily instruction in each classroom. A phase-in of four networked computers per classroom is in progress. In addition to computers, each teacher has a telephone with voice mail.

The computers are Macintosh G3s with Mac OS 8.1. Software includes ClarisWorks, HyperStudio, KidPix Studio Deluxe, Netscape, Eudora, Story Book Weaver, Filemaker Pro, and JumpStart. In addition, the school maintains copies of Microsoft Office, Adobe PhotoShop, Adobe Illustrator, Adobe Photo Deluxe, and OmniPage Pro. Teachers and students also have the use of eleven laser printers, nine color printers, and two scanners.

Technology goals and concerns. The district's technology plan has as its goal that students, staff, and administration will "use technology in a pervasive approach to maximize learning and productivity, encourage creative exploration, and manage the educational environment by establishing interactive, flexible, efficient technology environments." Specific program goals for the site school include the following:

1. Students will use technology "to achieve mastery of the district curriculum in all content areas."

2. Students will "have adequate access to current, appropriate technology tools," including word processors, databases, spreadsheets, multimedia creation tools, and telecommunications.

3. Students will "use technology effectively for accessing and acquiring information, organizing and synthesizing information, creating, presenting, and publishing."

4. Students will "access the most current information from resources around the world."

Project participants

The principal informed teachers during the hiring process that they would be required to participate in the ATRL project. There are 31 participants, including all of the teachers, the resource specialists and the librarian. Of these participants, 20 are white, six are Hispanic, and five are black. Twenty-six are female and five are male.

Table 22: Grade Levels Taught

Grade Level	Teachers
Pre-kindergarten	2
Kindergarten	4
Grade 1	4
Grade 2	4
Grade 3	4
Grade 4	4
Grade 5	2
Art*	1
Library	1
Music*	1
Physical Education*	1
Reading Recovery*	1
Special Education*	2
Total	31

*Teach all grades

The district provides specialized technology training and four computers in a classroom for teachers who receive that training. The classroom grade level teachers are listed in Table 22.

Approximately one-third of the teachers have five or less years of teaching experience, and two-thirds of the faculty have been teaching for ten years or less. Teaching experience among the participants is presented in Table 23.

Table 23: Years of Teaching Experience

Years of Teaching Experience	Participants
0-5	11
6-10	9
11-15	5
16-20	2
21+	5
Total	31

Participants' initial reactions. When teachers were hired to work in the new school, they knew that they were committed to participate in the ATRL project. In the project's

introductory session, teachers expressed excitement about the opportunities the project could provide for them and their students. A few teachers stated that they were impressed that their school was one of thousands of schools in Texas selected to be part of the project. Teachers were energetic and positive, eager to be part of an exciting new learning environment.

Teacher self-assessment in technology

Upon selection of this site, participating ATRL te[illegible] competed a technology skills self-assessment (See Appendix 4). The results of th[illegible] self-assessment are shown in Table 24.

Table 24: Teacher Self Assessment of Technology Skills

Skill	None	Low	Moderate	High	Total
General Skills	0	2	10	19	31
Word Processing	0	4	8	19	31
Spreadsheet	8	5	14	4	31
Database	24	1	0	6	31
Drawing	8	3	8	12	31
Presentation	19	5	4	3	31
World Wide Web	11	3	9	8	31
Email	5	13	9	4	31
Other Technology	16	12	1	2	31

All teachers have general computer and word-processing skills. Beyond this, the main area of competency is email with 84 percent of teachers reporting some familiarity with the application. Teachers also appear to be most familiar with spreadsheets (74 percent), drawing programs (74 percent) and the World Wide Web (65 percent). As with other schools in the ATRL project, few were familiar with database software (23 percent) or presentation software (39 percent).

Table 25: Observation of Classroom Practices

Constructivist Learning Environment	none to low	moderate	high
high	0	0	1
moderate	19	6	0
none to low	3	1	0

Technology Use

Observation of classroom practices

In the project's initial observation, 30 participants were observed teaching for approximately 40 minutes. (The librarian was not observed with students.) Observations were recorded, entered into an electronic database and results cross-tabulated (A copy of the observation protocol is attached to this report as Appendix 5).

Most of the teachers at this school used more than one instructional method; some methods were

teacher-centered, some learner-centered.

Low CLE and Low Technology. Three classrooms were identified as low CLE and low technology. The teachers in this category worked with the whole class as a group. There was little evidence of constructivist strategies in their instruction. Students responded to teacher-directed questions, with little or no teacher-supported interaction among students. Traditional resources such as textbooks, worksheets, paper and pencil, the overhead projector and the chalkboard were used. Although each classroom had at least one computer, none of the computers were being used at the time of the observation.

Moderate CLE and Low Technology. Nineteen classrooms were identified as belonging to this category. For part of the observed period, some teachers in this category led the whole class through the same activity at the same time. Traditional resources such as textbooks, worksheets, paper and pencil, the overhead projector and the chalkboard were used. Generally, teachers offered more in-depth questioning of students' prior knowledge, understanding and opinion, than in a low CLE classroom. In some of the classrooms, students worked in small groups. In three of the classrooms, students were physically active through use of music, physical education and action vocabulary practice.

In additional classrooms in this category, the whole class worked on the same activity at the same time, using hands-on materials, while each student created her or his own product. Resources such as paint and paintbrushes, poster board and construction paper were used. In the last two classrooms in this category, students worked on small group, hands-on activities, while the teacher served as facilitator. In one of these, groups of students created a paper maché globe; in another, pairs of students conducted an experiment. Although each classroom had at least one computer, none of the computers were being used at the time of the observation.

Low CLE and Moderate Technology. One classroom was identified as low CLE and moderate technology. This was a special education resource classroom, with three students engaged in different activities at different times, but with the teacher directing activity using traditional teaching methods. One student used one of the two classroom computers for a drill and practice game.

Moderate CLE and Moderate Technology. Six classrooms were identified in this category. Three of these classrooms were organized around learning centers, with the computers serving as one of the learning centers. In each of the learning center environments, students were collaboratively engaged in a number of activities, with the teacher working with a small group of students. Students were engaged either individually or in small groups in a variety of activities. Students rotated through activities as time permitted. These three classrooms were kindergarten or first grade classrooms.

The other three classrooms involved a variety of instructional methods, including class discussion, student writing, spelling practice using action, student reading and responding to questions, math practice with manipulatives, and teacher lecture. Students moved fairly easily from whole class, teacher-led activities, to small group or

individual work. Some discussion about cooperation and appropriate behavior was held in each classroom. The computer was available as students finished their work or as an extra activity, unrelated to the current content of the class.

High CLE and High Technology. Only one classroom was identified as both high CLE and high technology. The classroom was organized around learning centers with four computers serving as one of the learning centers. Students were engaged either individually or in small groups in a variety of activities. Each group of students rotated through activities automatically, with no prompting from the teacher who acted as a guide, working with one group of students on their English-language reading. Within a 40 minute time span, students engaged with a plethora of learning materials: computers, chalk and chalk board, a felt board and felt letters, Spanish-language audio tapes and books, crayons and paper, and English-language books. The level of student autonomy and engagement was so high that the teacher did not address the class as a whole during the time she was observed.

Appendix 1

LETTER OF UNDERSTANDING

Between

ATRL District

and

Southwest Educational Development Laboratory

Concerning the *Applying Technology to Restructuring and Learning* Project

Spring 1998

This letter of understanding delineates the terms under which Southwest Educational Development Laboratory (SEDL) and ATRL District will work together to develop and document replicable models of constructivist learning environments supported by technology. For the purposes of this project, technology is defined as computers, whether alone or in combination with other hardware, software, or networks.

1. Under this agreement, ATRL District agrees that:

   1.1 the District administrators will work with SEDL staff to support the creation of technology-rich classrooms and to support teachers as they employ instructional approaches consistent with constructivist learning theory;
   1.2 ATRL Project School will have technology in place prior to August 1, 1998;
   1.3 the District will make a financial commitment for ongoing support and maintenance of the technology in the form of an on-site technology coordinator or contracts with a local service provider (SEDL's experience has demonstrated that teachers quickly lose interest in using technology if there is no on-site support for correcting technical problems in a timely manner);
   1.4 ATRL Project School will have twenty-five teachers on staff who signify their agreement to all conditions of this project as explained in the teacher letter of intent;
   1.5 the District will identify a staff member to serve as a "master trainer" at the school or in the District who will work with SEDL staff as a co-developer (SEDL anticipates that by being engaged throughout the development process, these "master trainers" will become additional resources at their schools and in their Districts to provide this training beyond the site schools); and
   1.6 the District will provide three days per academic year of teacher release time for SEDL to conduct staff development sessions. (At the choice of the District, the release time may be during regularly scheduled staff development days already in the school's calendar, on days when the District pays substitutes to release the teachers, or on days when the District pays stipends to the teachers).

2. Under this agreement, SEDL's *Applying Technology to Restructuring and Learning* project will provide:

   2.1 technical assistance to support technology planning, including analysis of current plans and creation of a plan for staff development (as required by the school technology planning team, up to three days on-site per academic year);

Appendix 1

2.2 six full days of on-site staff development and six on-site visits for follow-up assistance per academic year, combined with on-going, on-line support for the 25 teachers who have signed letters of intent with SEDL;

2.3 assistance in selecting and using technologies appropriate for the creation of technology-rich, engaging learning environments for the 25 teachers who have signed letters of intent with SEDL;

2.4 stipends, in the amount of $50.00 per day per teacher to attend three SEDL-conducted staff development days for the 25 teachers who have signed letters of intent with SEDL (these days are outside the days teachers normally receive salary from the District, for example, on Saturdays, during the summer, or during other times when school is not in session);

2.5 linkages to other professional development resources, infrastructure resources, and resources related to new technologies and constructivist approaches to teaching; and

2.6 reports of classroom observations and interviews conducted during site visits at the beginning and near the end of each school year to document possible changes in the classroom environment.

Staff Development Schedule

	1998-1999	1999-2000	**Total Over Two Years**
Number of staff development days for which SEDL provides stipends	3	3	**6**
Number of staff development days supported by District funds	3	3	**6**
Total staff development days per year	6	6	**12**

Although the District and SEDL will each fund teacher time, SEDL staff will conduct all staff development sessions.

3. It is understood that ATRL District and participating teachers have agreed that information collected during the project about the District teachers' practices and their classrooms may be used in any reports or other documentation of this project, provided that no teacher, classroom, or school will be individually identifiable except with the expressed, written permission of the District, school, and teacher.

4. It is further understood that this constitutes the entire agreement with SEDL pertaining to participation in this project and no other agreement or compensation is expressed, intended, or implied.

Superintendent ATRL District	Wesley A. Hoover President and CEO Southwest Educational Development Laboratory
Date	Date

Appendix 2

LETTER OF UNDERSTANDING

Between

ATRL Project School

and

Southwest Educational Development Laboratory

Concerning the *Applying Technology to Restructuring and Learning* Project

Spring 1998

This letter of understanding delineates the terms under which Southwest Educational Development Laboratory's (SEDL's) Technology Assistance Program (TAP) and ATRL Project School will work together to develop and document replicable models of constructivist learning environments supported by technology. For the purposes of this project, technology is defined as computers, whether alone or in combination with other hardware, software, or networks.

I understand that ATRL Project School will:

- allow the participation of twenty-five teachers on staff who signify their agreement to all conditions of this project as explained in the teacher letter of intent;
- work with SEDL/TAP staff and with participating teachers to support the creation of technology-rich classrooms and to support teachers as they employ instructional approaches consistent with const ictivist learning theory;
- have technology in place prior to August 1, 1998;
- in collaboration with the District, provide for ongoing support and maintenance of the technology in the form of an on-site technology coordinator or contracts with a local service provider (SEDL's experience has demonstrated that teachers quickly lose interest in using technology if there is no on-site support for correcting technical problems in a timely manner);
- in collaboration with the District, designate a staff member to serve as a "master trainer" at the school or in the District who will work with SEDL/TAP staff as a co-developer (SEDL anticipates that by being engaged throughout the development process, these "master trainers" will become additional resources at their schools and in their districts to provide this training beyond the site schools);
- permit SEDL/TAP staff to conduct interviews and in-class observations of the 25 participating teachers;
- provide or secure space for staff development which is equipped with computers to be used by teachers; and
- allow three days of teacher release time per academic year for SEDL/TAP to conduct staff development sessions. (At the choice of the District, the District will provide release time during regularly scheduled staff development days already in the school's calendar, on days when the District pays substitutes to release the teachers, or on days when the District pays stipends to the teachers).

Appendix 2

I understand that SEDL/TAP staff will:

- synthesize the research on constructivist learning environments and the role of technology in supporting such learning and provide this information to participating teachers;
- provide three days per calendar year (with a stipend of $50.00 per day) of on-site staff development sessions of six hours in duration on Saturdays or other times teachers are not on salary;
- work with a team of local professionals to provide additional staff development, technical support, mentoring, and coaching to participating teachers;
- identify a local school or classroom using technology-supported constructivist methods to serve as an exemplar site to participating teachers;
- furnish on-site and on-line follow-up guidance to assist participating teachers in integrating technology in the classroom as a tool for teaching and learning;
- assist participating teachers in selecting and using technologies appropriate for the creation of technology-rich constructivist learning environments;
- link participating teachers with new technologies and constructivist approaches to teaching;
- conduct classroom observations and interviews with participating teachers during site visits at least two times per academic year to document changes in the classroom environment; and
- document the processes and outcomes of this project to provide a model that can be used by other schools.

Staff Development Schedule

	1998-1999	**1999-2000**	**Total Over Two Years**
Number of staff development days for which SEDL/TAP provides stipends	3	3	**6**
Number of staff development days supported by District funds	3	3	**6**
Total staff development days per year	6	6	**12**

Although the District and SEDL will each fund teacher time, SEDL/TAP staff will conduct all staff development sessions.

It is understood that ATRL Project School administrators and participating teachers have agreed that information collected during the project about the District, teachers' practices and their classrooms may be used in any reports or other documentation of this project, provided that no teacher, classroom, or school will be individually identifiable except with the expressed, written permission of the District, school, and teacher.

It is further understood that this constitutes the entire agreement with SEDL pertaining to participation in this project and no other agreement or compensation is expressed, intended, or implied.

Principal, ATRL Project School	K. Victoria Dimock Program Manager, TAP
Date	Date

Appendix 3

LETTER OF INTENT

Between

ATRL Project School Faculty

and

Southwest Educational Development Laboratory

Concerning the *Applying Technology to Restructuring and Learning* Project

Spring 1998

This letter of intent signifies my agreement to participate with Southwest Educational Development Laboratory's (SEDL's) Technology Assistance Program (TAP) in the *Applying Technology to Restructuring and Learning* project, which aims to integrate technology into a constructivist learning environment. My participation will begin in August 1998 and end in June 2000. By committing to participate in the project, I agree that I will:

- make a good faith effort to attend and participate in all staff development sessions for the duration of this project, the dates and times for which will be set after discussion between staff of ATRL Project School and SEDL/TAP (I understand that these sessions will be six hours in length and occur on Saturdays or at other times I am not on salary at my school);
- assist SEDL/TAP in formulating specific objectives and strategies for the work in ATRL Project School in order to meet the goal of creating a constructivist learning environment supported by technology;
- communicate to SEDL/TAP staff the types of staff development I feel are necessary for my classroom and actively work with SEDL/TAP staff in planning for this staff development;
- make a good faith effort to integrate into my classroom, with my students, the skills and strategies learned in these staff development sessions;
- engage in dialogue and give progress feedback to SEDL/TAP staff on a regular basis through e-mail, phone conversations, in face-to-face meetings, and/or in a written journal;
- agree to interviews and classroom observations by SEDL/TAP at least two times per year;
- share with SEDL/TAP and other project participants a minimum of one curricular unit per year that I have developed as a result of these staff development sessions; and
- serve as a resource to educators at my school and to other teachers participating in this project.

I further agree that information collected during this project about me and my classroom and practices may be used in any reports or other documentation of this project, provided that neither I nor my classroom is identifiable, except with my expressed, written permission.

Appendix 3

I understand that SEDL/TAP staff will:

- synthesize the research on constructivist learning environments and the role of technology in supporting such learning and provide this information to me;
- provide three days per calendar year of on-site staff development sessions of six hours in duration on Saturdays or other times I am not on salary with my school, with a stipend to me of $50.00 per day;
- work with a team of local professionals to provide additional staff development, technical support, mentoring, and coaching;
- identify a local school or classroom using technology-supported constructivist methods to serve as an exemplar site;
- furnish on-site and on-line follow-up guidance to assist me in integrating technology in the classroom as a tool for teaching and learning;
- assist me in selecting and using technologies appropriate for the creation of technology-rich constructivist learning environments;
- link me to other professional development resources, infrastructure resources, and resources related to new technologies and constructivist approaches to teaching;
- conduct classroom observations and teacher interviews during site visits at least two times per academic year to document changes in the classroom environment; and
- document the processes and outcomes of this project to provide a replicable model that can be used by other schools.

I further understand that this constitutes the entire agreement with SEDL pertaining to my participation in this project and no other agreement or compensation is expressed, intended, or implied.

Signature Teacher, ATRL Project School	K. Victoria Dimock Program Manager, TAP
Date	Date

Appendix 4

Computer Skills Checklist

The following list of computer skills is intended to provide us with a better understanding of your familiarity with certain types of applications. Please read through the following list and check whether you have **No Experience**, **Some Experience**, or are **Experienced** with the following skills. Please check **Want To Learn** if you want to learn this particular skill. In the section marked **Other**, please list the skills you may have but that are not listed here, for that particular application. Do not be discouraged if you're not familiar with many of the skills listed here. We have included a large number of skills in order to address a large variety of skills.

General Computer Skills. Indicate which experience level applies to you				
	None	**Some**	**Experienced**	**I want to learn**
1. Turn the computer on / off				
2. Turn the monitor on / off				
3. Use the mouse				
4. Format / initialize a floppy disk				
5. Create folders / directories				
6. Copy files from one directory / folder to another				
7. Move files from one directory / folder to another				
8. Move between programs / applications				
9. Delete files				
10. Empty trash / recycle bin				
11. Launch an application				
12. Open new / existing documents				
13. Use the **Help** function				
14. Save documents				
15. Print documents				
16. Work on a PC				
17. Work on a Mac				
18. Other skills:				
19. Have you ever used computers in your classes?				
20. Would you be willing to teach any of these skills to your colleagues?				

Appendix 4

Word Processing (e.g., Claris Works, Word). Indicate which experience level applies to you				
	None	**Some**	**Experienced**	**I want to learn**
1. Enter text using the keyboard				
2. Highlight certain text				
3. Copy / cut and paste text				
4. Format text (e.g. use different fonts, change spacing of a paragraph, etc.)				
5. Change the size of your text				
6. Change the style of your text				
7. Check the spelling in a document				
8. Find and replace text				
9. Change the alignment of text				
10. Use tabs to create columns				
11. Insert graphics into a text				
12. With what word processing software are you familiar?				
13. Other word processing skills:				
14. Have you ever used word processing in your classes?				
15. Would you be willing to teach word processing skills to your colleagues?				

Appendix 4

Spreadsheet (e.g., Lotus 123, Excel). Indicate which experience level applies to you				
	None	**Some**	**Experienced**	**I want to learn**
1. Perform calculations in a spreadsheet				
2. Use the formula bar				
3. Display spreadsheet data in graphs				
4. Sort data				
5. Insert rows / cells / columns				
6. Delete rows / cells / columns				
7. Link one spreadsheet to another				
8. Format spreadsheet				
9. Copy spreadsheet data into a word processing document				
10. With what spreadsheet programs are you familiar?				
11. Other spreadsheet skills:				
12. Have you ever used spreadsheets in your classes?				
13. Would you be willing to teach spreadsheet skills to your colleagues?				

Appendix 4

Database (e.g., FileMaker Pro, Access). Indicate which experience level applies to you				
	None	**Some**	**Experienced**	**I want to learn**
1. Set up a new database				
2. Define / create fields				
3. Add fields to your database				
4. Delete fields from your database				
5. Modify fields in your database				
6. Enter information into records				
7. Add records to your database				
8. Delete records from your database				
9. Modify records in your database				
10. Use formulas to perform calculations				
11. Cut / copy and paste data				
12. Sort data				
13. Create reports from data				
14. Query / select records				
15. With which database programs are you familiar?				
16. Other database skills:				
17. Have you ever used databases in your classes?				
18. Would you be willing to teach database skills to your colleagues?				

Appendix 4

Drawing Program (e.g., Paint, Illustrator). Indicate which experience level applies to you				
	None	**Some**	**Experienced**	**I want to learn**
1. Use the tools to create shapes				
2. Move shapes				
3. Cut / copy and paste shapes				
4. Color shapes				
5. Resize shapes				
6. Add text to your drawing				
7. Format the text				
8. Insert graphics				
9. Copy drawings into a word processing document				
10. With which drawing programs are you familiar?				
11. Other drawing program skills:				
12. Have you ever used drawing programs in your classes?				
13. Would you be willing to teach drawing program skills to your colleagues?				

Appendix 4

Presentation Programs / Hypertext (e.g., PowerPoint, HyperStudio). Indicate which experience level applies to you				
	None	**Some**	**Experienced**	**I want to learn**
1. Outline concepts				
2. Insert graphics				
3. Cut / copy and paste text				
4. Create hypertext links				
5. Move text and graphics				
6. Move between views				
7. Import information from spreadsheets / word processing documents				
8. Display information as a presentation				
9. Change the sequence of slides				
10. With which presentation / hypertext programs are you familiar?				
11. Other presentation / hypertext program skills:				
12. Have you ever used presentation / hypertext programs in your classes?				
13. Would you be willing to teach presentation / hypertext program skills to your colleagues?				

Appendix 4

World Wide Web (e.g., Internet Explorer, Netscape Navigator). Indicate which experience level applies to you				
	None	**Some**	**Experienced**	**I want to learn**
1. Go to a specific site by typing a URL				
2. Navigate the web by links				
3. Use **Backwards, Forwards, Go**				
4. Create bookmarks for important sites				
5. Copy or save text from a web page				
6. Copy or save graphics from a web page				
7. Use a search engine				
8. Create web pages				
9. With which web editors / web browsers are you familiar?				
10. Other web editor / web browsing skills:				
11. Have you ever used WWW / web editors in your classes?				
12. Would you be willing to teach used WWW / web editor skills to your colleagues?				

Appendix 4

E-mail (e.g. Eudora, Pegasus). Indicate which experience level applies to you.				
	None	**Some**	**Experienced**	**I want to learn**
1. Send and receive e-mail				
2. Attach documents to outgoing e-mail				
3. Subscribe / unsubscribe from a list				
4. With which e-mail programs are you familiar?				
5. Other e-mail skills:				
6. Have you ever used e-mail in your classes?				
7. Would you be willing to teach e-mail skills to your colleagues?				

Other Applications (e.g., PhotoShop, Accelerated Reader).
1. Please list any other types of software with which you are familiar.
2. Have you ever used these applications in your classes?
3. Would you be willing to teach these skills to your colleagues?

Other Technology Skills (e.g. network administration, programming) Indicate which experience level applies to you.				
	None	**Some**	**Experienced**	**I want to learn**
1. Use a digital camera				
2. Use digital video				
3. Use an LCD panel / projector				
4. Use the TV as a projection device				
5. Use laser discs				
6. Use a scanner				
7. Other technology skills:				
8. Have you ever used any of these in your classes?				
9. Would you be willing to teach these skills to your colleagues?				

Appendix 5

G5 - Classroom Observation Protocol

Teacher _____ **School** _____

Class/Grade _____ **Date Observed** _____ **Time** _____ **Observer** _____

Classroom Demographics

Total number of students: _____ Gender of teacher: _____

Ethnicity of students: _____ Ethnicity of teacher: _____

Gender of students: _____ Other pertinent demographics: _____

Classroom Environment

Overall appearance: _____

Seating arrangement: _____

Classroom space: _____

Distracters barriers: _____

Major content area of the lesson or activity

☐ Math ☐ Science ☐ Social Studies ☐ Language Arts ☐ Other

Instruction

What is the intended purpose of this lesson or activity? For example: Identifying prior student knowledge, introducing new concepts, developing conceptual understanding, reviewing concepts, developing problem solving skills, learning processes or procedures, learning isolated facts, developing core ideas, developing student awareness, assessing student achievement.

Appendix 5

What classroom resources are being used?

For example: Print materials, hands-on manipulative materials/models/tools technology audio-visual resources

Describe the major way (s) this lesson was structured.

For example: whole group (entire class together), small groups, pairs, individuals

Indicate the major way in which students engaged in activities.

For example, whole-class same activity, groups of students engaged in same activities at the same time, different groups - different activities

Describe the way the activity (activities) is are taking place.

For example Formal presentations by teacher, students presenting work orally, guest speaker, discussions seminars, whole group led by teacher, whole group led by student (s), groups pairs, role play, debate, game, fieldwork, building making things

Describe the purpose of the lesson activity-taking place.

For example: problem solving, data collection, practice, analysis, review, communication, developing skills, developing concepts.

Describe the use of technology resources.

For example To develop conceptual understanding, learn or practice a skill, collect data, analysis, create a presentation, reports, publishing, communication (e-mail, Internet, WWW)

Describe forms of assessment being used.

For example. Homework worksheet review, questioning for understanding, performance based, embedded in activity or project, paper test, oral test, portfolio, other

Appendix 5

Observation synthesis based on Constructivist principles

Teacher: _____ **School:** _____

Class/Grade: _____ **Date Observed:** _____ **Time:** _____ **Observer** _____

Descriptors for observation
Not evident at all
Minimal - may or may not be effective
Sometimes - may or may not be effective
Frequent - effective for learning
Regular practice - effective for learning.

Check one that applies

I. Learners bring unique prior knowledge, experience, and beliefs to a learning situation.

	Not evident	Minimal	Sometimes	Frequent	Regular Practice
1. This **session** is structured so students can interject relevant personal experiences and understandings.					
2. This **session** is framed so that problems are meaningful and relevant to students.					
3. The **teacher** elicits prior knowledge by encouraging the sharing of experiences.					
4. The **teacher** validates and shows mutual respect for all responses.					
5. The **teacher** inquires about student understanding of issues or concepts before offering his/her own understanding.					
6. The **teacher** nests instruction within relevant, meaningful and real-world context.					
7. The **student** draws upon previous knowledge/experiences to contribute to the learning activity and create new knowledge and understandings.					

II. Knowledge is constructed uniquely and individually, in multiple ways, through a variety of authentic tools, resources, experiences, and contexts.

1. This **session** is structured around complex or many-faceted themes.					
2. This **session** provides opportunity for interdisciplinary exploration.					
3. The **teacher** provides multiple ways of learning.					
4. The **teacher** provides opportunities for students to express ideas/experiences through electronic technologies.					
5. The **student** uses a variety of non-technology materials and tools for learning.					
6. The **student** uses raw data, primary resources, manipulative, or interactive materials requiring interpretation.					
7. The **student** uses technology to access information that is otherwise unavailable.					

Appendix 5

Descriptors for observation
Not evident at all
Minimal - may or may not be effective
Sometimes - may or may not be effective
Frequent - effective for learning
Regular practice - effective for learning.

III. Learning is both an active and reflective process.

	Check one that applies				
	Not evident	Minimal	Sometimes	Frequent	Regular practice
1. This **session** emphasizes the activity of the student rather than the activity of the teacher.					
2. The **teacher** stimulates thought and action through interesting, relevant, and authentic problems.					
3. The **student** becomes an explorer, problem-solver or active participant rather than a passive observer.					
4. The **student** reflects upon the task at hand through journaling, questions, or discussion.					

IV. Learning is a developmental process of accommodation, assimilation, or rejection to construct new conceptual structures, meaningful representations, or new mental models.

1. This **session** is part of a larger instructional activity that leads to multiple opportunities for learning.					
2. The **teacher** asks open-ended questions requiring multiple answers and development of multiple levels of thinking.					
3. The **teacher** seeks elaboration and exploration of students' understandings to elicit reflection.					
4. The **teacher** focuses on developing higher order thinking skills through problem solving and exploration activities.					
5. The **teacher** uses on-going assessment that is interwoven with (not discrete from) student learning.					
6. The **teacher** uses multiple ways to assess student product and process.					
7. The **student** recognizes and uses mistakes as valuable learning tools.					
8. The **student** shows evidence of understanding ideas and concepts.					

Appendix 5

Descriptors for observation
Not evident at all
Minimal - may or may not be effective
Sometimes - may or may not be effective
Frequent - effective for learning
Regular practice - effective for learning.

V. Social interaction introduces multiple perspectives through reflection, collaboration, negotiation, and shared meaning.

	Check one that applies				
	Not evident	Minimal	Sometimes	Frequent	Regular practice
1. This **session** provides opportunities for students to communicate with members of the larger community through letters, interviews, phone conversations, CMC, etc.					
2. This **session** provides opportunities for peer collaboration through discussion, project work and/or CMC.					
3. The **teacher** provides opportunities for collaborative / cooperative groupings or small group instruction.					
4. The **teacher** facilitates, models, and shares social and cognitive skills.					
5. The **teacher** established a positive rapport with individual students and with the class as a whole					
6. The **teacher** acts as a facilitator and/or co-learner (guide on the side).					
7. The **teacher** allows for students to collaborate with others during learning activities.					
8. **Students** are engaged in different activities at different times.					

VI. Learning is internally controlled and mediated by the learner.

1. This **session** provides opportunities for self-guided exploration.					
2. The **teacher** encourages student autonomy and initiative.					
3. **Students** raise questions for exploration or identify problems to be solved.					
4. **Students** design methods for answering questions or solving their own problems.					
5. **Students** help determine how their understanding will be demonstrated or assessed.					

Principles of Constructivism - TAP's working definition

1. Learners bring unique prior knowledge, experience, and beliefs to a learning situation.
2. Knowledge is constructed uniquely and individually, in multiple ways, through a variety of authentic tools, resources, experiences, and contexts.
3. Learning is both an active and reflective process.
4. Learning is a developmental process of accommodation, assimilation, or rejection to construct new conceptual structures, meaningful representations, or new mental models
5. Social interaction introduces multiple perspectives through reflection, collaboration, negotiation, and shared meaning.
6. Learning is internally controlled and mediated by the learner.